

Procedures for Grain Bin Fumigation

April 2004

THIS PRODUCT MAY ONLY BE USED BY A CERTIFIED PESTICIDE APPLICATOR OR A PERSON HAVING SUCCESSFULLY COMPLETED THE FARMER PESTICIDE COURSE AND EXAM

Contact Lakeland College at 1-866-853-8646 for information on Pesticide Applicator Certification.
Contact Olds College at 1-800-661-6537 for information on the Farmer Pesticide Course.

The following information has been provided to supplement and/or clarify label directions. Should information provided conflict with label directions, follow the label. If in doubt regarding any label direction, contact the pesticide manufacturer.

Aluminum phosphide, when exposed to any moisture, will release phosphine gas. This gas has a garlic or strong fishy odour, and can be fatal if inhaled. If you smell this odour, leave the treatment area **immediately**. Aluminum phosphide pellets or tablets are impregnated with paraffin to provide enough time for their handling and placement before phosphine gas is released.

Always wear required protective equipment when using aluminum phosphide.

Use of Aluminum Phosphide

- All persons conducting a fumigation **must** be at least 18 years of age.
- At least two people **must** be present during fumigation. One **must** remain on the outside of the structure to get help should an emergency develop.
- Phosphine gas is heavier than air. This means that it will diffuse down through the grain and accumulate in the lower portions of the grain bin or rail car. Thorough ventilation **must** be performed to release the gas accumulated in these areas.
- If you are not familiar with the use of aluminum phosphide, consult your pesticide vendor. Follow the label directions completely and don't take chances.
- Grain bins with an attached dwelling or animal shelter **must not** be fumigated.
- Farmers should keep detailed records of grain bin fumigations including the date of the fumigation, amount of grain treated, amount of fumigant used, and prevailing weather conditions at the time of fumigation.

Temperature and Moisture Restrictions

- Grain **must not** be fumigated when the moisture content of the grain is greater than 15%, or the grain temperature is less than 5°C.
- Humidity greater than 15% within the grain can cause phosphine gas to be evolved at a greater rate than can be diffused causing high concentrations of the gas to accumulate. Spontaneous ignition of the gas could then occur.

Procedures for Grain Bin Fumigation

April 2004

- The evolution of gas is temperature-dependent and at grain temperatures lower than 5°C, very little gas will evolve resulting in no pest control. **Moving grain containing still active aluminum phosphide pellets or tablets to a warmer location would create a serious life-threatening situation.** The temperature of the grain and the outside air temperature should be similar.
- When the grain is warm and the outside temperature is cool, the air currents move up so grain at the bottom of the bin may not be effectively fumigated. When grain is cool and the outside air temperature is warm, the air currents move down, so grain at the top of the bin may not be effectively fumigated.

It is against federal law to transport grain by road or rail while it is being fumigated.

Personal Protective Equipment

Phosphine gas can be absorbed through the skin but inhalation is the most direct route. Anyone performing a fumigation must know how to use and have on hand, at each fumigation, a canister-type full-face gas mask with the appropriate canister for phosphine gas. The gas mask canister **must** be checked to verify that it has not passed its expiry date.

Symptoms of over exposure include fatigue, ringing in the ears, pressing sensation in the chest, nausea and diarrhoea. If any poisoning symptoms are experienced call an ambulance or contact the Alberta Poison Centre (1-800-332-1414).

Safety Precautions

- Warning signs **must** be placed on or adjacent to all doors and hatches of each grain bin being fumigated. The sign should bear wording similar to the following: **"FUMIGATION - DANGER THIS BIN IS BEING FUMIGATED WITH THE POISONOUS GAS PHOSPHINE - KEEP OUT"**
- All entrances to the grain bin(s) **must** remain locked during the fumigation.
- Aluminum phosphide flasks or containers **must** only be opened in a well-ventilated area. Moisture resistant gloves **must** be worn when handling aluminum phosphide.
- Once phosphine gas has been released, no person shall enter a grain bin without wearing a Self-Contained Breathing Apparatus (SCBA).

Moisture on the skin can initiate the release of phosphine gas, which can then be inhaled.

Ventilation has been completed when:

1. all substances used for the fumigation and sealing of openings have been removed from the grain bin,
2. all the grain has been augured out and the floor-level grain bin door(s) and top inspection hatch have been opened for at least 24 hours, and
3. warning signs have been removed.

Use an electric fan to help force air through the bin.

A gas detection device should be purchased to ensure that no pockets of phosphine gas remain after ventilation. The device includes a hand pump used to draw gas into a glass detector tube. The detector tubes are available for different concentrations and types of gas. These devices are available from most safety supply stores. The maximum concentration for Short Term Exposure Limit (STEL) is 1.0 ppm for a continuous exposure period of 15 minutes with a maximum of four such periods per day and at least 60 minutes between exposure periods.

Procedures for Grain Bin Fumigation

April 2004

For long term exposure (TWA-TLV) the maximum is 0.3 ppm, which is the **Time-Weighted Average** concentration for a normal 8-hour workday or 40 hour week. **DO NOT ENTER** the bin without using a respiratory device if gas levels exceed 1.0 ppm.

Storage

Keep any unused aluminum phosphide in its original, tightly closed container. Store in a heated, well-ventilated, dry and locked location. If allowed to freeze, condensation inside the container will cause phosphine gas to be evolved creating a hazardous, **life threatening**, situation. **Purchase only the required amount of fumigant at any one time, eliminating the need to store.**

Disposal

Usually, any residue is mixed with the grain and lost. However, if there is a need to dispose of active ash or wet tablets or pellets check the label for disposal instructions. Generally, immersing in a 2% detergent solution will neutralize ash residue. Make sure that the detergent solution fills the container, eliminating an air space on top that can fill with dangerous levels of phosphine gas. This procedure should only be performed outdoors in an isolated area. If the detergent solution begins to foam, cease adding ash until foaming stops. The ash/detergent solution should be left for 36 hours, and then disposed of through regular waste management procedures. High concentrations of phosphine gas can lead to spontaneous ignition. This can occur when the tablets or pellets are exposed to too much moisture. In case of fire, use a carbon dioxide or Met-L-X fire extinguisher. **DO NOT** add more water as this will cause more phosphine gas to evolve and make the situation worse.

For further information regarding the safe use of aluminum phosphide grain bin fumigant, please contact the product manufacturer. For information regarding provincial regulatory provisions for fumigation regulations, please contact Alberta Environment at 780 427-2700.