

Memorandum

Date: July 15, 1999

To: Mr. Tayseer Mahmoud
Department of Toxic Substances Control (DTSC), Region 4
Office of Military Facilities
5796 Corporate Avenue
Cypress, California 90630

From: Environmental Management Branch
P.O. Box 942732
601 North 7th Street, MS 396
Sacramento, California 94234-7320
(916) 445-0498

Subject: Review of Technical Memorandum Radionuclides in Groundwater Marine Corps Air Station El Toro, California, June 1998

Attached are the previous DHS comments made on the Technical Memorandum, dated June 1998. At that time we requested that the groundwater be analyzed for gross alpha-beta using EPA method 900.0 and for gamma emitters using EPA method 901.1. (See General Comment 4, a-d, on how to further analyze the samples that exceed 5 pCi/L gross alpha.) If the samples exceed 50 pCi/L gross beta, then further analysis should be performed or a comparison to the gamma analysis may be made by identifying gamma emitters that also emit beta (e.g., potassium-40.)

Based on the HRA dated May 1999, it appears that Landfill 17 was not used for disposal of radium dials or radium painting equipment. If Landfill Site 17 was not opened until the 1980s it probably does not require monitoring for radionuclides. However, four seasonal rounds to analyze groundwater samples at Landfill Site 17 for radionuclides would provide useful information regarding background data for comparison to the other landfills.

Groundwater from Landfill Sites 2, 3 and 5 should continue to be monitored for gross alpha-beta and gamma emitters (all gamma emitters should be reported in pCi/L along with the lower limit of detection (LLD). If the gross alpha or gross beta exceed 5 pCi/L or 50 pCi/L respectively, then the individual samples should be further analyzed as stated in General Comment 4, a-e from the attached DHS review dated August 19, 1998.

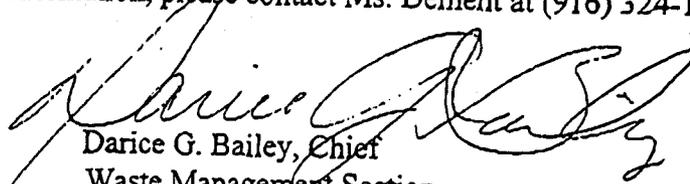
The frequency of sampling should remain quarterly until enough data has been collected to determine trends in the data. At a minimum a full year's seasonal (i.e., quarterly) data should be collected and analyzed fully as stated above. The DON may request to reduce or discontinue monitoring if such changes can be justified.

Tayseer Mahmoud

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This review was performed by Ms. Deirdre Dement, Associate Health Physicist, in support of the Interagency Agreement between DTSC and DHS. If you have any questions concerning this review, or if you need additional information, please contact Ms. Dement at (916) 324-1378.



Darice G. Bailey, Chief
Waste Management Section

cc: Mr. Joseph Joyce
BRAC Environmental Coordinator
AC/S, Environment (1AU)
MCAS El Toro
P.O. Box 95001
Santa Ana, CA 92709-5001

Ms. Deirdre Dement
PO Box 942732
601 N. 7th Street MS 396
Sacramento, CA 94234

Department of Health Services

Review of *Technical Memorandum Radionuclides in Groundwater Marine Corps
Air Station El Toro, California, June 1998*

August 19, 1998

DTSC Resource Planning Form # 400

The following comments are in response to the request from Mr. Tayseer Mahmoud of the Department of Toxic Substances Control to review the technical memorandum regarding radionuclides in groundwater at the Marine Corps Air Station in El Toro, California.

General Comments:

1. The main purpose of monitoring the groundwater below the landfills at this time is to collect background data for comparison to future samples for detection of future leaching of contamination from the landfills to the groundwater. It would be very unlikely to see the migration of contamination from radium dials to the groundwater at this time, but because of the long half-life (the time required for half of the sample to decay) of radium-226 of approximately 1600 years it would remain a potential contaminant to groundwater for a very long period of time. A "rule of thumb" is that it takes approximately 7 half-lives for the activity of any radionuclide to be reduced to less than 1 % and after 10 half-lives the activity would be negligible. This rule of thumb is another reason that choosing Cs-134, with a half-life of 2.06 years, as an indicator of man-made contamination is not a reasonable choice as its 10 half-lives would have ended after approximately 20 years after placement in the landfill.
2. The method of analysis reported as used for the analysis of Cs-134 from the APCL Analytical Report dated 12/18/97, is EPA Method 901.1 which is the Standard Method for analysis of gamma emitting radionuclides in drinking water. DHS still does not understand why Cs-134 was the only gamma emitter reported when this analytical method is applicable for analyzing water samples that contain radionuclides emitting gamma photons with energies ranging from 60 to 2000 keV (i.e., Cs-137, Co-60, Ra-226, uranium and thorium daughters, etc.) This method detects a multitude of radioisotopes, and it requires no further sampling or analysis to obtain this data from the analyses already performed. DHS requests that this additional data also be reported. (At a minimum, the lower limit of detection (LLD) and the analytical result for each radionuclide should be listed.) Having the detected gamma emitters listed or knowing what gamma emitters could have been detected by the laboratory analysis would serve this report better than reporting an isotope, such as Cs-134, that would have already undergone 20 half-lives over the last 40 years ensuring that it would not be detected at this time or in the future.

General Comments: (Continued)

3. See the attached "SUMMARY of Maximum Contaminant Levels (MCL) and Action Levels (AL)" from the DHS Office of Drinking Water. This shows an MCL of 20 picocuries per liter (pCi/l) for uranium in drinking water, which could be a component of the alpha particle activities reported in this technical memorandum and would reduce the elevated gross alpha activities if subtracted. Note though, that this attachment lists limits for drinking water systems and is not necessarily directly applicable to groundwater. If this water were to be used for drinking water it would possibly require treatment to lower the levels of natural or man-made radionuclides exceeding the MCLs found in the attached summary of MCLs for drinking water.
4. Future groundwater monitoring at landfill site monitoring wells should be continued because of the potential presence of long-lived radionuclides in the landfills and should include the following analyses for radioactivity:
 - a. gross alpha and beta analysis using U.S. EPA method 900.0.
 - b. If a gross-alpha sample result is greater than 5 pCi/L, then the sample should be further analyzed using U.S. EPA method 908.0 to screen for total uranium. If this total uranium concentration result accounts for the gross alpha result being greater than 5 pCi/L, then no further analysis for Ra-226 would be necessary for that sample. (If the gross alpha sample result minus the total uranium concentration result shows a concentration greater than 5 pCi/L, see general comment 4.c. below.)
 - c. If the gross alpha sample result minus the total uranium concentration result shows a concentration greater than 5 pCi/L, then the sample should be further analyzed for total radium using U.S. EPA Method 903.0. If the total radium concentration result were less than 5 pCi/L, then no further analysis for Ra-226 would be necessary for that sample. (If the total radium sample result concentration result shows a concentration greater than 5 pCi/L, see general comment 4.d. below.)
 - d. If the total radium sample result shows a concentration greater than 5 pCi/L, then the sample should be further analyzed for radium-226 using U.S. EPA Method 903.1. Further analysis for Ra-228 using U.S. EPA Method 904.0 may be necessary to determine if the combined Ra-226 and Ra-228 are in compliance with drinking water standards.

General Comments:

(4. Continued.)

- e. If gross beta results appear elevated, further analysis to determine the causes may be necessary, but the data acquired using the analytical methods above should provide a means to monitor trends and to alert if contamination becomes evident.