

Just the Facts...

Perchlorate in Drinking Water

Source

Perchlorate (ClO_4^-) is an anion that originates as a contaminant in ground water and surface water when the salts ammonium, potassium, magnesium, or sodium perchlorate dissolve in water. Ammonium perchlorate is used as the primary component in solid propellant for rockets, missiles, and fireworks. Because of its short shelf life, ammonium perchlorate must periodically be replaced within the country's missile and rocket inventory. Therefore, large volumes of the compound have been disposed of since the 1950's. Additionally, it has been found that detonation of missiles, rockets and fireworks results in residual ammonium perchlorate in the affected area. Any regulation of perchlorate will most likely affect these actions and therefore impact DOD operations. Other sources of perchlorate salts include: air bag inflators, manufacture of matches, analytical chemistry ingredients, nuclear reactors, electronic tubes, lubricating oils, leather tanning and finishing activities, fabrics and dye fixers, electroplating, aluminum refining, rubber manufacture, paint and enamel production.

Health Effects

Perchlorate interferes with iodide uptake into the thyroid gland. Because iodide is an essential component of thyroid hormones, perchlorate disrupts how the thyroid functions. In adults, the thyroid helps to regulate metabolism. In children, the thyroid plays a major role in proper development in addition to metabolism. Impairment of thyroid function in expectant mothers may impact the fetus and newborn and result in effects including changes in behavior, delayed development and decreased learning capability. Changes in thyroid hormone levels may also result in thyroid gland tumors. EPA's draft analysis of perchlorate toxicity is that perchlorate's disruption of iodide uptake is the key event leading to changes in development or tumor formation.

Current Federal Regulatory Guidance

There is currently no federal maximum contaminant level (MCL) for perchlorate; however, the Unregulated Contaminant Monitoring Rule (UMCR) requires public water systems serving more than 10,000 people and some smaller systems specifically chosen by the EPA or their primacy State to monitor drinking water for perchlorate. These monitoring activities along with the recently completed draft health risk assessment for perchlorate will provide EPA with the necessary information to determine whether or not perchlorate should be regulated during the second round of regulatory determinations scheduled for 2006. The draft risk assessment defines the health risks associated with perchlorate and assigns a new reference dose (maximum daily intake value) of 0.00003 mg/kg – day to protect human health. This reference dose could result in a

regulatory MCL in drinking water of 1 ppb or less (0.001 mg/L, assuming a 70 kg adult consuming 2 liters of water per day). If it is determined in 2006 that perchlorate should be regulated, a proposal would come out two years later (2008) with a final regulation by 2010. If perchlorate is determined to be an urgent threat to public health under the mechanisms of the Safe Drinking Water Act, the regulatory process could be greatly expedited.

Current State Regulatory Guidance

Widespread detection of perchlorate has occurred throughout areas heavily supporting munitions storage and testing and perchlorate salts manufacturing. High detections are extensive in Arizona, California, Idaho, Indiana, Kansas, Maryland, New Mexico, New York, Pennsylvania, Texas, Utah, and West Virginia. The Table below depicts current State guidance on perchlorate in drinking water aimed at protecting health. These limits may be used to set individual clean up levels at contamination sites in the respective states. States not shown do not currently (as of May 2002) have any health related guidance or regulatory limits for perchlorate in drinking water.

Table. Current State Health Guidance for Perchlorate in Drinking Water.

State	Regulation Type	Health Guidance
Texas	Drinking Water Action Level	4 ppb
	Residential Groundwater Cleanup Level	4 ppb
	Industrial / Commercial Groundwater Cleanup Level	7 or 10 ppb*
California	Action Level	4 ppb
	Draft Public Health Goal	6 ppb
Arizona	Health-Based Guidance Level	14 ppb
New York	Drinking Water Planning Level	5 ppb
	Public Notification Level	18 ppb
New Mexico	Interim Groundwater Screening Level	1 ppb
Nevada	Public Notice Standard	18 ppb

*Depending upon whether the site falls under the old or new Risk Reduction Program.

Impact on DOD

Perchlorate's use in a large number of industries makes the perchlorate regulation stakeholders group very large. The DOD is one of 24 different government agencies drawn together to ensure an integrated approach is followed for addressing and regulating perchlorate in the environment. This group of stakeholders, the Interagency Perchlorate Steering Committee, is participating in the evaluation of the health risks associated with perchlorate, detection methods, impacts on other food sources and any resulting environmental regulations. Any drinking water regulations will impact both drinking water treatment and ground water clean up activities. Proven drinking water technologies that can remove perchlorate include ion exchange and membranes. Both technologies are available for large-scale use or small-scale point-of-use for individual sites. While each technology is effective, both will significantly increase the capital and operating costs of providing safe drinking water. Additionally, consideration must be given to the disposal of the perchlorate-containing waste products that will be generated at large-scale water treatment operations. Generation of large quantities of perchlorate waste is not an issue when ion exchange and membrane systems are used as point-of-use devices for homeowners.