Environmental Health Information

June 1999

Use of Methyl Bromide: Public Health Concerns and Recommendations

This information sheet is written in response to an incident involving methyl bromide poisoning during fumigation of a Minneapolis grain mill in 1997. It does not provide a comprehensive discussion of methyl bromide, or of all health issues possibly related to its use. More information regarding methyl bromide, and the Minneapolis incident in particular can be found in a health consultation available from the Minnesota Department of Health (MDH).

This and other MDH materials regarding environmental hazards relevant to human health are freely available to the public. They may be used to gain a better understanding of health risks associated with hazardous chemicals, to inform regulatory decisions, or to assist people in taking action to reduce or avoid exposures to toxic chemicals.

The August 1997 Methyl Bromide Incident

On the morning of August 24, 1997, an individual was found dead in his warehouse studio in Minneapolis, Minnesota. The cause of death was ultimately determined to be methyl bromide poisoning. The fumigant, methyl bromide, was being used that day to control pests at a grain mill about 160 feet from the warehouse, and connected to it by an underground pipe tunnel. In addition to the fatality, several individuals who entered the warehouse in the first 24 hours were reported to have suffered symptoms consistent with methyl bromide poisoning.

Prior to fumigation of the mill, employees of the fumigation company spent two weeks sealing the building. This included sealing the underground pipe tunnel which connected the two structures. The amount of fumigant used, method of application, and other information about this specific event are not currently available.

Methyl bromide is applied by (1) sealing and then, (2) evacuating the building, (3) releasing methyl bromide from pressurized canisters, (4) waiting 10 - 72 hours for the fumigant to eradicate pests, (5) venting and monitoring the building, and then (6) leaving it vacant until concentrations of the fumigant fall below levels that are considered safe.

According to published reports, the mill had previously been fumigated with methyl bromide two or three times in each of the previous five years. Use of a fumigant within the city of Minneapolis requires notification of the Minneapolis Fire Department. The Fire Department was unable to verify that notification had taken place prior to the August 1997 incident.

Other Methyl Bromide Incidents

Since 1955, the majority of methyl bromide poisonings have been associated with fumigation of residences, field and greenhouse soils, or grain and commodities. In urban areas, methyl bromide has been used to fumigate houses, and grain mills or elevators. Homes being fumigated in warmer climates are typically covered by large tents to allow complete and controlled fumigation. Entry into tented structures without proper respiratory protection has led to numerous deaths and injuries.

Incidents similar to the 1997 Minneapolis event have occurred when methyl bromide has migrated from fumigated houses to nearby houses via pipes or tunnels, causing death and/or injury to residents.

In one such incident in Norway, an infant died and two adults were injured when methyl bromide entered a house seven meters from a house being fumigated through sewer lines that had been cleaned and emptied of water the day of the accident. The empty sewers allowed gas to flow from one house to the other. The applicator noted an unexplained decrease in methyl bromide in the fumigated house during application, and he then increased the flow of fumigant to compensate for the loss.

A 1997 newspaper report reviewed evidence that another individual may have been exposed to methyl bromide in August 1996 in the same Minneapolis warehouse where the 1997 fatality occurred. Symptoms from that possible exposure included dizziness and loss of muscular control. Severe symptoms were reported to have lasted a couple of weeks. Minor symptoms lasted about a year.

Possible Exposure Scenarios

Two routes have been identified by which methyl bromide - at dangerously high concentrations - could have entered the warehouse during the August 1997 incident: (1) methyl bromide may have entered the warehouse directly from the mill through the connecting pipe tunnel, or (2) methyl bromide may have escaped from the mill and entered the warehouse through open windows, air intakes, or vents.

Sealing: Plastic was reportedly used to seal the pipe tunnel connecting the mill and the warehouse. It has been demonstrated that methyl bromide can pass through polyethylene sheeting during the fumigation of garden soils. Furthermore, there are numerous ways that sealing can fail. Powerful drafts can be created in multi-story buildings which can stress or break physical barriers, or loosen adhesives being used to secure sealing materials. Specific information is not available about sealing techniques at this site.

Venting: A 1987 study showed that outdoor concentrations of methyl bromide during venting of a fumigated mill can be above levels of health concern. This study also suggests that a greater amount of methyl bromide may *inadvertently* leak during fumigation than is *deliberately* vented at

the end of the fumigation process. Therefore, it is possible that monitoring of outdoor air during planned venting may not always detect the highest potential exposure levels during fumigation.

Limiting the Risk of Further Incidents

Environmental Protection Agency (EPA) regulations require that methyl bromide and other pesticides always be applied by trained and experienced applicators. Prior to application, fumigators should acquire a thorough understanding of site characteristics, including: (1) existence of pipes or tunnels connecting the fumigated building to other structures, (2) normal air movement in the area and around air intakes of adjacent buildings, and (3) factors in the site area that might increase risk during fumigation (e.g., utility or construction work; proximity to a school or daycare center).

MDH believes that other risk reduction measures should include the following: (1) Prior to fumigation, applicators or facility management should notify public works and emergency response employees, and individuals working or living near the facility. (2) Concentrations of methyl bromide in the air should be monitored throughout the fumigation and venting processes. (3) Use of an odorant, in addition to proper monitoring and other measures, should be considered.

Odorants: An odorant (and pesticide), chloropicrin, has been used in some applications of methyl bromide. However, regulations limit the use of chloropicrin and other odorants in the fumigation of certain food products. While odorants have extremely irritating effects, odor is often not enough to deter individuals from entering fumigated buildings. Individuals who may potentially be exposed should also receive prior notification of the fumigation, and information about potentially serious health effects which may accompany exposure.

Given the chemical differences between odorants and methyl bromide, awareness of an odorant will mean that a significant exposure has already occurred. Odorants should therefore not be used as a substitute for other safety or monitoring measures.

Replacement Fumigants: The use of methyl bromide in the United States is scheduled to be phased out by the year 2005. Replacement fumigants are also expected to have some potential for public health concern. Without knowing what new chemicals may be used, it is not possible to compare their relative risk to the human health risks of methyl bromide. Risks that may need to be investigated with replacement chemicals include: (1) the amount of chemical residue remaining in the final food product, (2) chronic and latent effects of exposure to the pesticide and residue, and (3) bioaccumulation of the fumigant.

Regulation: The United States Food and Drug Administration (FDA) generally enforces regulations regarding pesticides used on foodstuffs. Health risks are reviewed by the EPA prior to registration of pesticides. These measures do not preclude individual states or municipalities from adding additional regulations to govern specific pesticide use.

Conclusions:

Methyl bromide is an effective fumigant that is possible to use with minimal risk to applicators and to the general public. However, MDH is concerned that individuals may sometimes be exposed to dangerous concentrations of methyl bromide even during careful and conservative applications of the pesticide. Methyl bromide use in Minnesota is currently believed to be limited to a few grain mills and elevators in the state. Though the potential for accidental poisonings in Minnesota is small, when exposure causes symptoms in an individual, the health effects may be severe.

Summary Recommendations

Severe health effects may result from exposure to methyl bromide. MDH believes that stringent measures may be necessary to protect the public from potential exposure, especially in populated or urban areas. Methods which may be employed to limit exposure to methyl bromide and other pesticides, and which may not be required by the current pesticide label include:

- Notification of nearby community residents, businesses, and employees.
- Notification of local authorities specifically including emergency, health, and public works personnel.
- Controlled access and patrol of areas, outdoors and indoors, adjacent to the facility
- Environmental monitoring throughout event and venting process
- Use of an impermeable sealing material to seal potential leak areas (labels currently require "gas tight tarp or polyethylene sheeting [thickness of 4 mil or greater])"
- Fumigation planning, including, a review of risks which may be associated with not evacuating nearby residences and businesses
- Fumigation planning, including, calculation of expected concentrations in areas of the structure, and the creation of action plans (e.g., evacuation; increased monitoring) in the event that monitoring does not match concentration estimates.
- Addition of an odorizing agent to the fumigant

Public health reports on the August 1997 methyl bromide incident are available from MDH. To request a copy call 651-201-4897 (or toll-free at 1-800-657-3908 and press "4" on you touch-tone phone). Or write: Site Assessment and Consultation Unit, Minnesota Department of Health, P.O. Box 64975, St. Paul, MN 55164.