TOTAL TRIHALOMETHANES (TTHMs)

TTHMs are a group of volatile and potentially toxic chemicals formed during water treatment with disinfectants, such as chlorine. Disinfectants are used in the treatment of water to kill disease-causing microorganisms. The most common member of TTHMs is chloroform, but others such as bromoform can be found as well.

The purpose of this fact sheet is to provide an overview of frequently asked questions regarding TTHMs in the environment and their possible health effects, as well as regulatory guidance.

General Facts

What are TTHMs?

TTHMs are a common contaminant group of organic chemicals that often occur in drinking water as a result of chlorine treatment for disinfectant purposes to kill bacteria, viruses, and other contaminants that could cause serious waterborne infectious disease. TTHMs are:

- Tasteless
- Colorless
- Volatile
- Potentially toxic

The following TTHMs are the most common components as a result of chlorination:

- Chloroform
- Bromodichloromethane
- Chlorodibromomethane
- Bromoform

Why are TTHMs a concern?

TTHMs can vaporize readily into the air when in hot water. Further, when TTHMs are released into the environment, they only slowly break down by reaction with other chemicals and sunlight.
Even though its effects have not been well documented, there is evidence that some of the individual chemicals could pose both short- and long-term health effects.

How can I be exposed to TTHMs?

The main way you can be exposed to TTHMs is through:

- Drinking water that is contaminated with TTHMs.
- Ingesting foods that are prepared with TTHMs contaminated water.
- Skin uptake and breathing of TTHMs contaminated air when showering and bathing with TTHMs contaminated water.

How can TTHMs potentially affect health?

The effects on human health from exposure to TTHMs have not been well documented, however, there is evidence that some of the individual chemicals could pose both short- and long-term health effects such as:

- Dizziness
- Fatigue
- Headache
- Sleepiness
- Incoordination
- Dull chest pain
- Liver damage
- Kidney damage
- Testicle damage
- Skin sores

Can TTHMs cause cancer?

- The U.S. Department of Health and Human Services (DHHS) has determined that some TTHMs such as chloroform and bromodichloromethane are ***reasonably*** anticipated to be a human carcinogen.

- The U.S. Environmental Protection Agency (EPA) has determined that three TTHMs (chloroform, bromoform, and bromodichloromethane) are classified as ***probable*** human carcinogens. Therefore, long-term exposure to TTHMs levels above the drinking water limit could slightly increase the risk of certain cancer such as bladder, colon and rectal.

How certain are the studies that showed health risks?

- More research is needed to fully understand any health effects in humans.

- Animals (mostly rats and mice) exposed to much higher levels than most people, showed several health problems, such as liver damage, developmental and reproductive effects, and changes in hormone levels.

TTHMs Regulation and Advisories

What levels of TTHMs in water are considered harmful?

- The EPA has developed a drinking water limit for TTHMs of 80,000 ng/L. The level is equal to the approximate amount of 1,000 shot glasses (1.5 oz) in approximately 150 million gallons of water.

- The EPA requires that spills or accidental releases of 10 pounds or more of chloroform into the environment be reported to the EPA.

- Drinking water utilities are required to test for TTHMs every quarter and this standard is compared to a one-year running average of samples.

- The Occupational Safety and Health Administration has set the maximum allowable concentration of TTHMs such as chloroform in workroom air during an 8-hour workday in a 40-hour workweek at 50 parts per million (ppm).

- If testing shows that your drinking water contains TTHMs above the EPA drinking water limit, use other water sources for drinking, preparing food, cooking, brushing teeth, and other uses

when you might swallow water. However, the risk from disinfection byproducts is much lower than the risk of illness from drinking water that has not been disinfected.

Biomonitoring and Blood Testing

Can a test determine whether I have been exposed to high TTHMs levels?

There are special tests (air, breath, blood, urine, body tissue and fat) that can determine if you have been exposed to TTHMs. However, these tests are usually not done in a regular doctor's office and need special equipment.

When is testing of TTHMs useful and what can the results tell me?

The measurement of TTHMs such as chloroform in body fluids and tissues may help to determine if you have come into contact with large amounts of chloroform, but these tests are useful for only a short time after you are exposed as the body metabolizes chloroform quickly.

What can the results from testing for TTHMs NOT tell me?

Although the amounts of TTHMs in your body can be measured, there is no reliable test to determine:

- How much you have been exposed to.
- If exposure to TTHMs will cause health problems.
- Information about treatment.

Individual Concerns

If drinking water has high levels of TTHMs, should my pets drink it?

No. Pets should be given the same drinking water you drink. As with humans, if the drinking water contains high TTHMs levels causing a possible concern, use alternative water sources.

I drank water with high levels of TTHMs while I was pregnant and lactating. What impact could it have on my child?

It is not known whether TTHMs such as chloroform cause birth defects in humans.

Animal studies have shown some miscarriages and birth defects.

We have tried to get pregnant for a long time without success. Could it be due to high levels of TTHMs in my drinking water?

It is not known whether TTHMs such as chloroform affect a couple's ability to conceive.

Animal studies have shown abnormal sperm counts.

If TTHMs have been found in my soil and water, should I be concerned?

While garden fruits and vegetables should be considered when evaluating the risk of exposure to TTHMs, no data are currently available for Florida to evaluate possible risks. However, the Florida Department of Health would consider evaluation when data become available.

Can I water my lawn with water containing TTHMs?

Under normal conditions, using water containing TTHMs for your lawn will not threaten your health. Conditions where the lawn is stressed due to disease, drought or extreme temperatures could increase the use of water and therefore possibly increase the concentration of TTHMs that will be discharged on your lawn. In this case, the use of a different, alternative water source is recommended.

Can I use reuse water containing TTHMs for watering my home produce?

No. Reuse water should never be used for home-grown produce due to the concern for human microbial pathogens. Reuse water should also not be used for drinking.

Can I use chlorinated pool water containing TTHMs for watering my home produce?

No. Chlorinated pool water should never be used for home-grown produce. Chlorinated pool water should also not be used for drinking.

Can I swim in my pool if it is contaminated with TTHMs?

While there is no regulation for TTHMs in swimming pool water, swimming pool water could have levels of TTHMs that can be of risk to your health as TTHMs are very volatile and can be taken up into the blood by the skin (dermal) and lungs (breathing). Body fluids and personal care products could increase the development of TTHMs in swimming pool water to levels much greater than the levels found in regular drinking water that don't cause a harm to your health.

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If you have questions or comments about this factsheet, we encourage you to contact us.

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