Ahmanson Ranch Groundwater Sampling of June 2003

Introduction

The Ahmanson Ranch property consists of approximately 1900 acres of undeveloped land in Ventura County, California, situated south of the Santa Susana Field Laboratory (SSFL) in the Las Virgenes and East Las Virgenes drainages. A request was made at a SSFL Workgroup meeting by an official of the City of Calabasas that the California Department of Health Services, Radiologic Health Branch (RHB), independently analyze well water samples from the Ahmanson Ranch property for radioactivity. The Calabasas official expressed a concern that radioactivity may be migrating through ground water from SSFL to the City of Calabasas, and that sampling of the Ahmanson Ranch wells could verify this possible pathway due to the location of the property between SSFL and the City of Calabasas.

Water sampling on the Ahmanson Ranch property has been performed for several years by Psomas, a contractor for the Ahmanson Land Company, to establish baseline water conditions at the proposed project site. This water sampling has consisted of sampling groundwater at 7 wells, and surface water at 6 stream locations in and around the site. Groundwater monitoring consisted of sampling one deep groundwater well (M-1) installed in 1967 and six shallow groundwater-monitoring wells (P1-P6) installed in November 2000. The water samples collected from these wells by Psomas were analyzed for various physical, chemical, biological, and radioactive components on a quarterly basis. None of the wells sampled is used as a drinking water source.

As a result of the request from the Calabasas official, RHB participated in groundwater sampling by Psomas at the Ahmanson Ranch property in June 2003, splitting water samples collected at the site wells and duplicating the radioactive analysis methods used by Psomas's contract analytical laboratory to provide independent verification of concentrations of radioactive materials in the groundwater at the project site.

Method

On June 16, 2003, deep well M-1 was sampled at 450 and 550 feet. Deep well M-1 was also sampled on June 25, 2003, from water brought to the surface through the artesian conditions of the well. Shallow wells P1-P6 were sampled with a bailer on June 25, 2003, after the wells were purged of three well volumes each the previous day and allowed to recharge with formation water overnight. The samples were split between Psomas and the RHB staff. The California Sanitation and Radiation Laboratory (SRL) analyzed the RHB well samples for gross alpha (EPA method 900.0), gross beta (EPA method 900.0), tritium (EPA method 900.0), and gamma isotopes (EPA method 901.1). Except for tritium, these analyses were performed on both filtered and unfiltered water samples. Water samples that had gross alpha results that exceeded 5 pCi/L were further analyzed for isotopic radium (EPA method 903.1 and 904.0), and water samples that had gross alpha results that exceeded 15 pCi/L were further analyzed for isotopic uranium (standard method 7500-UC).

Summaries of the RHB analytical results are shown in Tables 1, 2, and 3.

Results

Table 1 - Well Samples - Filtered (pCi/L)[1,2]

	P-1	P-2	P-3	P-4	P-5	P-6	M-1	M-1(450)	M-1(550)
Gross Alpha	8.0 ± 2.4	11.8 ± 3.2	22.8 ± 6.0	<4.6	<19.4	19.2 ± 4.5	<14	<3.9	<2.7
Gross Beta	7.6 ± 3.1	14.9 ± 4.0	34.0 ± 8.1	10.9 ± 5.0	17.8 ± 8.9	12.2 ± 5.4	<9.9	10.3 ± 4.0	7.4 ± 3.1
H-3	<254	<254	<254	<254	<254	<254	<254	<249	<249
K-40	<23	<23	<53	<61	<31	54.5 ± 35	<48	<54	11.6[4] ± 20

Table 2 – Well Samples - Unfiltered (pCi/L)[1,2]

	P-1	P-2	P-3	P-4	P-5	P-6	M-1	M-1(450)	M-1(550)
Gross Alpha	9.0 ± 2.4	14.0 ± 3.5	26.9 ± 6.4	<3.6	20.5 ± 13.7	21.1 ± 4.6	6.9 ± 3.1	<4.3	<3.1
Gross Beta	11.5 ± 3.2	9.4 ± 4.1	30.3 ± 8.1	10.0 ± 4.9	20.9 ± 9.0	15 ± 5.5	8.3 ± 4.9	8.2 ± 5.0	6.9 ± 3.7
K-40	<52	<60	<19	<28	<31	50.5 ± 38	<18	<18	<30

Table 3- Isotopic Radium and Uranium (pCi/L)[1,2,3]

	P-1	P-2	P-3	P-4	P-5	P-6	M-1	M-1(450)	M-1(550)
Ra-226	0.40 ± 0.10	0.29 ± 0.07	0.35 ± 0. 08	NA	1.22 ± 0.14	0.23 ± 0.09	0.73 ± 0.11	NA	NA
Ra-228	1.52 ± 0.90	<1.47	<2.0	NA	<2.2	1.8 ± 1.1	<1.5	NA	NA
U-234	NA	3.77 ± 0.31	8.28 ± 0.65	NA	5.63 ± 0.43	3.70 ± 0.31	NA	NA	NA
U-235	NA	0.14 ±0.03	0.34 ± 0.06	NA	0.20 ± 0.04	0.15 ± 0.04	NA	NA	NA
U-238	NA	3.66 ± 0.30	7.85 ± 0.62	NA	5.45 ± 0.41	3.54 ± 0.30	NA	NA	NA

[1]Uncertainties shown are 2 sigma values.
[2]Less than ("<") values are shown if sample analytical results are below the minimum detectable concentration (MDC) of the test method used. The MDC value is shown.
[3]"NA" indicates that the gross alpha threshold for performing radium and/or uranium analyses was not exceeded. Uranium analyses were performed for well P-2 even though the 15 pCi/L standard was not exceeded.
[4]While greater than MDC, this analytical result is questionable due to its relatively high statistical uncertainty.

The RHB analytical results could not be compared to Psomas' analytical results for the split samples because Psomas never published their radioisotopic analytical results due to the termination of the proposed project to develop the Ahmanson Ranch property. However, Psomas groundwater sampling for the second and third quarters of 2002 yielded published gross alpha analytical results reasonably comparable to the June 2003 RHB samples, except that some Psomas samples indicated higher gross alpha activity than the RHB samples. One of the Psomas samples would exceed United States Environmental Protection Agency (EPA) and California standards for drinking water. Some others could potentially exceed the drinking water standards, but because radium and uranium specific analyses were not performed by Psomas, this determination could not be made. Psomas did not provide or publish analytical results for tritium, radium, uranium, or potassium-40. None of the Psomas gross beta analytical results exceeded the United States Environmental Protection Agency (EPA) and California screening level of 50 pCi/L for drinking water.

Discussion and Conclusions

Of the various radioactive contaminants for which analyses were performed, tritium (H-3) is considered the most mobile in groundwater in both the saturated and unsaturated zones. Further, tritium is the only specific radionuclide contaminant of concern at the SSFL site that has been identified as having impacted groundwater on the site. The RHB sampling results indicate that no tritium above the minimum detectable concentration (MDC) was detected in any of the wells found on the Ahmanson Ranch property. Therefore, there is no evidence, within the constraints of the tritium MDC, that any potentially radioactively contaminated groundwater and/or surface run off from SSFL has impacted the local water sources for the wells tested on the project property. Because the analytical MDC for tritium is significantly greater than ground water background tritium concentrations, one cannot conclude with certainty that the Ahmanson Ranch monitoring wells do not contain water at elevated tritium concentrations, but below the MDC.

Gross beta activities detected in the RHB sampling all fall below guidance levels of 50 pCi/L used to screen drinking water. The levels found would appear to reflect the chemical and physical interaction of naturally occurring radioactive material with meteoric water and groundwater in and around the project site.

Gross alpha activities detected in the RHB sampling exceeded US EPA and California drinking water trigger levels for nuclide specific analyses (radium, uranium) in a number of samples. In all cases the radium and uranium isotopic analytical results indicated that the drinking water standards were not exceeded.

Based on the wells tested at the Ahmanson Ranch property by RHB in June 2003, no evidence was found that the Ahmanson Ranch property ground water has been impacted by man-made radioactive contamination, or that radioactivity had migrated from the SSFL site to the Ahmanson Ranch groundwater.