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Fact Sheet	
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Methyl Bromide

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Health Hazard Summary: *The most common effects of overexposure to methyl bromide are effects on the nervous system, including headache, nausea, vomiting, dizziness, blurred vision, poor coordination, and twitching. High exposures can be fatal. Liquid methyl bromide can cause severe, delayed, blistering burns.*

HOW TO FIND OUT IF YOU ARE WORKING WITH METHYL BROMIDE

Jobs Where Methyl Bromide is Used: Methyl bromide is a pesticide. It is used mainly as a fumigant to kill insects in crops being stored or transported, to fumigate soil before planting, and to fumigate buildings. You can be exposed to methyl bromide if your work involves fumigating crops or soil,

handling or transporting fumigated crops, working where fumigated crops are stored, or fumigating buildings.

Methyl bromide is also used in the chemical industry. In the past, it was used in some fire extinguishers and as a refrigerant.

Odor and Appearance: Methyl bromide is usually an invisible, odorless gas. Often it is pressurized so that it becomes a liquid. In cold storage areas, methyl bromide used for fumigation can condense into liquid form near refrigeration coils. At very high levels, the gas has a sweet odor; if you can smell it, you are being dangerously overexposed.

Methyl bromide is sometimes called bromomethane. It has also been sold under many different trade names. These names include:

Brom-O-Gas	Haltox	Promfume
Brom-O-Sol	Isobrome	Rotox
Brozone	Kayafume	Tefabol
Celfume	Mebr	Terr-O-Gas
Dowfume	Metafume	Zytox
Embafume	Meth-O-Gas	

Your Right to Know: Under California's Hazard Communication Standard (Cal/OSHA regulation *GISO 5194*), your employer must tell you if you are working with any hazardous substances, including methyl bromide, and must train you to use them safely.

If you think you may be exposed to hazardous chemicals at work, ask to see the Material Safety Data Sheets (MSDSs) for the products in your work area (however, agricultural employers are not required to provide MSDSs). An MSDS lists the hazardous chemical contents of a product, describes its health and safety hazards, and gives methods for its safe use, storage, and disposal. An MSDS should also include information on fire and explosion hazards, reactivity, first aid, and procedures for handling leaks and spills.

This Fact Sheet is an aid for worker training programs. It does not take the place of a Material Safety Data Sheet or required pesticide training.

HOW METHYL BROMIDE ENTERS AND AFFECTS YOUR BODY

Methyl bromide enters your body when you breathe it in or absorb it through your skin. The most common effects of overexposure are effects on your nervous system, as described below. **Skin or eye**

contact with liquid methyl bromide is especially hazardous and must be prevented.

> **NOTE:** Symptoms of methyl bronmide poisoning vary widely, and its is difficult to say which ones may appear first. Symptoms from a single large exposure often appear 4-6 hours later, and possibly as long as two days later. **You could receive a harmful or even fatal dose without being aware of it at the time,** and then develop severe symptoms hours later. You could even seem to be recovering for several hours before serious effects begin to appear. Recovery from severe poisoning can take months, and permanent brain damage can occur; seek medical care for **any** likely overexposure.

Nervous System: The first signs of methyl bromide poisoning are usually from damage to the nervous system. Early symptoms of short-term overexposure may include any of the following: blurred or double vision, nausea, vomiting, cramps, dizziness, headache, fever, slurred or slowed speech, lack of coordination in movement, muscle twitching, convulsions, weakness, and shaking of the hands. Fainting spells, seizures, or unconsciousness may occur. Overexcitement, confusion, delirium, or other severe personality changes may occur.

Symptoms of long-term overexposure include loss of appetite, a general feeling of illness or tiredness, muscle pains, and any of the symptoms described in the paragraph above. Chronic overexposure to methyl bromide can damage the nerves in your hands and legs, causing numbness, tingling, prickling, and/or weakness. Recovery from this effect may take months. Your vision can also be damaged.

Skin: Methyl bromide liquid severely irritates the skin. It causes burning, itching, redness, blistering, acne, and swelling. It can penetrate ordinary clothing, including leather boots. Liquid methyl bromide that soaks into your clothes or shoes usually won't bother you at first, but may cause severe blistering burns that can appear up to a day or two later. Methyl bromide can also pass quickly through your skin into your body and poison you. If liquid methyl bromide is spilled or splashed on you, immediately remove all contaminated clothing, including shoes, and wash yourself thoroughly with soap and water. Do not wear the clothing or equipment again until it has been decontaminated; leave it with your employer to be cleaned. Leather items cannot be adequately cleaned.

Eyes, Nose, Throat, and Lungs: Methyl bromide gas can irritate your eyes and lungs, causing coughing and difficulty in breathing. Methyl bromide liquid can severely burn the eye.

Kidneys and Liver: Very high exposures to methyl bromide may damage the kidneys. Laboratory tests of workers exposed to unknown levels of methyl bromide have shown abnormal functioning of the liver,

but no other evidence of liver disease.

Cancer: Methyl bromide can cause genetic mutations in bacteria. This suggests that it may be able to cause cancer or affect the reproductive system, but as yet, we do not know. It is currently being tested to see whether it can cause cancer in animals.

Reproductive System: Methyl bromide has not been tested thoroughly to see whether it could pose a hazard to fertility or pregnancy. Based on limited testing, it does not appear to be more hazardous to pregnant women than to other people. However, because its effects on pregnancy have not been studied well, pregnant women should avoid exposure to methyl bromide.

TESTS FOR EXPOSURE AND MEDICAL EFFECTS

Methyl bromide absorbed into the body quickly releases bromide ion, which can be measured in the blood. This type of test can help to tell whether symptoms have been caused by *recent* exposure to methyl bromide. However, the relationship between long-term methyl bromide exposure and the level of bromide ion in the blood is not well known. Therefore, routine testing is *not* recommended or legally required.

It is generally recommended that workers who are regularly exposed to hazardous substances receive a complete physical examination, including an occupational and medical history, at the beginning of their employment. They should also have regular periodic follow-up examinations.

LEGAL EXPOSURE LIMITS

California's Division of Occupational Safety and Health (Cal/OSHA) sets and enforces workplace chemical exposure limits. Cal/OSHA establishes Permissible Exposure Limits (PELs) for the amounts of certain chemicals in workplace air. The PELs are intended to protect the health of a person who is exposed every day for a working lifetime.

Cal/OSHA's PEL for methyl bromide is 5 parts methyl bromide per million parts of air (5 parts per million, or 5 "ppm"). Legally, your exposure may be above the PEL at times, but only if it is *below* the PEL at other times, so that your *average* exposure for any 8-hour workshift is 5 ppm or less.

Cal/OSHA requires that employers provide any protective equipment necessary to prevent skin contact with liquid methyl bromide.

The California Department of Food and Agriculture (CDFA) also regulates pesticide use and the health and safety of pesticide workers. CDFA requires Pest Control Operators to be trained and certified to work with methyl bromide. All workers under their supervision must also be trained before working

with methyl bromide, and at least once a year thereafter. This must include training on the proper use and maintenance of safety equipment. Each county's Agricultural Commission also regulates pesticide use.

You should not rely on your sense of smell to warn you if you are being overexposed to methyl bromide. **You can be overexposed to methyl bromide without being able to smell it at all.** Sometimes methyl bromide is mixed with a strong-smelling, irritating gas (chloropicrin) to provide a warning of exposure; however, sometimes there are dangerous levels of methyl bromide without enough chloropicrin to warn you that you are being exposed.

Measuring the amount of a substance in the air is the only reliable way to determine your exposure level. Direct-reading detector tubes are the recommended air exposure monitoring equipment; a halide torch can be used to check for very high levels, but it cannot detect methyl bromide at the legal exposure limit.

If you think that you may be overexposed, talk to your supervisor, your union representative, or other people listed under "Resources" on page 4. If any worker might be exposed to a substance at more than the legal exposure limit, the employer must measure the amount of the chemical in the air in the work area (Cal/OSHA regulation *GISO 5155*). You have the right to see the results of monitoring relevant to your exposure (*GISO 3204*).

You also have the right to see and copy your own medical records and records of your exposure to toxic substances. These records are important in determining whether your health has been affected by your work. If your employers have such records, they must keep them and make them available to you for at least 30 years after the end of your employment.

REDUCING YOUR EXPOSURE

Your employer is required to protect you from being exposed to levels of methyl bromide that are above the legal exposure limit. For information about how Cal/OSHA, Cal/OSHA Consultation Service, and CDFA can help you and your employer, see the "Resources" section on the last page.

Substitution: The most effective way to reduce hazardous chemical exposures is to use a safer chemical, if one is available. However, the health and safety hazards of the substitute must also be carefully considered to ensure that it is actually safer.

Engineering and Administrative Controls: When possible, employers must use engineering and administrative controls rather than personal protective equipment to prevent overexposures. CDFA regulations require that mixing, loading, and transfer of methyl bromide be done only in closed systems. Two trained workers must be present for any fumigation of fields or enclosed spaces. At least 24 hours must pass between application of methyl bromide to fields or crops and re-entry of workers into the fields to do hand harvesting, weeding, pruning, irrigation, or operating machinery without specified protective equipment. The employer must provide washing facilities and a clean clothing change area.

At fumigation sites, the employer must provide washing facilities and emergency shower facilities. If liquid methyl bromide is spilled or splashed on you, immediately remove all contaminated clothing, including shoes, and wash yourself thoroughly with soap and water. Do not wear the clothing or equipment again until it has been decontaminated; leave it with your employer to be cleaned. Leather items cannot be adequately cleaned.

Personal Protective Equipment: Your employer must provide any necessary protective equipment. You must wear safety goggles when you are doing certain jobs where liquid methyl bromide could be splashed into your eyes. When engineering controls cannot sufficiently reduce exposures, a respirator must be worn and a respiratory protection program must be developed by the employer, as outlined in Cal/OSHA regulations (*GISO 5144*). An industrial hygienist or other knowledgeable person should be consulted to ensure that the equipment is appropriate and is used correctly. Methyl bromide has poor warning properties, so the cartridge on an air-purifying respirator can wear out and need replacement without your knowing that it is no longer effective. Therefore, only a supplied-air respirator or a self-contained breathing apparatus is approved.

You must avoid all direct skin contact with liquid methyl bromide. You should not wear gloves when working with liquid methyl bromide, because gloves can absorb the chemical and trap it against your skin. Shoes, belts, bandages, watches, and jewelry can also trap the liquid and cause burns.