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TECHNICAL BULLETIN

HEALTH EFFECTS INFORMATION

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Lithium

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USES

Lithium is an elemental metal. Different forms of lithium have many types of uses:

- Batteries
- Ceramics
- Electronics
- Desiccant (to absorb moisture)
- Medication to treat people with bipolar disorder

CHEMICAL AND PHYSICAL PROPERTIES

The chemical symbol for lithium is Li. Lithium does not exist as a pure metal in nature, but is always present as salts, oxides, or other combined forms. It is a natural ingredient found in some soils and mineral formations. Dry lithium salts are corrosive and very irritating to exposed skin, eyes, nose, and airways. Lithium salts, such as lithium chloride, dissolve quickly in water. When lithium chloride dissolves, it separates into individual lithium and chloride ions.

Low levels of lithium in drinking water are odorless, colorless and without taste. The only way to know if it is there is to test for it in a laboratory.

WHERE DOES IT COME FROM? HOW DOES IT ENTER THE ENVIRONMENT?

Since lithium is a natural earth metal, it is found in soils, rocks, dusts, surface water, ground water and seawater. Because of its natural presence it is found in plants, animals, food products and beverages. Manmade products that contain lithium and industrial processes that involve lithium can produce higher concentrations in some areas than would be found under natural conditions.

WHAT HAPPENS TO IT IN THE ENVIRONMENT?

Lithium found naturally or from manmade sources does not disappear or break down in the environment. It may combine with other materials but it does not diminish or disappear unless it is physically removed by treatment processes.

HOW CAN LITHIUM ENTER AND LEAVE MY BODY?

Everyone is exposed to lithium in food, beverages, air and soil. Ingestion of lithium is normal and it is probably beneficial to health at low doses. Most people

get an average of 2 milligrams (mg) of lithium per day, mainly from their food. Lithium is excreted rapidly from the body through urine. Doctors may prescribe lithium chloride as a medication for patients with bipolar disorder. Typical doses prescribed by doctors range from 140-1200 mg/day (50-600 times more than the average daily intake from food).

WHAT ARE ITS HARMFUL EFFECTS?

Inhaled lithium salts cause nasal and respiratory irritation. Lithium salt contact with skin or eyes can cause burns and irritation.

Oral exposure to excessive amounts of lithium, usually in cases where people are taking lithium as a medication, can cause tremors, weakness, convulsions, nausea, vomiting, diarrhea, kidney failure, diabetes insipidus, or excessive thirst. Chronic oral exposure to high doses (greater than 140 mg/day as in medical treatment) of lithium over time can also disrupt the normal functioning of the thyroid gland, eventually leading to goiter (swelling of thyroid gland) and hypothyroidism. Hypothyroidism is a disease in which the thyroid does not produce enough thyroid hormone. Symptoms of hypothyroidism include weight gain, muscle weakness, joint and muscle pain, depression, fatigue, brittle hair and fingernails, decreased senses of taste and smell, puffy face and hands and feet, slow speech, thickening of the skin, and thinning of the eyebrows. Lithium has also been shown to cause reproductive and developmental toxicity in animals at doses within the range that people receive who are being medicated with lithium.

DRINKING WATER STANDARDS

Neither the US Environmental Protection Agency (EPA) nor any state regulatory agency has set a mandatory maximum contaminant limit (MCL) for lithium in drinking water.

HOW MUCH LITHIUM IS GENERALLY FOUND IN OREGON DRINKING WATER?

Oregon's drinking water systems are not required to test for lithium. No Oregon-specific studies have been done to determine the average concentration of lithium in drinking water. Some national studies have found that lithium in drinking water typically ranges from 1-10 parts per billion (ppb). Studies have found that some communities in Chili have up to 6,000 ppb in their drinking water.

In public drinking water systems, lithium chloride (a lithium salt) is sometimes used for contact tracer studies, which are done for informational purposes to determine how much time the water takes to get from one part of the treatment plant to another.

The use of lithium chloride in these studies may cause a temporary elevation in the level of lithium in drinking water. These temporarily elevated levels are still hundreds of times lower than concentrations that could lead to any of the health effects listed above.

FOR MORE INFORMATION

For more information about the Oregon Administrative Rules that regulate public drinking water, go to the following link:

<http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Pages/rules.aspx>.