

Utah Department of Environmental Quality Division of Solid and Hazardous Waste Fact Sheet



October 2013

PERCHLORATE

This fact sheet describes the Department of Environmental Quality's (DEQ) interest and concern regarding perchlorate in the State of Utah.

WHAT IS PERCHLORATE?

Perchlorates are salts derived from perchloric acids.

Perchlorate consists of one chlorine atom surrounded by four oxygen atoms.

Perchlorate can occur naturally but can also be produced artificially through manufacturing processes for a variety of industrial uses, including safety flares, fireworks, air bag deployment systems and military and space exploration applications.

Naturally occurring perchlorate is found in Chilean nitrate fertilizer, and has been known to also accumulate in arid regions such as the southwestern United States as a result of environmental conditions.

Manufactured forms of perchlorate include perchloric acid and salts such as ammonium perchlorate, sodium perchlorate, and

potassium perchlorate.

Perchlorates are commonly used as oxidizers in solid rocket propellants, munitions, fireworks, airbag initiators for vehicles, matches, and signal flares. They can also be found in some disinfectants and some herbicides.

In Utah and the United States in general, the most common form of perchlorate produced is ammonium perchlorate of which a significant portion is used in the defense and aerospace industries as an oxidizer.

Environmental media samples (soil and groundwater) from federal facilities and other private sites involved in testing and disposal of ammunitions and rocket fuel have recently been shown to contain perchlorate. Food crops and milk have also been shown to contain perchlorate in recent surveys.

WHY IS PERCHLORATE A CONCERN?

In the environment, perchlorate is a persistent or stable contaminant that presents a number of issues to government, private sector and other interested

organizations. Issues include health effects, risks, and regulatory and cleanup standards.

Perchlorate salts are highly soluble in water and thus migrate readily from soil to groundwater and surface waters. Common treatment technologies include ion-exchange, bioreactors and in situ bioremediation.

HOW DOES PERCHLORATE AFFECT HUMAN HEALTH?

The health effects of perchlorate salts are due to the perchlorate itself and not the associated element or ion (i.e. sodium, potassium, or ammonium). The primary pathways for human exposure include ingestion of food and water containing perchlorate.

High levels of perchlorate exposure can interfere with iodine uptake into the thyroid gland, a condition called Iodine Uptake Inhibition (IUI). When iodine uptake is inhibited it disrupts the function of the thyroid gland and will potentially lead to a reduction in the production of thyroid hormones.

Thyroid hormones play an important role in regulating metabolism in adults. These hormones play an essential role in normal growth and development of fetuses, infants and young children. Thus a significant and sustained impairment of thyroid function during infant development will result in delayed development and changes in behavior leading to decreased learning capacity.

Potassium perchlorate historically was used to treat hyperthyroidism and Graves's Disease because of its ability to inhibit iodine uptake by the thyroid gland.

Studies conducted on rodents have shown that a perchlorate concentration below the level required to alter thyroid hormone equilibrium is unlikely to cause thyroid cancer in a human being.

EPA has developed a chronic oral reference (RfD) of 0.0007 milligrams per kilogram body weight per day. This is the estimated oral daily dose with uncertainties in the human population, including sensitive subgroups, that is likely to be without appreciable risk of adverse health effects over a lifetime.

Short-term exposure to high doses may cause eye and skin irritation, coughing, nausea, vomiting, and diarrhea.

WHERE IS PERCHLORATE FOUND IN UTAH?

Since 1997, DEQ has identified perchlorate contamination at the following sites in the State of Utah:

- ♦ ATK Launch Systems Inc., Bacchus Facility
- ♦ ATK Launch Systems Inc., Promontory Facility
- ♦ Hill Air Force Base
- ♦ Dyno Nobel, Site B (Pelican Point)
- ♦ Dyno Nobel, Tooele Test Site
- ♦ Utah Test & Training Range
- ♦ Wendover AFB, (FUD site)

DEQ continues to work with these facilities to assess the magnitude and extent of the contamination, and manage the exposure pathways to protect human health and the environment.

ARE THERE ANY FEDERAL AND STATE REGULATIONS, GUIDELINES AND HEALTH STANDARDS FOR PERCHLORATE?

The State of Utah follows the Environmental Protection Agency (EPA) regulations and guidelines with regards to environmental standards and contaminant regulations. The EPA has decided to regulate perchlorate under the Safe Drinking Water Act and has initiated the process of proposing a national primary

drinking water regulation. EPA has since established an interim Drinking Water Health Advisory of 15 micrograms per liter (ug/L).

Some states have also promulgated enforceable standards for perchlorate in drinking water. In Massachusetts the enforceable drinking water standard for perchlorate is 2 ug/L while California has established an enforceable standard of 6 ug/L for perchlorate in drinking water. Other states have developed a health advisory standard or a health-based goal ranging from 4 to 51 ug/L.

WHERE CAN I GET MORE INFORMATION ABOUT PERCHLORATE?

Additional information on perchlorate can be found at the following EPA site: www.cluin.org/perchlorate

CONTACT INFORMATION

For any questions or comments on this fact sheet, please contact:

Brad Maulding, Manager
Corrective Action Section
(801) 536-0205
bmaulding@utah.gov

Eric Baiden, Toxicologist
Corrective Action Section
(801) 536-0216
ebaiden@utah.gov