Groundwater Cleanup at Superfund Site

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(PhysOrg.com) -- A chain of chemical reactions between organic waste and naturally occurring chromium appears to explain the long-standing elevated levels of the chemical chromium-6, a human carcinogen, in groundwater at a federal Superfund site on the southern edge of the UC Davis campus, according to university environmental professionals.

But the UC Davis officials emphasize that those chemical reactions and the resulting chromium-6 have not increased concentrations of the contaminant in neighboring drinking-water wells above background levels.

"Based on our sampling, there is no indication that the contamination at the site has affected local drinking water or agricultural uses, but we are going to take steps to make sure that this contaminant is addressed or mitigated," said John Meyer, vice chancellor for administrative and resource management at UC Davis.

UC Davis and the U.S. Department of Energy have been working to clean up the 15-acre site of the former Laboratory for Energy-Related Health Research since the U.S. Environmental Protection Agency declared it a federal Superfund site in 1994. Workers have removed 150 cubic yards of soil contaminated with low-level radioactivity, and continue to treat groundwater to remove contaminants.

Over the past decade, chromium-6 has been detected at the site at levels up to 500 parts per billion, or 10 times the California standard for drinking water. Investigators had assumed that the contaminant was

naturally occurring, since there is no evidence that chromium was ever used or dumped at the site, and because chromium is found in soils and wells in the Yolo/Solano region and other areas of California.

However, environmental consultants contracted by the university now conclude that sewage sludge dumped in a landfill at the site decades ago appears to have begun a series of chemical reactions that eventually converted the naturally occurring, nontoxic chromium-3 in the soil into the carcinogen chromium-6.

Campus officials have launched a pilot project to reverse the process and convert the chromium-6 back to nontoxic chromium-3 by injecting calcium polysulfide into the soil, according to Sue Fields, project manager for UC Davis Environmental Health and Safety. The pilot project will also estimate the duration and cost of the cleanup.

Based on the pilot study, the campus will submit options for final cleanup of the site to the EPA this fall. The EPA will then develop a plan for UC Davis to follow. The plan will be open to public comment before the EPA issues a final decision, probably in 2012. UC Davis is also treating other groundwater contaminants at the site, primarily chloroform.

Repeated drilling samples taken since cleanup began at the site in the mid-1990s show that the chromium-6 has not impacted neighboring drinking-water and agricultural wells above background levels (chromium-6 is found at levels above California drinking-water standards in wells around Davis and in Yolo County, as well as in other areas of the state).

UC Davis continues to monitor groundwater by sampling wells across the site and treating the identified contaminants. The campus is working with the EPA, the Regional Water Quality Control Board and the

California Department of Toxic Substances Control to identify long-term management options for closing the landfills and remediating the groundwater. Campus representatives meet monthly with state and federal agencies and the local oversight committee, which includes local residents, to ensure the public is protected and the site is progressing toward cleanup.

The Department of Energy released a Record of Decision last month, approved by the EPA, which sets out a plan for the final cleanup of those parts of the site that are the responsibility of the department.

The Laboratory for Energy-Related Health Research carried out studies on the health effects of low-level, long-term radioactivity on animals, principally beagle dogs. The presence of chromium-6 is not connected to past use of radioactivity at the site, according to UC Davis specialists. The lab operated from 1958 to 1988.

About chromium-6 and chromium-3

Chromium can occur in two forms in chemical compounds, chromium-6 (hexavalent chromium) and chromium-3 (trivalent chromium). Chromium-6 is recognized as a carcinogen by the federal and California EPA and can cause other respiratory, gut and skin problems at high doses. Chromium-3 is an essential nutrient and not normally considered toxic.

[Source: U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry fact sheet, www.atsdr.cdc.gov/tfacts7.html .]

Provided by UC Davis