

1. PUBLIC HEALTH STATEMENT

1.1 WHAT IS BROMODICHLOROMETHANE?

Bromodichloromethane (BDCM) is a colorless, heavy, nonburnable liquid. BDCM does not usually exist as a liquid in the environment. Rather, it usually is found evaporated in air or dissolved in water.

Most BDCM in the environment is formed as a by-product when chlorine is added to drinking water to kill disease-causing organisms. Small amounts of BDCM are also made in chemical plants for use in laboratories or in making other chemicals. A very small amount (less than 1% of the amount coming from human activities) is formed by algae in the ocean.

BDCM evaporates quite easily, so most BDCM that escapes into the environment from chemical facilities, waste sites, or drinking water enters the atmosphere as a gas. BDCM is slowly broken down (about 90% in a year) by chemical reactions in the air. Any BDCM that remains in water or soil may also be broken down slowly by bacteria.

Further information on the properties and uses of BDCM, and how it behaves in the environment, may be found in Chapters 3, 4, and 5.

1.2 HOW MIGHT I BE EXPOSED TO BROMODICHLOROMETHANE?

For most people, the most likely means of exposure to BDCM is by drinking chlorinated water. Usually the levels in drinking water are between 1 and 10 ppb (parts per billion). BDCM is also found in some foods and beverages such as ice cream or soft-drinks that are made using chlorinated water, but this is probably not a major source of exposure. BDCM has been found in chlorinated swimming pools, where exposure might occur by breathing the vapors or through the skin. Exposure to BDCM might also occur by breathing BDCM in the air in or near a laboratory or factory that made or used BDCM. However, BDCM is not widely used in this country, so this is not likely for most people. Average levels of BDCM in air are usually quite low (less than 0.2 ppb). Another place where human exposure might occur is near a waste site where BDCM has been allowed to leak into water or soil. In this situation, people could be exposed by drinking the water or by getting the soil on their skin. BDCM has been found in water and soil at some waste sites (about 1% to 10% of those tested), usually at levels of 1 to 50 ppb. Further information on how people might be exposed to BDCM is given in Chapter 5.

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1.3 HOW CAN BROMODICHLOROMETHANE ENTER AND LEAVE MY BODY?

Studies in animals show that almost all BDCM swallowed in water or food will enter the body by moving from the stomach or intestines into the blood. It is likely that BDCM would also move from the lungs into the blood if it were breathed in and would cross the skin if skin contact occurred, but this has not been studied. Bromodichloromethane leaves the body mostly by being breathed out through the lungs. Smaller amounts leave in the urine and feces. BDCM removal is fairly rapid and complete (about 95% in 8 hours), so it does not usually build up in the body. Further information on how BDCM enters and leaves the body is given in Chapter 2.

1.4 HOW CAN BROMODICHLOROMETHANE AFFECT MY HEALTH?

The effects of BDCM depend on how much is taken into the body. In animals, the main effect of eating or drinking large amounts of BDCM is injury to the liver and kidneys, These effects can occur within a short time after exposure. High levels can also cause effects on the brain, leading to incoordination and sleepiness. There is some evidence that BDCM can be toxic to developing fetuses, but this has not been well-studied. Studies in animals show that intake of BDCM for several years in food or water can lead to cancer of the liver, kidney and intestines. Although effects of BDCM have not been reported in humans, effects would probably occur if enough BDCM were taken into the body. Further information on how BDCM can affect the health of humans and animals is presented in Chapter 2.

1.5 IS THERE A MEDICAL TEST TO DETERMINE IF I HAVE BEEN EXPOSED TO BROMODICHLOROMETHANE?

Methods are available to measure low levels of BDCM in human blood, breath, urine and fat, but not enough information is available to use such tests to predict if any health effects might result. Because special equipment is needed, these tests are not usually done in doctors' offices. Because BDCM leaves the body fairly quickly, these methods are best suited to detecting recent exposures. Further information on how BDCM can be measured in exposed humans is presented in Chapter 6.

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1.6 WHAT LEVELS OF EXPOSURE HAVE RESULTED IN HARMFUL HEALTH EFFECTS?

Tables 1-1 through 1-4 show the relationship between exposure to BDCM and known health effects. Minimal Risk Levels (MRLs) are also included in Table 1-3. These MRLs were derived from animal data for both short-term and longer-term exposure, as described in Chapter 2 and in Table 2-1. These MRLs provide a basis for comparison with levels that people might encounter either in food or drinking water. If a person is exposed to BDCM at an amount below the MRL, it is not expected that harmful noncancer health effects will occur. Because these levels are based only on information currently available, some uncertainty is always associated with them. Also, because the method for deriving MRLs does not use any information about cancer, a MRL does not imply anything about the presence, absence or level of risk of cancer. Further information on the levels of BDCM that have been observed to cause health effects in animals is presented in Chapter 2.

1.7 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

The U.S. Environmental Protection Agency (EPA) has set a Maximum Contaminant Level in drinking water of 0.10 ppm (parts per million) for the combination of BDCM and a group of similar compounds (trihalomethanes). Most water samples in the U.S. have BDCM levels lower than this. The Food and Drug Administration (FDA) has set the same limit for bottled water, but no tolerance limits have been set for BDCM in food. Because it has such limited use in industry, there is no Occupational Safety and Health Administration standard for BDCM. Further information on regulations concerning BDCM is presented in Chapter 7.

1.8 WHERE CAN I GET MORE INFORMATION?

If you have further questions or concerns, please contact your State Health or Environmental Department or:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road, E-29
Atlanta, Georgia 30333

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TABLE 1-1. Human Health Effects from Breathing BDCM*

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Air (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from short-term human exposure to air containing specific levels of BDCM are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Air (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from long-term human exposure to air containing specific levels of BDCM are not known.

* See Section 1.2 for a discussion of exposures encountered in daily life.

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TABLE 1-2. Animal Health Effects from Breathing BDCM

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Air (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from short-term animal exposure to air containing specific levels of BDCM are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Air (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from long-term animal exposure to air containing specific levels of BDCM are not known.

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TABLE 1-3. Human Health Effects from Eating or Drinking BDCM*

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
1.3		Estimated Minimal Risk Level (based on studies in animals; see Section 1.6 for discussion)
<u>Levels in Water (ppm)</u>		The health effects resulting from short-term human exposure to water containing specific levels of BDCM are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
0.6		Estimated Minimal Risk Level (based on studies in animals; see Section 1.6 for discussion)
<u>Levels in Water (ppm)</u>		The health effects resulting from long-term human exposure to water containing specific levels of BDCM are not known.

* See Section 1.2 for a discussion of exposures encountered in daily life.

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TABLE 1-4. Animal Health Effects from Eating or Drinking BDCM

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
280	14 days	Liver injury in mice.
570	14 days	Kidney injury in mice.
1,000	10 days	Impaired fetal development in rats.
1,200	14 days	Death in mice.
<u>Levels in Water (ppm)</u>		The health effects resulting from short-term animal exposure to water containing specific levels of BDCM are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects*</u>
190	2 years	Kidney injury in mice.
380	2 years	Liver injury in mice.
<u>Levels in Water (ppm)</u>		The health effects resulting from long-term animal exposure to water containing specific levels of BDCM are not known.

* These effects are listed at the lowest level at which they were first observed. They may also be seen at higher levels.

