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Fires in Agricultural Chemicals

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

Chemicals used by farmers and commercial applicators include: fertilizers and soil conditioners, soil fumigants, herbicides, pesticides, rodenticides, insecticides, fungicides, explosives, etc. Many of these chemicals release toxic fumes with little or no warning when exposed to fire. Most serious are the organic phosphates, such as parathion and malathion, 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.

Firefighters should spend more time with farmers and suppliers to plan in case of a fire. Trade names and formulations number in the thousands. Many of these are chemicals that are poisonous both for their intended to humans. Proper storage, hazard identification, established emergency procedures and firefighter training are extremely important.

Fighting fires involving agricultural chemicals

Firefighters responding to fires involving agricultural chemicals should follow these steps:

- After receiving a call for a fire involving chemicals, notify physicians 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.)
- Evacuate the downwind area and isolate the area. Patrol this area to keep spectators out.
- Before attempting to fight the fire, use the correct personal protective equipment. This includes rubber gloves, boots, turn-outs and helmets. If contact cannot be avoided, also wear a self-contained breathing apparatus.
- 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.
- Attempt to contain the fire and protect the surroundings. Prevent the spread of the fire by cooling nearby containers to prevent rupture.
- Avoid raising a flammable, explosive, or toxic dust.
 - Use soft water streams such as fog to avoid tearing open paper containers or breaking 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.
- Keep toxic runoff to a minimum by avoiding the use of large quantities of water. Construct dikes to prevent flow into lakes, streams, sewers, etc. (the cooling effect of water retards high-temperature decomposition of chemicals to less toxic compounds).

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 is an oxidizing agent and will increase the intensity of fire. All grades of ammonium nitrate can be detonated if they are in the proper crystalline form, if the initiating source is sufficiently large or if they are 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 number 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 procedures for ammonium nitrate should include:

- Approach the fire from the upwind side. Use a self-contained breathing apparatus (vapors from decomposing ammonium nitrate are extremely toxic).
- Create as much ventilation as possible to permit smoke, gases and heat to escape and to prevent pressure build-up.
- Flood the burning ammonium nitrate with water to rapidly reduce the temperature of the burning material.
- 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 or sand will have no effect.

Anhydrous ammonia

Anhydrous ammonia can cause severe burns upon contact. Contact with the liquid ammonia also can 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 — a self-contained breathing apparatus with full face shields (air paks) and full protective clothing. If working around the shut-off valves, also wear rubber gloves and a rubber apron to protect your body from contact with liquid.

If you are exposed to liquid anhydrous ammonia, wash the exposed area with water for at least 15 minutes or until you receive medical attention.

Anhydrous ammonia fire fighting procedures should include:

- Stop the flow of the anhydrous ammonia gases by shutting off all valves and disconnecting all hoses from storage, nurse and applicator tanks.
- If in an enclosed area, ventilate the fire.
- Keep the storage vessels cooled with water.
- Anhydrous fires can be extinguished with dry chemicals, carbon dioxide or a water spray.
- 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 534.2 degrees Fahrenheit. At temperatures higher than 534.2 degrees Fahrenheit, 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 procedures should include:

- Approach the fire on the upwind side.
- Flood the area to reduce the temperature of the burning mass.
- 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 Celsius. Both of these are rated as **slightly dangerous** in toxicity.

Fire fighting procedures should include:

- Flood the area to reduce the temperature.
- Provide adequate ventilation.
- 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 procedures 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 could easily spread contamination over a wide area. For this reason, planning and training for chemical fires are very important.

Recommendations

Fire planning and inspection for local fire departments

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

Post-fire clean-up

Personal precautions

- Remove protective clothing upon leaving the site and impound with contaminated fire fighting equipment.
- Upon returning to the station, shower and shampoo thoroughly with soap and water to remove traces of toxic chemicals.
- Wash inner clothing with detergent and put on clean clothes.

- Watch for signs and symptoms of pesticide poisoning.
- 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

- Isolate and secure scene to keep people away.
- Contact public health department for disposal instructions and approval.
- Handle waste and runoff same as for a product spill. Personal protective equipment is required.
- Be aware of aid available to you. The National Agricultural Chemicals Association has a network of safety teams to assist you in case of major pesticide spillage that may result from a fire. To contact NCA, telephone Cincinnati, Ohio, call and ask for help.
513-961-4300,
- 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. CHEMTREC is a voluntary program operated by 165 U.S. member companies. Assistance is available 24 hours a day, seven days a week.
800-424-9300.

References

- *Recommended Procedures for Fighting Fire Involving Fertilizer Material*, Missouri Farmers Association, Inc., 201 South Seventh Street, Columbia, Missouri 65201.
- *Fire Department Guidelines — Agricultural and Garden Chemical Fires*, Chevron Chemical Company, 575 Market Street, San Francisco, California 94105.
- *Safety Manual for Handling and Warehousing Class B Poison Pesticides*, National Agricultural Chemicals Association, 1155 15th Street, N.W., Washington, D.C. 20005.
- *Fire Hazards of Stored Pesticides*, Agricultural Extension Service, University of Minnesota, St. Paul, Minnesota 55108.

Related MU Extension publications

- G1907, Residential Fire Detection
<http://extension.missouri.edu/p/G1907>

Order publications online at <http://extension.missouri.edu/explore/shop/> or call toll-free 800-292-0969.



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