

## **FAQs**

### **Polonium 210**

#### **About Polonium-210**

##### **What is Polonium 210 (Po-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 emits alpha particles, which makes it decay to form a stable isotope of lead. The alpha particles carry high amounts of energy 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 breathed in or eaten to exert its toxic effects. Your skin or a piece of paper is enough to stop the radiation emitted by Po-210.

##### **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.

##### **How is Po-210 measured?**

The concentration of Po-210 in water is measured in 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.

#### **Polonium in Water**

##### **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 picocurie per liter. The US Environmental Protection Agency has not established drinking water standards specifically for Po-210. However, the maximum contaminant level for alpha radioactivity in drinking water is 15 pCi/L.

The maximum contaminant level is the concentration of a contaminant that EPA considers protective of public health if someone lived to be 70 years old and drank 2 liters of water per day. Maximum contaminant levels are regulatory concentrations.

##### **Is the public water supply at risk in the Lahontan Valley, NV?**

The public water supplies in Nevada's Lahontan Valley are not at risk because the public-supply water well contains only 0.2 pCi/L, well below the EPA maximum contaminant level of 1 picocurie per liter. Families whose well water has been shown to have concentrations of Po-210 above 15 pCi/L should consider treating water with a properly functioning reverse-osmosis system before drinking it, using it for cooking or watering animals.

## **Exposure**

### **Are humans normally exposed to Po-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.

### **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.

### **What happens to Po-210 after it enters the body?**

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.

### **How long does Po-210 stay in 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. 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.

### **Are there tests to determine if I have ingested Po-210?**

Some laboratories in the United States can conduct Po-210 testing on urine, and your state health department can help you assess whether this is appropriate for you. CDC is also available to assist you, your health care provider, and your state health department in interpreting results of any tests that you and your health care provider may decide to undertake. 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.

### **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.

## **Cancer Clusters**

### **Does this finding explain the cancer cluster?**

No scientific evidence is available at this time to establish a link between the concentrations of Po-210 in wells in Nevada's Lahontan Valley, and the cancer clusters that occurred in the nearby Fallon area. The US Geological Service and other federal agencies are continuing to conduct detailed studies, sampling and analysis. The agencies will evaluate these data to assess whether there is a public health impact, and they will report their findings when they are completed.

### **Is Po-210 related to childhood leukemia clusters?**

Although Po-210 is a cancer-causing agent, we do not currently know if Po-210 can cause childhood leukemias or childhood leukemia clusters.

### **What is a childhood leukemia cluster?**

Childhood leukemias are cancers of the blood-forming organs of the body which result in high levels of abnormal white blood cells. Childhood leukemia clusters occur when there is a higher than expected number of children diagnosed with leukemia in a defined geographic area over a specific period of time.

Risk factors for leukemias include inherited genetic problems and exposure to different chemicals and radiation. Po-210 is a radionuclide, or element that is radioactive. Things which are radioactive can cause cancer in certain situations. These situations often depend on factors such as duration of exposure, the type of exposure, the amount of radioactivity the person is exposed to, and the type of radioactivity the radioactive substance produces.

### **Was Po-210 measured in tap water samples collected during the CDC leukemia cluster investigation?**

No. For the CDC study, the Nevada Department of Environmental Protection sampled tap water for a broad array of metals, minerals, and volatile organic compounds. The contaminants assessed were based on community concerns and suspected contaminants. Elevated levels of Po-210 in ground-water, a source of drinking water in Churchill County, is rare and was not suspected in this community. Further, the expert panel convened to discuss the investigation determined that groundwater was not a likely source of the causal agent of the cluster.

### **Can Po-210 cause cancer?**

Po-210 is an established human carcinogen (known to cause cancer), and its presence in drinking water is a concern. The US Environmental Protection Agency has not

established drinking water standards specifically for Po-210. However, the maximum contaminant level for alpha radioactivity in drinking water is 15 pCi/L.

The maximum contaminant level is the concentration of a contaminant that EPA considers protective of public health if someone lived to be 70 years old and drank 2 liters of water per day. Maximum contaminant levels 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.

### **Source and Extent of Po-210**

#### **How extensive is this?**

At this time, we do not know the extent of concentrations of Po-210 in groundwater wells using the same aquifer, because only a limited number of samples was reported. Residents can contact their county health department or the Nevada State Health Department for information on testing their well water source.

#### **Could the previous nuclear testing have led to this build-up?**

There is not any scientific evidence to support a link between the concentrations of Po-210 in certain wells in the Lahontan Valley near Fallon, Nevada and previous nuclear testing. The US Geological Service and other federal agencies are continuing to conduct detailed studies, sampling and analysis. The agencies will evaluate these data to assess whether there is a public health impact, and they will report their findings when they are completed.

#### **How are people exposed to Po-210?**

Small amounts of Po-210 can be found naturally throughout the environment. People can be exposed to Po-210 through a variety of different ways including eating food or drinking water that has Po-210 in it. Po-210 can also be found in tobacco. That means smokers tend to be exposed to higher levels of this substance than non-smokers. In most of these situations, the amount of Po-210 that someone is exposed to is so small that it is not expected to cause any harmful effects.

#### **Where else has this been found in the US?**

Polonium is found at varying levels in all groundwater sources throughout the world. Polonium concentrations exceeding the values for the Lahontan Valley have been reported in only two other areas in the U.S.