



Frequently Asked Questions on USGS Data on Polonium-210 in Wells in Lahontan Valley, Churchill County, Nevada

On August 6, the USGS released [Open-File Report 2007-1231](#) that documents the occurrence of Polonium-210 (Po-210) in untreated, unfiltered water collected from 25 drinking-water wells in Lahontan Valley in Churchill County, Nevada. Most of these wells provide water for human and (or) domestic animal consumption. Concentrations were elevated in water collected from the wells by the USGS in 2007, with a median of 18 picocuries per liter (pCi/L) and a maximum of 67.7 pCi/L.

What is polonium-210? – Polonium-210 (Po-210) is a radioactive element derived from the natural decay of uranium, which occurs naturally in sediments present in the Lahontan Valley.

Are human actions responsible for the presence of Po-210 in Nevada? – There is no indication that the occurrence of Po-210 stems from any human activity in this area. All signs point to natural occurrence associated with geologic characteristics of the Lahontan Valley, and specifically to alluvial sediments derived from Sierra Nevada granites.

At what concentrations was the Po-210 found in drinking-water wells? – Concentrations in untreated, unfiltered water collected from 25 wells in the Lahontan Valley ranged from <0.1 to 67.7 picocuries per liter (pCi/L). Thirteen of these wells had concentrations greater than 15 pCi/L, which is the Environmental Protection Agency (EPA) Maximum Contaminant Level (MCL) for gross alpha radioactivity in public-supply wells.

Are these levels harmful to human health? – Po-210 is a carcinogen. At this time, the EPA has not established a drinking-water standard specifically for Po-210 in public-water supplies. Po-210 is regulated only by the EPA Maximum Contaminant Level (MCL) for gross alpha radioactivity, which is 15 pCi/L (<http://www.epa.gov/safewater/>). Most of these samples had more than this gross alpha level from Po-210 alone. The concentration of Po-210 was low (0.2 pCi/L), however, in the one public water supply well that was sampled, which tapped a deep aquifer underlying in the Lahontan Valley. Most of the domestic wells sampled (a total of 24) with elevated concentrations were more than 100 feet below land surface. It is important to note that the quality of water in domestic wells is not regulated by EPA and States. Monitoring the quality of water from domestic wells is primarily the well owner's responsibility; however, States and local agencies commonly provide guidance to domestic well owners.

The fatal poisoning of Alexander Litvinenko with Po-210 in 2006 has made the public aware that Po-210 can be acutely toxic. The amount of Po-210 that is thought to have killed Litvinenko was hundreds of millions of times greater than the amount that the public would be exposed to by drinking any well water in the Lahontan Valley (John Harrison, et. al., 2007, "Polonium as a Poison," Journal of Radiological Protection, Vol. 27, pgs. 17-40).

Can the water be treated? – USGS samples represent unfiltered water from a well before any treatment. Various filters and treatment technologies, such as reverse osmosis, have been shown to remove Po-210 from drinking water. Choice of treatment technologies depends on a range of factors including water chemistry, costs, disposal, and maintenance and should be done in consultation with a water treatment professional. Many homeowners in Nevada use reverse-osmosis systems.

Is Po-210 connected to the cancer cluster identified in the late 1990s? – From 1997 to 2002, 16 cases of acute childhood leukemia were diagnosed in children who resided or had resided in the Lahontan Valley in Churchill County, Nevada. The occurrence of Po-210 has not been connected to the cancer cluster by Centers for Disease Control and Prevention (CDC) or other public health officials.

How do these findings relate to previous work? – During 2001, the USGS sampled 100 domestic and public-supply wells in Lahontan Valley in support of a CDC investigation of the cancer cluster. Several surprising findings occurred, including gross alpha radioactivity in numerous domestic wells that was substantially higher than could be explained by the presence of uranium. Analysis suggested that excess alpha radioactivity was due to the presence of Po-210. This 2007 study, done in cooperation with University of Nevada Reno, was designed to identify high gross alpha radiation in relation to the amounts of uranium in water and to better understand the source of excess radioactivity. Nineteen of the 25 wells sampled in this study had been sampled in 2001; data confirmed that the excess radioactivity was due to Po-210. All of these studies focus on a rural area in Churchill County, near the town of Fallon. The water supply for Fallon and the Fallon Naval Air Station have been studied extensively in other studies and comes from a different (and deeper) aquifer than the one used in the rural area. Levels of radioactivity in the water supplies were below EPA drinking-water standards and considered safe to drink.

Are these levels found elsewhere? – No systematic surveys have been completed at this time. However, based on a few studies reported in the literature, the data from Nevada were unexpectedly elevated (greater than about 1 pCi/L). Except for a well in Louisiana, one well in Virginia, and about 35 wells in Florida, Po-210 concentrations exceeding the values in the Lahontan Valley wells have not been documented elsewhere in the U.S. Only under an uncommon set of geologic and ground-water conditions does the compound become mobile and available for transport in water; the compound typically binds strongly to sediment.

How did USGS choose which wells would be sampled for this study? – USGS designed the study to better understand the source of excess radioactivity. Wells targeted, in large part, those wells sampled in 2001; specifically, 19 of the 25 wells sampled in the 2007 study were sampled in 2001.

How confident is USGS that our data are correct? – The USGS follows rigorous quality-assurance and quality-control procedures to assure credibility of its data and scientific analysis. Laboratory and quality-assurance procedures are available from the USGS Office of Water Quality in Reston, Virginia and the USGS National Water-Quality Laboratory in Denver, Colorado.

Is there Po-210 in surface water around Fallon?—The USGS did not measure surface water in the study; however, the USGS does not expect Po-210 to occur in surface water because it is derived from different sources, such as the Truckee and Carson Rivers.

How is USGS releasing this information to the public? – USGS policy states that measurements of water quality of possible significance to public health should be released to public-health officials and to individual land owners from whom samples were collected as soon as laboratory and quality-assurance/quality control analyses are complete. USGS is taking the following steps to meet this policy:

1. On August 2, 2007, following final data-quality assurance verifications, USGS convened an Internet-based briefing for public-health and agricultural officials from Churchill County, Nevada, the State of Nevada, and officials from CDC, EPA, FDA, and USDA on the findings and implications.
2. Each sampled well owner was sent a letter on August 2, 2007, with the results for their well(s), directing them to the Lahontan Valley Information Line (775-684-4256) and the USGS for questions and concerns.
3. USGS plans to release the information in the USGS Open-File Report series on or about August 6, 2007, on the Internet, which provides for quick dissemination of reviewed and approved scientific data and information. The Open-File Report will include a general map of the study area; explanation of methodology, and a table of chemical and well data.
4. USGS is planning a more formal USGS interpretative report that evaluates geologic and geochemical conditions associated with the chemical data. Such findings identify portions of the Lahontan Valley likely to have elevated levels of Po-210 and will explain the natural sources and processes affecting its transport in the ground-water system. The report is expected within a year.
5. The USGS will continue to collaborate with Federal, State and local agencies to provide the citizens of the Lahontan Valley with this new information about ground-water quality and guide them to the best possible advice about steps they should take to protect their health.

Who can I contact for more information?—

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