STATE OF NEVADA

JIM GIBBONS
Governor

MICHAEL J. WILLDEN
Director

ALEX HAARTZ, MPH
Administrator

State Health Officer

DEPARTMENT OF HEALTH AND HUMAN SERVICES
HEALTH DIVISION
4150 Technology Way, Room 300
Carson City, NV 89706-2009
Telephone: (775) 684-4200 • Fax: (775) 684-4211

Polonium-210 Information Sheet

What is Polonium 210?

Polonium-210 (Po-210) is a radioactive material that occurs in nature at very low levels. Po-210 results from the natural radioactive decay of uranium, which is commonly found in Sierra Nevada granites. Po-210 decays to a stable isotope of lead (Pb-206) by emitting alpha particles. It is alpha particles that carry high amounts of energy and which can damage or destroy genetic material in cells inside the body. Po-210 is considered to be one of the most hazardous radioactive materials known, but it must be inhaled or ingested to exert its toxic effects. Your skin or a piece of paper is enough to stop the radiation emitted by Po-210.

How is Po-210 measured?

The measurement used for the concentration of Po-210 in water is picocuries per liter (pCi/L). A picocurie is a unit of measure for radioactivity in air and water. This represents the amount of radiation that is emitted from a radioactive substance such as Po-210. A picocurie is one million millionth, or a trillionth, of a curie.

What is considered a safe concentration of Po-210 in water?

It is very unusual for ground water to have concentrations of Po-210 greater than 1 pCi/L. The US EPA has not established drinking water standards specifically for Po-210, an alpha radiation emitter. However, there is a drinking water maximum contaminant level (MCL) for alpha radioactivity of 15 pCi/L. The MCL is the contaminant concentration that EPA considers protective of public health over a 70-year lifetime at an exposure rate of 2 liters of water per day. MCLs are regulatory concentrations. The public water supplies in Lahontan Valley are not at risk because the public-supply water well contains only 0.2 pCi/L. For concentrations of Po-210 above 15 pCi/L, you should consider treating water with a properly functioning reverse-osmosis system before drinking it, using it for cooking or watering animals.

How are humans normally exposed to Polonium 210?

Polonium-210 (Po-210) is a radioactive material that occurs in nature at very low levels. It is found naturally in the environment, and the general population is internally contaminated with small but measurable amounts of it on a regular basis through food, water, and air. Because tobacco leaves are known to concentrate Po-210, users of tobacco products are likely to have higher levels of this radioactive element in their bodies.

What are common uses of Polonium 210?
Po-210 is used in some devices to eliminate static electricity in processes such as rolling paper, manufacturing sheet plastics, and spinning synthetic fibers.

Is Po-210 harmful to humans?
Po-210 is a radiation hazard only if it is taken into the body through breathing or eating or by entering a wound. This "internal contamination" can cause radiation exposure of internal organs, which at high levels can result in serious medical symptoms or death. Po-210 is not a hazard to the outside of the body—neither polonium nor its radiation will go through unbroken skin or membranes. Careful washing will remove most external traces of Po-210.

Is it safe to drink well water?
The US EPA has not established drinking water standards specifically for Po-210, an alpha radiation emitter. However, there is a drinking water maximum contaminant level (MCL) for alpha radioactivity of 15 pCi/L. The MCL is the contaminant concentration that EPA considers protective of public health over a 70-year lifetime at an exposure rate of 2 liters of water per day. MCLs are regulatory concentrations. The public water supplies in Lahontan Valley are not at risk because the public-supply water well contains only 0.2 pCi/L. For concentrations of Po-210 above 15 pCi/L, you should consider treating water with a properly functioning reverse-osmosis system before drinking it, using it for cooking or watering animals.

Are other people at risk if they come into close contact with a person who has ingested Po-210?
People will not be exposed to radiation just by being near a person who may have ingested water containing some Po-210. Health care workers who are providing care for patients will not be exposed to Po-210 unless they inhale or ingest contaminated bodily fluids. Normal hygiene practices in hospitals for microbial contamination will protect workers from any surface radiological contamination.

Can I wash, bath and shower with well water containing Po-210?
Use of water for showering, washing clothes, or watering your lawn will not expose you to harmful radioactivity.

Can Po-210 cause cancer?
Po-210 is an established human carcinogen (causes cancer) and its presence in drinking water is a concern. The US EPA has not established drinking water standards specifically for Po-210, an alpha radiation emitter. However, there is a drinking water maximum contaminant level (MCL) for alpha radioactivity of 15 pCi/L. The MCL is the contaminant concentration that EPA considers protective of public health over a 70-year lifetime at an exposure rate of 2 liters of water per day. MCLs are regulatory concentrations. The public water supplies in Lahontan Valley are not at risk because the public-supply water well contains only 0.2 pCi/L (below both lifetime total cancer risk and lifetime fatal cancer risk). More rigorous drinking water standards for Po-210 (below 15 pCi/L) are under consideration. For concentrations of Po-210 above 15 pCi/L, you should consider treating water with a properly functioning reverse-osmosis system before drinking it, using it for cooking or watering animals.

What happens to Po-210 after it is ingested?
Between 50% and 90% of ingested Po-210 passes thru the gastrointestinal (GI) tract and leaves the body in the feces. The retained amount enters the bloodstream where it concentrates in the soft tissues. Approximately 45% of ingested Po-210 is deposited in the spleen, kidneys, and

liver; 10% is deposited in the bone marrow and the remainder is distributed throughout the body. Within the bloodstream, Po-210 combines with hemoglobin.

What is the half-life of Po-210?
The physical half-life of Po-210 is about 140 days. Physical half-life is a measure of the time required for one-half of the activity of a radioactive substance to be lost due to radioactive decay. The whole body biological half-life of Po-210 is approximately 50 days. Biological half-life is a measure of the time required for biological processes to eliminate one-half of the Po-210 retained by the body. The effective half-life of Po-210 (the time required for the combined action of the physical and biological half-lives to reduce the activity by 50 percent) is approximately 40 days.

Are there tests to determine if I have ingested Po-210?
The small amounts of Po-210 that anyone would be exposed to drinking even the most contaminated well water in Lahontan Valley are greatly below the amounts that would be expected to cause acute health problems such as radiation sickness. If you have any medical concerns, you should contact your health care provider to discuss them.

Below are helpful telephone numbers and websites that will provide information about Polonium-210:

Lahontan Valley Help Line: 775.684.4256
Toll free number: 866.767.5038
The numbers above will connect you to the Rocky Mountain Poison and Drug Center. Medical staff will be available to answer questions pertaining to Polonium-210.

Useful websites:

Nevada State Health Division: http://health.nv.gov
Under "Hot Topics," click on Churchill County Water Quality/Polonium-210
NOTE: This website will be updated as new information is available.

Health Physics Society
http://hps.org/