

FIRES IN AGRICULTURAL CHEMICALS

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Introduction

With increased agricultural production, farmers are using more fertilizers and chemicals. This has caused new problems for fire fighters due to the numerous types of chemicals used and the increased chemical storage by farmers and suppliers.

Fire fighters should spend more time with farmers and suppliers to pre-plan in case of a fire. Trade name and formulations number in the thousands. Not only are many of these chemicals poisonous for their intended use, but many are toxic to humans both internally and externally. For this reason proper storage, hazard identification, established emergency procedures, and fire fighter training are extremely important.

Chemicals used by farmers and commercial applicators include: fertilizers, soil conditioners, and pesticides.

Many of these chemicals release toxic fumes with little or no warning when exposed to fire. Most serious are the organophosphate and chlorinated hydrocarbons.

When fighting chemical fires wear protective clothing, use a self-contained breathing apparatus (air paks), and have sufficient air available to complete the job. For additional protection work on the upwind side of the fire.

Fertilizers

Although most fertilizers are quite stable, there have been problems of fires and explosions with materials such as ammonium nitrate.

Ammonium Nitrate

Like other inorganic nitrates, ammonium nitrate can be detonated if they are in the proper crystalline form, if the initiating source is sufficiently large, or if heated under sufficient confinement. The degree of confinement necessary usually is greatest for the purest material.

Storage recommendations for bagged and bulk ammonium nitrate are published in NFPA No. 490, Code for the Storage of Ammonium Nitrate. The Standard covers building construction, pile sizes,

spacing, and separation of ammonium nitrate from contaminating material that could increase its sensitivity during a fire. Also covered are flow, cleanliness of the storage area, and precautions against ignition sources.

Fire fighting procedure for ammonium nitrate should include:

1. Approach the fire from upwind side. Use a self-contained breathing apparatus (vapors from decomposing ammonium nitrate are extremely toxic).
2. Create as much ventilation as possible to permit smoke, gases and heat to escape and to prevent pressure build-up.
3. Flood the burning ammonium nitrate with water to reduce the temperature of the burning material rapidly.
4. Because ammonium nitrate is an oxidizing material (decomposes under certain conditions to yield oxygen and increase a fire's intensity) smothering agents such as inert gases, steam, foam, dry chemicals, sand, etc. will have no effect.

Anhydrous Ammonia

Anhydrous ammonia can cause severe burns upon contact. Contact with the liquid ammonia can also cause loss of sight, severe injury of the respiratory membranes and varying degrees of irritation of skin, eyes and mucous membranes. For these reasons, use adequate body protection -- self-contained breathing apparatus with full face shields (air paks) and full protective clothing. In addition to the air pak, if working around the shut-off valves, wear rubber gloves and a rubber apron to protect the body from contact with liquid.

If exposed to liquid anhydrous ammonia, wash the exposed area with water for at least 15 minutes or until the injured person receives medical attention.

Anhydrous ammonia fire fighting procedures should include:

1. Stop the flow of the anhydrous ammonia gases by shutting off all valves and disconnecting all hoses from storage, nurse, and applicator tanks.
2. If in an enclosed area, ventilate the fire.
3. Keep the storage vessels cool with the use of water.
4. Anhydrous fires can be extinguished by the use of dry chemicals, carbon dioxide, or a water spray.
5. Always use proper personal protective equipment.

Urea

Urea is classified as a non-flammable material by the Interstate Commerce Commission. Urea will not support combustion by itself but melts at a temperature of 534.2F. Above this point it begins to decompose, giving off mildly toxic fumes. For this reason, the toxicity hazard of urea is given as slightly dangerous.

Urea fire fighting procedure should include:

1. Approach the fire on the upwind side.
2. Flood the area to reduce the temperature of the burning mass.

3. Provide adequate ventilation to prevent pressure, temperature and toxic fumes build-up (self-contained breathing equipment is recommended to protect personnel against toxic fumes).

Phosphate Fertilizer Materials

Phosphate fertilizers commonly used and stored in blending plants (triple super phosphate, diammonium phosphate) will not support combustion and have a melting point in excess of 1500 degrees Centigrade. Both of these are rated as slightly dangerous in toxicity.

Fire fighting procedure should include:

1. Flood the area to reduce the temperature.
2. Provide adequate ventilation.
3. Wear protective clothing and breathing apparatus.

Potash Fertilizer Materials

Muriate of potash is the principal potassium containing fertilizer used as a bulk blending ingredient. It is rated slightly dangerous as a fire and toxicity hazard.

Fire fighting procedure for muriate of potash is the same as for phosphate fertilizer.

Chemical Fires

Fire in a warehouse or farm storage area where agricultural chemicals are stored may create a great hazard to fire fighters, inhabitants, and livestock because the possibility of poisoning is added to the usual fire hazards. In addition, if proper fire fighting procedure is not followed, water or chemicals used to fight the fire very easily could spread contamination over a wide area. For this reason preplanning and training for chemical fires are very important.

Recommendations

Pre-Fire Planning and Inspection for Local Fire Departments

1. At least annually visit each large chemical storage warehouse and take note of the following:
 - ✓ General layout of the facility
 - ✓ Locations of hydrants, normal and alternate access roads, gates, fences
 - ✓ Surrounding building occupancies and land use
 - ✓ Means of ventilation
 - ✓ Means of controlling drainage at and adjacent to the facility.

2. Prepare a list of day and night telephone numbers of:
 - ✓ Facility operators
 - ✓ Physician (familiar with the products)
 - ✓ Poison Control Center
 - ✓ Manufacturers of the products
3. Establish a card file on each facility to make the officer aware of the hazards he might face in fighting the fire.
4. Establish a reference manual of the systems of poisoning and what to do in case of contact with the chemicals stored in the facility.
5. Recommend chemical storage procedures to owners or managers. Chemicals should be stored away from other fire hazards.

Post-Fire Clean-Up

Personal Precautions

1. Remove protective clothing upon leaving site and impound with contaminated fire fighting equipment.
2. Upon returning to the station, shower and shampoo thoroughly with soap and water to remove traces of toxic chemicals.
3. Wash inner clothing with detergent and put on clean clothes.
4. Watch for signs and symptoms of pesticide poisoning.
5. Wash all personal clothing, protective clothing and respirators in an isolated area. Put on coveralls and rubber gloves and use respiratory protection when cleaning clothing and equipment.

Fire Site

1. Isolate and secure scene to keep people away.
2. Contact public health department for disposal instructions and approval.
3. Handle waste and run-off same as for a product spill -- personal protective equipment is required.
4. Be aware of aid available to you. For example in the US the National Agricultural Chemicals Association has a network of safety teams to assist you in case of major pesticide spillage such as may result from a fire. To contact NCA, telephone Cincinnati, Ohio (513) 961-4300 and ask for help.
5. In the US the Chemical Transportation Emergency Center (CHEMTREC) provides emergency personnel with information on safety measures in handling hazardous chemicals involved in accidents on the nation's highways, railroads, and waterways. Assistance is available 24 hours a day, seven days a week. Their nationwide emergency telephone number is (800) 424-9300 .

Fighting fires involving agricultural chemicals

1. After receiving call of a fire involving chemicals, notify physician and hospitals to be prepared to receive possible poison victims. (Hospitals should have a card file on each storage facility listing the type of chemicals stored and the manufacturer of each.)

2. Evacuate the downwind area and isolate the area. Patrol this area to keep spectators out.
3. Before attempting to fight the fire use the correct personnel protective equipment. This includes the use of rubber gloves, boots, turn-outs, and helmets. If contact cannot be avoided also wear self-contained breathing apparatus.
4. Avoid working in areas on the downwind side of the fire. Attack the fire from a safe distance. Bottles, drums, metal and aerosol cans are not vented and may explode.
5. Attempt to contain the fire and protect the surroundings. Prevent the spread of the fire by cooling nearby containers to prevent rupture.
6. Avoid raising a flammable, explosive, or toxic dust.
 - ✓ Use soft streams such as fog so as not to tear open paper containers or break jars.
 - ✓ Use foam when large volumes of flammable solvents are released from ruptured metal or glass containers.
 - ✓ Cool drums containing flammable solvents with water spray.
 - ✓ Keep a safe distance in case of explosion.
7. Avoid using large quantities of water to keep toxic run-off to a minimum. Construct dikes to prevent flow into lakes, streams, sewers, etc. (Cooling effect of water retards high-temperature decomposition of chemicals to less toxic compounds).