



Research • Service
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MCAS EL TORO
SSIC #5090.3

To: DoN

From: Subcommittee

re: Earth Tech/Radionuclides in Groundwater Report

The Subcommittee has had no vote for action and the comments below are part of the Subcommittee report. The Subcommittee considers Steve Dean's and Deidre Dement's responses to the Report to be of the most importance.

A recent article in Environmental Science and Technology regarding uranium sediments in an Ohio river stated that the natural ratio of U238 to U235 is given as 137.88. We have substantiated that number with several others who have express knowledge of this topic. Any statistically significant deviation from this ratio indicates that the uranium is either enriched or depleted.

Comment A. This is a clear, thorough, complete, and well-prepared Report. Yet, it is not without certain problems.

Comment B. Table 4-1 is the linchpin of this entire report. Based upon Table 4-1, a conclusion is presented that the Uranium found is of "Natural" not "Anthropogenic" or man made origin. This conclusion is stated in the paragraph above Table 4-1. However, other data in Table 3-1 tend to lead to the contrary conclusion that there is actually some anthropogenic contribution.

Comment C. In LD001 of Table 4-1, there are a series of NC's that can be calculated anyway (N.B. Table 3-1 does not have a "U" on the U235 result). If you do the calculation, the U235 proportion is 2.26% (cf. 0.7% for natural) and the ratio is 43.2 (cf. 137.88 for natural).

This is consistent with anthropogenic U.

Comment D. LD089, LD090, LD094 are omitted in Table 4-1, but raw data is in Table 3-1. In calculating the U235 proportions they are 1.42%, 1.45%, and 1.46% respectively. The ratios are 69.6, 68.0, and 67.6 respectively. Along with LD001, all the Site 1 samples express the highest levels of U235.

This is consistent with anthropogenic U in Site 1 groundwater samples.

Comment E. The LD010 location in Table 4-1 disagrees with the location in Table 3-1. It appears that Table 3-1 has the correct location.

*provided by Dr. Chuck Bennett at 5/31/00 RAB MEETING
EL TORO NB SUBCOMMITTEE
ACTION*

Comment F. LD019 from location 18-BGMW12-GW01S has one of the highest total uranium levels (in fact it slightly exceeds the MCL) and is the single sample most consistent with natural uranium isotopic ratios. This location has never been analyzed before for radionuclides, according to the June 1999 Proposed Groundwater Monitoring Program Report.

Comment G. A propagation of error treatment of the LD094 data indicates that the U235 proportion is 1.46% +/- 0.7%; thus, the deviation from 0.7% for natural U235 appears to be statistically significant.

This is consistent with anthropogenic U in Site 1 in a groundwater sample.

Comment H. Appendix D contains omissions in Well Sampling log data. While these log data for are present for 1MW201 (LD001), they are absent for 1MW203 & 1MW207 (LD089, LD090, LD094). These were the Site 1 locations with the highest proportions of U235.

Comment I. Of all 20 samples, all but four express U238/U235 ratios clearly below 137.88. Of the four higher (depleted) proportion: two were both of the Site 17 results, one was the control sample at 18BGMW12, and one was a 2NEW15 sample that was on the southern edge of the Site 2 landfill.

The other 16 results are consistent with anthropogenic U in groundwater samples.

Comment J. Page 1-1 of the Report refers (Jacobs 1993) to possible training exercises with low level radioactive materials, while in the Final HRA there is no mention made of this training exercise. Can we definitively rule out the use of enriched U in any training exercises at El Toro?

El Toro Groundwater Radionuclides Data
(Modified Table 4-1)

Site	bgs + notes	Location	U 234 pCi/L	U 235 pCi/L	U 238 pCi/L	U total	U 234 N U	U 235 N U	U 238 N U	U 234 %	U 235 %	U 238 %	U 238/234 pCi/l ratio	U 238/235 % ratio	natural 137.88
						Factor:	1.65e-10	1.24e-5	8.07e-5						
1	&	01 - MW201-GW01S	0.35	0.023	0.153	0.526	5.78e-11	2.86e-7	1.23e-5	0.0005%	2.26%	97.74%	0.44	43	enriched
1	*	01 - MW203-GW01S	0.86	0.071	0.74	1.671	1.42e-10	8.83e-7	5.97e-5	0.0002%	1.46%	98.54%	0.86	68	enriched
1	*	01 - MW207-GW01S	3.2	0.295	3.09	6.585	5.28e-10	3.67e-6	2.49e-4	0.0002%	1.45%	98.55%	0.97	68	enriched
1	*	01 - MW207-GW01S	3.02	0.274	2.94	6.234	4.98e-10	3.41e-6	2.37e-4	0.0002%	1.42%	98.58%	0.97	70	enriched
2	75	02 - UGMW25-GW01S	4.12	0.22	3.2	7.54	6.80e-10	2.74e-6	2.58e-4	0.0003%	1.05%	98.95%	0.78	94	enriched
2	100	02 - DGMW60-GW01S	25	1.32	19.5	45.82	4.13e-9	1.64e-5	1.57e-3	0.0003%	1.03%	98.97%	0.78	96	enriched
2	75	02 - UGMW25-GW01D	4.33	0.23	3.65	8.21	7.15e-10	2.86e-6	2.95e-4	0.0002%	0.96%	99.04%	0.84	103	enriched
2	95	02 - NEW02-GW01S	8.3	0.45	7.5	16.25	1.37e-9	5.60e-6	6.05e-4	0.0002%	0.92%	99.08%	0.90	108	enriched
5		05 - NEW1-GW01S	5.09	0.32	5.38	10.79	8.40e-10	3.98e-6	4.34e-4	0.0002%	0.91%	99.09%	1.06	109	enriched
2	104	02 - NEW8A-GW01S	12.2	0.65	11.2	24.05	2.01e-9	8.08e-6	9.04e-4	0.0002%	0.89%	99.11%	0.92	112	enriched
4		04 - DGMW63-GW01S	12.2	0.63	11.1	23.93	2.01e-9	7.84e-6	8.96e-4	0.0002%	0.87%	99.13%	0.91	114	enriched
3		03 - DGMW64-GW01S	14	0.76	13.5	28.26	2.31e-9	9.45e-6	1.09e-3	0.0002%	0.86%	99.14%	0.96	115	enriched
4		04 - DGMW40-GW01S	9.5	0.45	8.5	18.45	1.57e-9	5.60e-6	6.86e-4	0.0002%	0.81%	99.19%	0.89	123	enriched
5	238	05 - UGMW27-GW01S	8.4	0.4	7.7	16.5	1.39e-9	4.98e-6	6.21e-4	0.0002%	0.79%	99.21%	0.92	125	enriched
2	65	02 - NEW15-GW01S	6.59	0.26	5.3	12.15	1.09e-9	3.23e-6	4.28e-4	0.0003%	0.75%	99.25%	0.80	132	enriched
5		05 - DGMW41-GW01S	10.1	0.45	9.2	19.75	1.67e-9	5.60e-6	7.42e-4	0.0002%	0.75%	99.25%	0.91	133	enriched
		Natural												138	
18		18 - BGMW12-GW01S	10.4	0.42	9.2	20.02	1.72e-9	5.22e-6	7.42e-4	0.0002%	0.70%	99.30%	0.88	142	depleted
2	95 #	02 - NEW02-GW01D	8	0.37	8.2	16.57	1.32e-9	4.60e-6	6.62e-4	0.0002%	0.69%	99.31%	1.02	144	depleted
17		17 - NEW02-GW01S	1.78	0.054	1.23	3.064	2.94e-10	6.72e-7	9.93e-5	0.0003%	0.67%	99.33%	0.69	148	depleted
17		17 - DGMW82-GW01S	2.9	0.061	2.29	5.251	4.79e-10	7.59e-7	1.85e-4	0.0003%	0.41%	99.59%	0.79	244	depleted

& - U235 value is uncertain * - values missing from table 4-1 # - well location mislabeled in table 4-1
and no Well Sampling Data in Appendix D

*provided by DR. Chuck Bennett
at 5/31/00 RAB Meeting*

Attachment No. 1

El Toro Groundwater Radionuclides Data

Site	ID	Location of well	U 235 %	U 238 %	U 238/235 % ratio	NATURAL 137.88
1	LD001	01 - MW201-GW01S	2.26%	97.74%	43	enriched
1	LD094	01 - MW203-GW01S	1.46%	98.54%	68	enriched
1	LD090	01 - MW207-GW01D	1.45%	98.55%	68	enriched
1	LD089	01 - MW207-GW01S	1.42%	98.58%	70	enriched
2	LD007	02 - UGMW25-GW01S	1.05%	98.95%	94	enriched
2	LD009	02 - DGMW60-GW01S	1.03%	98.97%	96	enriched
2	LD008	02 - UGMW25-GW01D	0.96%	99.04%	103	enriched
2	LD004	02 - NEW02-GW01S	0.92%	99.08%	108	enriched
5	LD015	05 - NEW1-GW01S	0.91%	99.09%	109	enriched
2	LD005	02 - NEW8A-GW01S	0.89%	99.11%	112	enriched
4	LD012	04 - DGMW63-GW01S	0.87%	99.13%	114	enriched
3	LD011	03 - DGMW64-GW01S	0.86%	99.14%	115	enriched
4	LD013	04 - DGMW40-GW01S	0.81%	99.19%	123	enriched
5	LD014	05 - UGMW27-GW01S	0.79%	99.21%	125	enriched
2	LD006	02 - NEW15-GW01S	0.75%	99.25%	132	enriched
5	LD016	05 - DGMW41-GW01S	0.75%	99.25%	133	enriched
		NATURAL	0.70%	99.30%	138	
18	LD019	18 - BGMW12-GW01S	0.70%	99.30%	142	depleted
2	LD010	02 - NEW02-GW01D	0.69%	99.31%	144	depleted
17	LD017	17 - NEW02-GW01S	0.67%	99.33%	148	depleted
17	LD018	17 - DGMW82-GW01S	0.41%	99.59%	244	depleted

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