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Sulfolane Health Fact Sheet

Introduction

This fact sheet summarizes what the Alaska Division of Public Health currently knows about sulfolane and its health effects. We are preparing a more thorough report that discusses the public health implications of sulfolane in North Pole drinking water, and it should be available in the spring of 2010.

Sulfolane is most commonly used in refining oil to make gasoline. When sulfolane gets into the environment, it tends to dissolve into water rather than stick to the soil or evaporate. The most likely way people might come in contact with sulfolane is from drinking water.

Information about the health effects of sulfolane is limited because there have been no studies that have looked for health effects in people who have been exposed to this chemical, and few studies have been done with animals exposed to low levels of sulfolane for long periods of time.

What is sulfolane?

Sulfolane, or tetrahydrothiophene 1, 1-dioxide, is a man-made industrial solvent, commonly used in gas production and oil refining. Sulfolane is also used in other manufacturing industries such as plastics, textiles, pharmaceuticals, and electronics. Despite its widespread use, the U.S. Environmental Protection Agency does not regulate sulfolane levels in drinking water.

What happens to sulfolane when it gets into the environment?

Sulfolane dissolves readily in water, and when it gets into the environment it tends to move into groundwater. Once in groundwater, sulfolane spreads out and gets diluted as it travels with groundwater flow. Sulfolane does not break down easily in groundwater; it breaks down faster in surface water bodies when nutrients and oxygen are present. Sulfolane does not readily move from water into the air (volatilize), nor does it stick to the soils. Some plants can take up sulfolane from water. Sulfolane does not build up or accumulate (biomagnify) in aquatic food chains.

How might I be exposed to sulfolane?

The most likely way you might come in contact with sulfolane is from drinking contaminated water. Bathing/showering and washing clothes or dishes with contaminated water is not likely to pose a health risk because sulfolane is not absorbed through the skin and it does not readily volatilize.

How can sulfolane affect my health?

What we know about the health effects of sulfolane comes from animal studies (e.g. rats, guinea pigs, mice). No studies have been done to look at potential health effects in people who have been

exposed to sulfolane, either from their work or from consuming contaminated drinking water or food crops.

In most of the studies available, animals that were given a single high dose of sulfolane showed acute (short-term) effects to the central nervous system, such as hyperactivity, convulsions, hypothermia, and sometimes death at very high doses. Only a few studies looked for chronic (long-term) health effects using lower sulfolane doses (about 700 times lower) over a longer period of time. In these chronic toxicology studies, sulfolane affected certain organs, like the liver, kidneys, and spleen, and lowered white blood cell counts in test animals. These subtle chronic health effects in test animals occurred at sulfolane doses that were much higher (several hundred-fold higher) than those that could be obtained through consuming drinking water from North Pole wells.

Sulfolane is rapidly absorbed into the bloodstream when it is consumed, and is also rapidly excreted (removed), with a half-life of 3.5 to 5 hours (meaning that every 3.5 to 5 hours, half of the amount remaining in your body will be gone). Sulfolane is not a skin or eye irritant in animal studies.

How likely is sulfolane to cause cancer?

No long-term studies in animals have been done to see if sulfolane can cause cancer. In most laboratory tests with bacterial or animal cells, high doses of sulfolane did not cause cancer-like changes to the cells. Preliminary computer modeling also suggests that sulfolane is not a carcinogen (cancer-causing agent).

Has the federal government made recommendations to protect human health?

Sulfolane is not a regulated drinking water contaminant, so the federal government has not set a “maximum contaminant level” (a safe level) for sulfolane in drinking water.

What is the Alaska Division of Public Health doing to address community concerns about long-term exposure to sulfolane in drinking water?

The amount of sulfolane in North Pole’s residential wells is not a public health emergency. However, to be cautious, Flint Hills is providing bottled drinking water to residents with sulfolane in their well water.

To address concerns about past exposure, we are currently reviewing all the available scientific studies and literature on sulfolane. Some of the studies have been hard to locate (having been done over 20 years ago or not published in peer-reviewed journals), some were of questionable quality, and some had to be translated into English. As we learn more, we will share this information with the community through fact sheets, reports and notices.

We have also asked a federal public health agency, the Agency for Toxic Substances and Disease Registry (ATSDR), to recommend a level of exposure for sulfolane in drinking water that does not harm human health, both for children and adults. Unfortunately, this takes some time, but we anticipate a response in February 2010.

Because there are no studies that have looked for health effects in people who have been exposed to sulfolane, scientists and toxicology experts must rely on animal data and computer modeling to make recommendations on what is a “safe level” of exposure for people. The more uncertainty (due to lack of information and types of data available) that exists around a chemical, the higher the “safety factor” or buffer (layer of protection) we use between the smallest dose that caused a chronic health effect in animals and the amount allowed in drinking water.

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