Armed Forces Pest Management Board
Technical Guide No. 16

Pesticide Fires—Prevention, Management, and Cleanup

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AFPMB Technical Guides

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Comments and Changes

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Introduction

A fire involving pesticides, as with any fire involving toxic chemicals, may create unique and life threatening problems. The usual hazards presented by a fire are compounded by the danger of pesticide poisoning and widespread environmental contamination. Proper planning and training can greatly reduce the personal harm and environmental damage possible from a fire involving pesticides.

This TG has been prepared to help installation personnel prevent, control, and cleanup a pesticide fire. This TG does not supersede requirements of military component regulations and applicable laws.

The primary sources of information on storage of pesticides considered to be flammable or combustible are the DoD Unified Facilities Criteria (UFC) 4-440-01 and the National Fire Protection Association (NFPA) codes and standards, in particular NFPA 434, Code for the Storage of Pesticides. The DoD UFC is viewable online at DoD Unified Facilities Criteria 4-440-01. NFPA 434 is viewable at https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=434. See Appendix F for additional references.

Pre-Fire Planning

Success in minimizing hazards to health and the environment during and after a pesticide fire depends in large part upon adequate pre-fire planning. Time-consuming preparations and difficult decisions should be made in advance rather than during an emergency situation. An added benefit of pre-fire planning is that potential hazards are often identified during the planning process and can be eliminated, reducing the chance that a fire will occur.

All applicable organizations, particularly the fire department, should participate in the preparation of a pre-fire plan. A single individual or activity (e.g., the Installation Pest Management Coordinator, safety officer, or fire department) should prepare and coordinate the plan with relevant offices. The plan should be put in writing so that appropriate organizations can be notified. It should be updated whenever major changes of pesticides stored or modifications to the facility are made, and at least annually. The pre-fire plan should represent a detailed analysis of the installation's procedures to handle a toxic chemical fire and should at a minimum address the points listed below. See Appendix D for a sample pre-fire plan.

Know the Rules and Requirements for Pesticide Storage. Familiarize all workers with the general rules and requirements for storing pesticides, including local requirements if applicable. Appendix A describes general rules and requirements.

Know the Characteristics of Your Pesticide Inventory. Familiarize all workers with the combustion characteristics and of the pesticides in your inventory. See Appendix B and C for characteristics and terminology of pesticide flammability and combustibility.

Facility Floor Plan. Make a floor plan of the pesticide storage facility indicating where permanent inside walls, all external openings such as doors and windows, and pesticides are located. Pesticide storage areas and the mixing area should be clearly identified.

Pesticide Inventory. A copy of a current pesticide inventory should be provided to the local fire department. Updates to the list should be provided at least quarterly.

Pesticide Safety Data Sheets. Copies of the Safety Data Sheets (SDS's) for each pesticide must be maintained in the facility with copies offsite to be referenced if the facility is not accessible.

Access Routes. Primary and alternate access routes to the pesticide facility from all directions should be included because access may be blocked by toxic smoke. Smoke from a pesticide fire is not a nuisance that can be driven through, it must be presumed to be highly toxic.

Evacuation Routes. Evacuation routes that have been established with the installation police should be identified. Evacuation routes, as with access routes, must be developed in all directions so that toxic smoke can be avoided. This plan should also include procedures to secure the area to prevent unauthorized entry.

Water Runoff Control. Planning water runoff control is a very important part of pre-fire planning. Identify where there is a potential for water runoff and determine how to prevent contamination of waterways. Arrangements for equipment and supplies necessary to construct dikes or dams should

be included in the pre-fire plan. Do not rely solely on equipment and supplies located at or near the pesticide facility as they may be inaccessible because of fire or toxic smoke.

Map of Area. Provide a map of the area surrounding the pesticide facility. The map should include: location of water supplies; perimeter fences, with all gates shown; adjacent buildings/activities with contents/functions of each shown; nearby ditches, underground drains, creeks and rivers with arrows to show direction of flow; building access and evacuation routes; where and how the water runoff may be blocked; and an arrow showing the direction of north. This map can be hand-drawn as long as it is legible and meets the above criteria.

Emergency Telephone Numbers. Include a list of telephone numbers where key personnel can be contacted day or night. As a minimum, this list should include the following:

- First Responders, including security and emergency medical personnel.
- The pesticide facility supervisor who must be contacted as soon as possible because he/she will best know what pesticides are currently located in the facility and how the response might best be carried out.
- The Installation Spill Coordinator or equivalent.
- The DoD Pesticide Hotline, commercial 410-436-3773 / DSN 312-584-3773, e-mail usarmy.apg.medcom-aphc.mbx.pesticide-hotline@mail.mil.
- The National Capital Poison Center's POISONCONTROL® line can be reached at 1-800-222-1222 or through the POISONCONTROL® online web tool.
- The Chemical Transportation Emergency Center (CHEMTREC®) at 1-800-424-9300 and the US National Response Center (NRC) at 1-800-424-8802, both staffed 24 hours a day.
- Emergency numbers listed on the pesticide SDS's and container labels enable liaison with the pesticide manufacturer during an emergency.

Medical Assistance. The pre-fire plan should make provisions for medical assistance to personnel contaminated with pesticides. Local hospitals and poison control centers must be aware of the hazards of a pesticide fire so that poisoning or other pesticide-related illnesses can be properly treated. The plan should designate a first-aid center near the fire site to provide medical support to firefighters or others as needed. Guidance on how to prepare for pesticide poisonings can be obtained from local poison control centers, the pesticide label, or other information available from the pesticide manufacturers.

Salvage/Hazard Evaluation. In the event of a fire, the Incident Commander at the scene may decide to let the facility burn if fighting the fire would result in extensive run-off contamination or a greater hazard would be created by extinguishing the fire. The pre-fire plan should include a salvage-versus-hazard evaluation to decide whether or not to let the facility burn in the event of a fire. The evaluation balances the salvage value of the facility and its contents against the hazards

of fighting the fire. Hazards may include widespread contamination by water runoff or toxic fallout from contaminated steam and toxic compounds released into the air from the incomplete combustion of the pesticides. If the decision cannot be made during pre-fire planning, then an agreement should be prepared (in writing) with the fire department which allows the on-scene commanding officer of the firefighting unit to determine whether or not to let the facility burn.

Safety Briefings. The pre-fire plan should make provisions to include fire hazard awareness in periodic safety briefings for all appropriate personnel. These briefings should include, as a minimum, familiarization with first-aid procedures and symptoms of pesticide poisoning. Basic first-aid procedures and symptoms of pesticide poisoning are presented in Appendix A.

Informing Emergency Organizations. A copy of the pre-fire plan and each annual update should be provided to each emergency organization or service that would be involved in a pesticide fire.

Fire Notification Procedures

- When a fire is discovered, notify the fire department immediately.
- Upon receipt of a call, the fire department dispatcher or designated installation command post will, in addition to dispatching firefighting units:
  - Contact the facility supervisor. The supervisor should be present at the fire because he/she will know which pesticides are present, quantities, and where they are located. The last inventory may not be accurate as the location and/or quantity of the pesticides stored may have changed.
  - Contact the installation spill coordinator. The spill coordinator may be able to provide assistance regarding the containment of water runoff that may be contaminated with pesticides.
  - Call for outside help if the fire is large or if it is likely to affect off-installation people or property.
- Alert medical personnel. Pesticide poisoning may occur to personnel located downwind of the fire as well as firefighters.
- Contact installation security forces (police). They may need to implement the evacuation plan and isolate the area surrounding the fire. Police may also have to patrol the area to prevent reentry into the evacuated area.
- Contact the Chemical Transportation Emergency Center (CHEMTREC) at 1-800-424-9300 is staffed 24 hours a day by trained personnel who may be able to provide helpful guidance. The US National Response Center (NRC), staffed 24 hours a day by the U.S. Coast Guard, can be contacted at 1-800-424-8802. It is important that liaison be initiated as soon as possible so that important technical data and poison control information will be available when needed.
- Be prepared to apply first-aid procedures for pesticide poisoning, burns, cuts, and other injuries that may occur as a direct or indirect result of a fire. Appendix E describes basic first-aid procedures applicable to pesticide fire situations.

Firefighting Tactics

Non-firefighter personnel should only fight a fire if it can be done with certainty that the fire can be safely and easily extinguished, otherwise, alert other people in the facility and evacuate to an upwind position.

The first action that must be taken by responding firefighters upon arrival is to determine the type and quantity of materiel and hazards present. A small isolated fire in relatively nonhazardous materials might be extinguished with portable ABC type fire extinguishers. A larger and more involved fire will require more sophisticated equipment and techniques.

If a salvage/hazard evaluation decision was not made during the pre-fire planning, it must be made by the Incident Commander. If the decision is to fight the fire, it should be attacked from upwind to avoid toxic smoke and from a safe distance so that firefighters are clear of the danger of exploding containers. Evacuate personnel downwind from the fire and prevent unauthorized individuals from entering the fire area.

Personal protective equipment for firefighters will be as directed by the Incident Commander. A self-contained positive pressure breathing apparatus should be worn whenever fighting a pesticide fire.

Avoid contact with pesticide material, smoke, mist, and water runoff. Monitor for symptoms of pesticide poisoning (see Appendix E) during the fire. In case of contact, leave the site immediately and apply first-aid procedures (also in Appendix E). Wash face and hands before eating, drinking, smoking, or using the toilet. Do not put fingers in the mouth or rub the eyes. If turnout clothing becomes soaked through from contact with fallout, leave the fire site immediately, remove contaminated clothing, and shower. Firefighters should be immediately relieved from duty and checked for poisoning if exposed to fumes or smoke without adequate protection.

Water fog spray is most effective for fighting pesticide fires. Straight stream should not be used because it may break up bags and bottles, adding fuel to the fire and increasing the amount and area of contamination. Foam should be considered when large volumes of flammable solvents are released from ruptured containers. As little water as possible should be used when fighting a pesticide fire. Water runoff, which must be assumed to be toxic, can be a serious problem because it can spread contamination over a wide area. The water runoff control plan should be implemented to contain the contaminated water within as small an area as possible. Water will cool burning pesticides but may prevent the decomposition of the pesticides into less toxic compounds, and may combine with certain pesticides to form new toxic compounds. Steam rising from water directed on the fire can result in toxic fallout far from the fire site.

Specific fire-fighting information can be found on the SDS's for each pesticide product, in Section 5. Fire-Fighting Measures. The product manufacturer may also be contacted directly.

Upon leaving the fire site, protective clothing should be removed and impounded with contaminated equipment for decontamination. Firefighters must shower and shampoo thoroughly and change into clean clothing. Inner clothing worn while fighting the fire should be washed in

detergent and bleach in a wash load separate from normal washings.

Contaminated protective clothing and equipment should be decontaminated by washing thoroughly with a strong (heavy duty) non-phosphorous detergent. Coveralls, gloves, and boots should be worn when decontaminating equipment. Cotton-jacketed hoses must be pressure tested and discarded if they were weakened by detergent.

Post-Fire Cleanup

The fire scene should be secured to keep out unauthorized personnel until cleanup and decontamination have been completed. Post warning signs and rope off burned-out area and water run-off area.

Appropriate Federal, State and local organizations (i.e., Regional EPA Office, the comparable State agency and the State Public Health Office) should be included when developing the cleanup plan. For example, these agencies must participate in the location of an "approved" site for disposal of pesticide-contaminated waste and debris.

All workers participating in the cleanup operations must be thoroughly briefed on the potential hazards. They must also be aware of first-aid procedures in case of contact with pesticides or contaminated material and symptoms of pesticide poisoning.

All personnel working within the fire site during cleanup should wear, as a minimum, personal protective equipment consisting of gloves, boots, coveralls and respirator. A list of protective equipment approved for handling pesticides is contained in TG 14.

A "clean area" should be established to provide a break area for the cleanup crew. This area should have eating and toilet facilities. A place should be included to remove and hang up contaminated protective clothing and to wash up before entering the clean area.

When leaving the fire site at the end of the duty day or when work is completed, workers should remove contaminated clothing, shower thoroughly, and change to clean clothing. Contaminated clothing should be washed in strong (heavy duty) non-phosphorous detergent and bleach in a separate wash load.

Materials-handling equipment should be used whenever possible to minimize human contact with contaminated debris. All equipment should be made of metal; porous materials, such as wood, cannot be decontaminated and therefore, if contaminated, must be destroyed. Vehicles used to transport debris must be enclosed and leakproof to prevent the spread of contaminated material along the route to the disposal site. Trucks, if used, should have metal beds.

Dikes should be constructed around drains to prevent spilled pesticide or other contaminated material from entering the storm and sanitary sewer systems during cleanup.

Pesticide containers must be handled carefully to prevent spillage of the contents as they may have been damaged during the fire.

Concentrated pesticides that are spilled during the postfire cleanup should be cleaned up as follows:

- Stop the leak. Do whatever can be done safely, such as uprighting the container or plugging a hole, to limit the spill.
- Confine the spill to prevent it from spreading. Encircle a liquid spill with a dike of sand or absorbent material.

- Always work in a well ventilated area because most pesticides emit toxic vapors. Open enclosed areas to prevent the accumulation of toxic vapors while working. If it is impossible to ventilate, do not proceed with cleanup until a self-contained breathing apparatus is available. **Never work alone**. Always remain within sight of a partner.

- Immediate clean up actions are: Cover liquid spills with an absorbent material and dry spills with a secured tarpaulin.

    - Dry Spills. Sweep up the pesticide material and place it in plastic bags. Avoid brisk movements to keep dust from swirling into the air. Under windy conditions, lightly moisten the pesticide. The bagged pesticide should be taken to the disposal site with other debris.

    - Liquid Spills. Absorb liquid pesticide with absorbent material, then sweep up the material and place it in plastic bags. Work or rub the material into the pesticide either by broom or boot to absorb as much as possible. The bagged pesticide and absorbent material should be taken to the disposal site with other debris. Soil at the spill site should be removed to a depth of 3 inches below the wet surface line and taken to the disposal site. Soil samples should be collected and analyzed to assure that all the contaminated soil has been removed before fresh soil is added.

- Remove and replace wood and other porous materials because they cannot be adequately decontaminated.

Debris should be lightly sprinkled with water to reduce toxic dust. Use water sparingly as excess will have to be treated as a spill.

Soil exposed to water runoff should be removed to a depth of at least 3 inches below the moist soil and taken to the disposal site. Soil samples should be taken and analyzed to assure that all the contaminated soil has been removed before fresh soil is added.

After the debris has been cleared, the fire site should be decontaminated. Work the decontamination solution that has been recommended by CHEMTREC or the pesticide manufacturer into all surfaces using stiff brooms. Soak up the solution with absorbent material. Sweep up the absorbent material, place it in a plastic bag, and take it to the disposal site.

When the cleanup of the fire site is completed, the equipment must be decontaminated. Discard or destroy contaminated equipment which contains porous material, such as wood handles, fiber or straw brooms, leather shoes, etc. because they cannot be effectively decontaminated. Wash the equipment with soap and water, then apply the recommended decontamination solution with a brush or mop. All surfaces should be thoroughly rinsed using a sparing amount of water. All wash and rinse water should be collected for disposal.

Additional information on the cleanup of pesticide-contaminated areas may be obtained from AFPMB TG 15, Pesticide Spill Prevention and Management.

Appendix A: Pesticide Storage Rules and Requirements

General. The following general rules for safe pesticide storage should be followed to reduce the potential for and hazards of a pesticide fire. Guidance is current as of the date of publication of this TG. Sources are provided in Appendix F for the most current guidance.

- Develop an emergency plan for response to a fire, and train all workers in its execution.
- Identify pesticide storage areas with prominent waterproof signs over each entrance, including windows if present, and on all sides of buildings.
- Post appropriate fire hazard code signs on building.
- Post a list of pesticides stored, including flammable solvents, on the outside of the building, along with a storage floor plan.
- Provide updated pesticide inventory to local fire department.
- Keep pesticide storage locked when not in use.
- Store pesticide containers so that labels are visible from all ordinary avenues of approach.
- Keep pesticide containers away from windows and out of direct sunlight to prevent solar overheating that could cause them to break or ignite.
- Store pesticides or containers that could be damaged by moisture or water off the floor.
- Keep combustibles away from heat sources (steam pipes, radiators, etc.). Look for information on flammability on each pesticide label and store accordingly.
- Do not store partially empty herbicide containers containing chlorates.
- Do not store pesticides near other fire hazards such as ammonium nitrate or calcium hypochlorite (see Appendix B).
- Keep a quantity of absorbent material on hand to absorb pesticide spills.
- Develop, maintain, and update annually a pre-fire plan.
- Inform local medical treatment facility of the potential hazards associated with the storage of pesticide items and verify that current treatment procedures are known and that appropriate antidotes are on hand.
- Obtain appropriate first-aid and firefighting equipment, be sure that you and your fellow employees are familiar with the proper operation of the equipment and make periodic inspections to insure that the equipment is operating properly.

Combustible and Flammable Liquids. In addition to those regulations that dictate procedures for the storage and handling of pesticides as toxic or hazardous materials, additional requirements

must be considered when storing liquid pesticide formulations classified as combustible or flammable liquids. These requirements should be incorporated into new or existing pesticide storage facilities. Should a requirement differ from a similar requirement for handling toxic or hazardous substances, the more stringent requirement must be followed. Pertinent definitions are given in Appendix C. The following information from Title 29, Code of Federal Regulations, Section 1910.106(d) applies only to the storage of flammable or combustible liquids in drums or other containers (including flammable aerosols) not exceeding 60 gallons individual capacity and portable tanks not exceeding 660 gallons individual capacity:

- Design, Construction, and Capacity of Storage Cabinets.
    - Maximum Capacity — Not more than 60 gallons of Class I or Class II liquids, nor more than 120 gallons of Class III liquids may be stored in a storage cabinet.
    - Fire Resistance — Storage cabinets must be designed and constructed to limit the internal temperature to not more than 325°F when subjected to a 10-minute fire test using the standard time-temperature curve as set forth in NFPA 251, Standard Methods of Tests of Fire Resistance of Building Construction and Materials (see Appendix F for source).
    - Metal cabinets — Must have the bottom, top, door, and sides constructed using at least No. 18 gage sheet iron and double walled with 1&1/2-inch air space. Joints must be riveted, welded, or made tight by some equally effective means. The door must be provided with a three-point lock and the door sill must be raised at least 2 inches above the bottom of the cabinet.
    - Wooden cabinets — Must have the bottom, sides, and top constructed of an approved grade of plywood at least 1 inch in thickness, which must not break down or delaminate under fire conditions. All joints must be riveted and must be fastened in two directions with flathead woodscrews. When more than one door is used, there must be a riveted overlap of not less than 1 inch. Hinges must be mounted in such a manner as not to lose their holding capacity due to loosening or burning out of the screws when subjected to the fire test.
    - Safety Labeling — Cabinets must be labeled in conspicuous lettering “Flammable—Keep Fire Away.”
- Design and Construction of Inside Storage Rooms.
    - Construction — Inside storage rooms must be constructed to meet the required fire-resistive rating for their use. Such construction must comply with the test specifications set forth in DoD Unified Facilities Criteria (UFC) 4-440-01 (1 October 2014). Where an automatic sprinkler system is provided, the system must be designed and installed in an approved manner. Openings to other rooms or buildings must be provided with noncombustible liquid-tight raised sills or ramps at least 4 inches in height, or the floor in the storage area must be at least 4 inches below the surrounding floor. Openings must be provided with approved, self-closing fire doors.

The room must be liquid-tight where the walls join the floor. A permissible alternate to the sill or ramp is an open-grated trench inside of the room which drains to a safe location. (**Note**: **A storm drain or sanitary sewer is not acceptable**). Where other portions of the building or other properties are exposed, windows must be protected as set forth in the Standard for Fire Doors and Windows, NFPA 80, Standard for Fire Doors and Other Opening Protectives (see Appendix F for source) for Class E or F openings. Wood at least 1 inch nominal thickness may be used for shelving, racks, dunnage, scuffboards, floor overlay, and similar installations.

- Rating and Capacity — Storage in inside storage rooms must comply with Title 29, Code of Federal Regulations, Section 1910.106, Table H-13:

Storage in Inside Rooms

Fire Protection* Provided?	Fire Resistance (hours)	Maximum Size (square feet)	Total Allowable Quantities (gals/sq ft/floor area)
Yes	2	500	10
No	2	500	5
Yes	1	150	4
No	1	150	2

*Sprinkler, water spray, carbon dioxide, or other approved system.

- (c) Wiring — Electrical wiring and equipment located in inside storage rooms used for Class I liquids must be approved under Subpart S of Part 1910, Title 29, for Class I, Division 2, Hazardous Locations; for Class II and Class III liquids, must be approved for general use.

- (d) Ventilation — Every inside storage room must be provided with either a gravity or a mechanical exhaust ventilation system. Such system must be designed to provide for a complete change of air within the room at least six times per hour (NOTE: *when occupied*). If a mechanical exhaust system is used, it must be controlled by a switch located outside the door. (NOTE: and *activated 5 minutes before entry*). The ventilating equipment and any lighting fixtures must be operated by the same switch. A pilot light must be installed adjacent to the switch if Class I flammable liquids are dispensed within the room. Where gravity ventilation is provided, the fresh air intake, as well as the exhaust outlet from the room, must be on the exterior of the building in which the room is located.

- (e) Storage in Inside Storage Rooms — In every inside storage room there must be maintained one clear aisle at least 3-feet wide. Containers over 30-gallons capacity must not be stacked one upon the other. Dispensing must be done by approved pump or self-closing faucet only.

- Storage inside Building.
    - Flammable or combustible liquids must not be stored in ways that limit use of exits, stairways, or areas normally used for the safe egress of people.
    - Storage in offices is prohibited except when required for maintenance and operation of the building and operation of equipment. Such storage must be kept in closed metal containers stored in a storage cabinet or in safety cans or in an inside storage room not having a door that opens into that portion of the building used by the public.
- Flammable and Combustible Liquid Warehouse or Storage Buildings.
    - If the storage building is located 50 feet or less from a building or line of adjoining property that may be built upon, the exposing wall must be a blank wall having a fire-resistance rating of at least 2 hours.
    - The storage of liquids within a building must comply with Tables H-14 or H-15 of Title 29, Code of Federal Regulations, Section 1910.106. Indoor storage of containers of Class I, II, or III liquids is not permitted in the basement of a building. For indoor storage of portable tanks, only tanks containing Class II or III liquids may be stored in basement areas where the storage area is protected.
    - Containers in stacks or piles must be separated by pallets or dunnage where necessary to provide stability and to prevent excessive stress on container walls.
    - Portable tanks stored over one tier high must be designed to nest securely, without dunnage, and adequate materials handling equipment must be available to handle tanks safely at the upper tier level.
    - No stack or pile shall be closer than 3 feet to the nearest beam, chord, girder, or other obstruction, and must be 3 feet below sprinkler deflectors or discharge orifices of water spray, or other overhead fire protection systems.
    - Aisles at least 3-feet wide must be provided where necessary for reasons of access to doors, windows, or standpipe connections.
- Fire prevention considerations are also applicable to pesticides when transported in vehicles. Pesticides transported for business purposes on public roads are required to be in compliance with US Department of Transportation Hazardous Material Regulations in Title 49, Code of Federal Regulations, Parts 100-185 (see Appendix F for source).
- Fire Control.
    - Suitable fire control devices, such as small hose or portable fire extinguishers approved for chemical fires must be available at locations where flammable or combustible liquids are stored. Note: Fire extinguishers must be inspected and maintained on a regular basis to ensure that they are in good operating condition.

- Classification of portable extinguishers and associated symbols (Ref. NFPA 10):

Class A: Trash, Wood, Paper, Cardboard and most Plastics

Class B: Flammable Liquids (Gasoline, Kerosene, etc.)

Class C: Electrical Equipment

Class D: Combustible Metals

Class K: Cooking Media (Cooking Oils and Fats)

Figure. 1 Example of a portable ABC type dry chemical fire extinguisher showing a rating of 40-B units.

- At least one portable fire extinguisher having a rating of not less than 12-B units must be located outside of, but not more than 10 feet from, the door opening into any room used for storage.

- At least one portable fire extinguisher having a rating of not less than 12-B units must be located not less than 10 feet, nor more than 25 feet, from any Class I or Class II liquid storage area located outside of a storage room but inside a building.
- When sprinklers are provided, they must be installed in accordance with DoD UFC 3-600-01, Fire Protection Engineering for Facilities (see Appendix F for source).
- Open flames and smoking must not be permitted in flammable or combustible liquid storage areas.
- Materials which will react with water must not be stored in the same room with flammable or combustible liquids.

Appendix B: Combustion Characteristics of Pesticides

While not all pesticides are flammable, they will decompose in the heat of a fire and may release toxic gases, vapors, and smoke. Installation pesticide storage facilities usually store a wide variety of pesticides. Therefore, unless it is known specifically what is burning, it must be assumed that highly toxic substances are being produced. Combustion characteristics of commonly encountered pesticide formulations include:

- Oil Solution Formulations — May burn readily and containers may rupture or explode when overheated.
- Aerosol Formulations — Containers may rupture or explode when overheated.
- Dust Formulations — Finely divided dusts can ignite as easily as vapors and may be explosive.
- Wettable Powder Formulations — Wettable powder pesticide formulations consist of pesticide on or mixed with clay. Since clay will not burn, the potential for fire is the bag, which will heat the contents and may release toxic fumes.
- Water-based Formulations — Water-based pesticide formulations do not pose a direct fire hazard because of the water, but contaminated steam can be generated if exposed to fire.
- Solvent-based Formulations — Solvent-based pesticide formulations contain petroleum distillates such as xylene, toluene, and petroleum oils (i.e., fuel oils, mineral oils, and mineral spirits). The solvents used in pesticide formulations are generally flammable and, as a result, these pesticide formulations pose the greatest fire hazard.
- Pesticide/Fertilizer Formulations — Ammonium sulfate and/or ammonium phosphate fertilizer components will not burn but, like pesticides, will decompose and release toxic vapors or smoke in the heat of a fire.
- Chlorate Herbicides — Chlorates present in some herbicides and desiccants are flammable and explosive. Partially empty containers should not be stored.
- Ammonium Nitrate Fertilizer — When uncontaminated is relatively safe when properly stored and handled, but when contaminated by fats, oils, acids, metal dust, sulfur, etc., becomes highly flammable and explosive. Large amounts of oxygen are given off when this fertilizer burns, increasing the intensity of the fire. Toxic gases may also be emitted. Must **not** be stored with pesticides or other possible contaminants.
- Calcium Hypochlorite — A powerful oxidizer that will react, ignite, and possibly explode if contaminated by organic substances. Must **not** be mixed indoors nor stored with pesticides.
- Fumigants — If contained in compressed gas cylinders, will vent if heated and may explode. Cylinders may become airborne and pose a ballistic hazard.

Appendix C: Definitions and Terms for Flammable and Combustible Liquids

Reference: NFPA 30, Flammable and Combustible Liquids Code (see Appendix F for source)

- Flammable liquid — A liquid having a flash point below 100°F (37.8°C). Flammable liquids are classified as Class I liquids. Class I liquids are divided into three subclasses as follows:
  - Class IA — Liquids having flash points below 73°F (22.8°C) and a boiling point below 100°F (37.8°C).
  - Class IB — Liquids having flash points below 73°F (22.8°C) and a boiling point at or above 100°F (37.8°C).
  - Class IC — Liquids having flash points at or above 73°F (22.8°C) and below 100°F (37.8°C).
- Combustible liquid — A liquid having a flash point at or above 100°F (37.8°C). Combustible liquids are divided into two classes as follows:
  - Class II liquids — Flash points at or above 100°F (37.8°C) and below 140°F (60°C).
  - Class III liquids — Flash points at or above 140°F (60°C). Class III liquids are subdivided into two subclasses:
    - Class IIIA liquids — Flash points at or above 140°F (60°C) and below 200°F (93.3°C).
    - Class IIIB liquids — Flash points at or above 200°F (93.3°C).
- Flashpoint — The minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.
- Office occupancy — The occupancy or use of a building or structure, or any portion thereof, for the transaction of business, or the rendering or receiving of professional services.
- Portable tank — A closed container having a liquid capacity over 60 US gallons and not intended for fixed installation.
- Safety can — An approved container, of not more than 5 gallons capacity, having a spring-closing lid and spout cover so designed that it will safely relieve internal pressure when subjected to fire exposure.
- Ventilation — For the prevention of fire and explosion, considered adequate if it is sufficient to prevent accumulation of significant quantities of vapor-air mixtures in concentration over one-fourth of the lower flammable limit.

Appendix D: Sample Pre-Fire Plan

Pre-Fire Plan for Pesticides

Facility Name _____

Location _____

Phone Number _____

Fax Number _____

E-mail Address _____

EMERGENCY PHONE NUMBERS:	Day	Home	Pager	Cell
Manager's Name				
Ass't Mgr's Name				
Alternate 1				
Alternate 2				

Hospital _____

Most chemical manufacturers are equipped to provide emergency information on their products.

Manufacturers may also be contacted through CHEMTREC (Chemical Transportation Emergency Center) (800) 424-9300 (Toll free).

In addition to the usual fire hazard, the possibility of poisoning must be considered. A specific plan should be developed for each facility as outlined in the instructions here. Local fire departments should be invited to your facility at least once a year. Fire fighters should be thoroughly familiar with the contents of your Emergency Pre-Plan. It is a good idea to give them advance information about anticipated quantities, locations, and types of hazardous materials stored. Have the manufacturers' Material Safety Data Sheets (MSDS) for each product available for their reference.

EMERGENCY PRE-PLAN UPDATE (Revise annually and after any important change):

Facility Manager _____ _____
Signature Date

Fire Dept. Official _____ _____
Signature Date

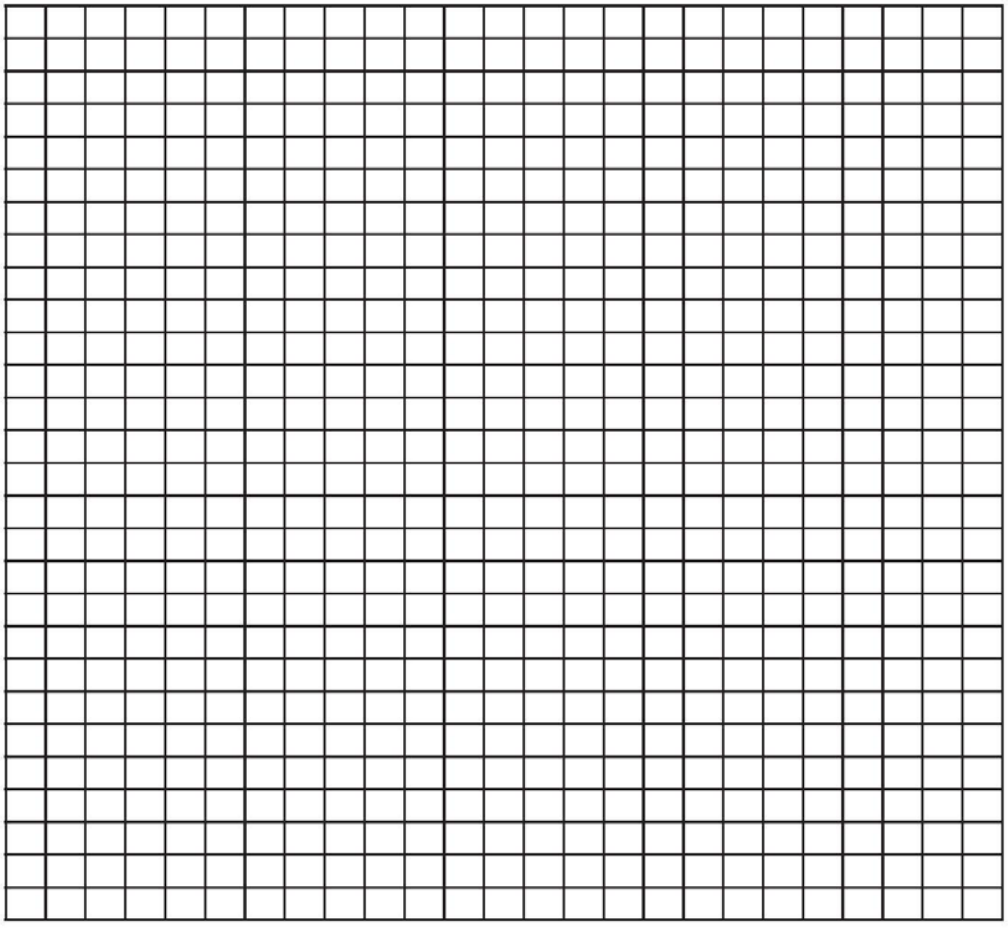
Name of Fire Dept. _____

Date of next scheduled review or update: _____

Page 1

Sketch of Facility and Immediate Surroundings

Draw map showing the property site and surroundings. Select a suitable scale. Show outline of buildings, type of construction, permanent interior walls, building openings, and major fixed equipment. Provide elevation views if more than one story. Locate all fixed outside equipment. Show perimeter fences, gates, rail spurs, floor drains, etc. Show access routes and approximate distances to important buildings. Identify areas of the facility committed to pesticides, flammables, oxidizers, etc. including bulk storage tanks.

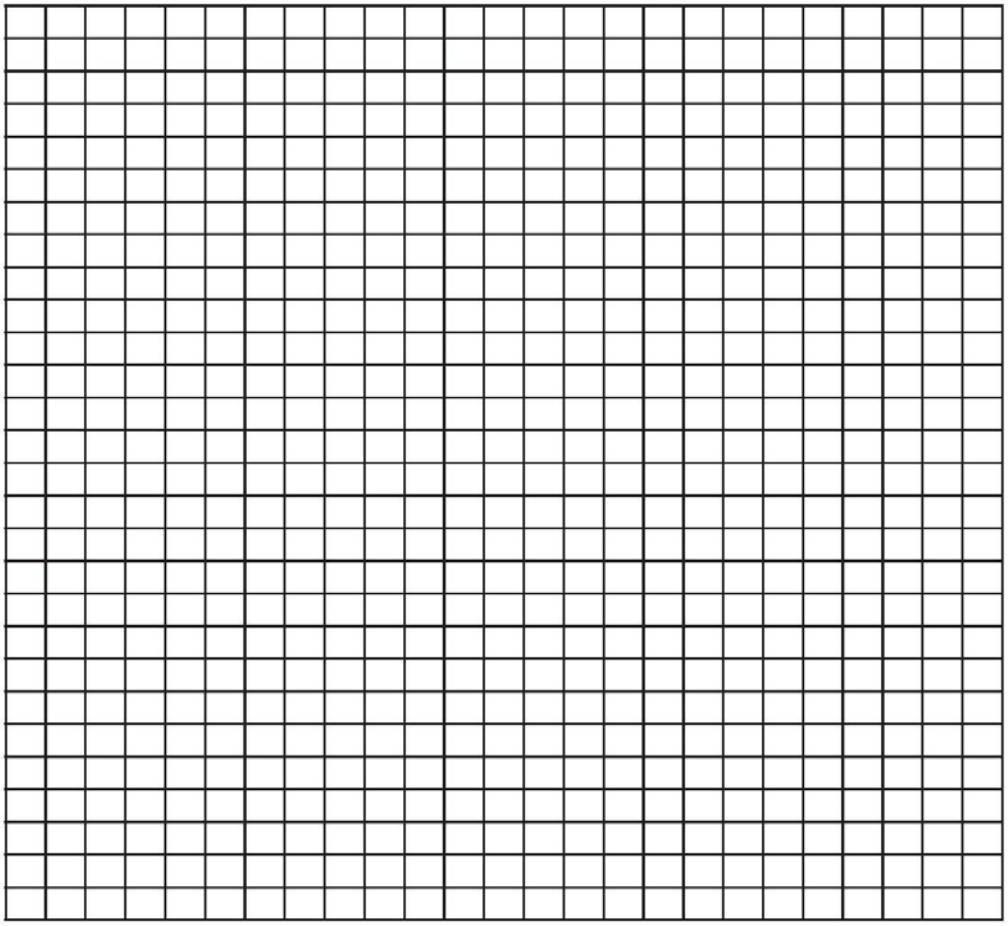


Legend

Fire Protection Equipment		Wall Construction		Building	
Fire hydrant	(H)	Concrete		Pedestrian Door	
Sprinkler Booster Connection	(B)	Masonry		Sliding Door	
Main Electrical Shutoff	(E)	Metal		Overhead Door	
Main Gas Shutoff	(G)	Wood		Fire Door (add to door symbol)	(FD)
Water Runoff Shutoff	(RO)	Fire Wall (add to wall symbol)	(FW)	MSDS & Emergency Plan	(MSDS)
		Emergency rescue equipment	(ER)		

Site Runoff Control

Draw map showing the surrounding area for about one mile in all directions. Extend the map in the direction of the site drainage so that drainage can be traced until it reaches the nearest large body of water. If runoff can be impounded on or off site, show location and approximate number of gallons that can be contained. Mark places where runoff may be blocked by dikes, dams, shutting off lift pumps, etc. Show surrounding land use (residential, crops, etc.). Show places of public assembly such as schools, churches. Use symbols below. Show north arrow.



Exterior

Primary Staging Area STAGE

Fence X-X-X-X-X

Gate

Railroad

Drain Inlet (D)

Manhole (M)

Well (W)

Drain lines or culverts

(with direction of flow)

Surface

Underground

Direction of ground slope

Stream or creek

Impoundment location

Lift pump (P)

Proposed dike or berm

1. Agency notification: (List the names and telephone numbers of agencies that need to be notified should a spill or fire involving pesticides or fertilizers occur. Include railroads if rails may be blocked.)

	Phone Number
• Fire, Police, etc – 911 unless another telephone number is to be used	
• National Response Center	(800) 424-8802
• Local Emergency Prepardness Center	_____
• Manufacturers Emergency Response Programs	
_____	_____
_____	_____
_____	_____
_____	_____
• List of major nearby sites to be called and alerted	
_____	_____
_____	_____
_____	_____
_____	_____

2. Surrounding occupancies and land use: Describe surrounding land use in all four directions for one mile radius. For example, north: grazing land to .2 mile, commercial district .25 to.5 mile, residential zone .5 to 1 mile, hospital located at [address or location]. Show as much as possible in sketch on page 3.

North _____
_____
_____

South _____
_____
_____

East _____
_____
_____

West _____
_____
_____

3. Location of emergency equipment and supplies (Available 24 hours a day. Include phone numbers).

- Local contract HAZMAT team _____
- Self-contained breathing apparatus _____
- Spare compressed breathing air tanks _____
- Earth moving equipment _____
- Portable water pumps _____
- Street barriers _____
- Sand bags _____
- Other _____
- Remediation contractor _____

4. Location and types of water supplies: (Hydrants, ponds, irrigation canals, fresh or salt water, etc. Verify hydrant thread compatibility and water pressure and flow rates.)

_____
_____
_____

5. List of in-house emergency equipment

_____
_____
_____

Fire Fighting Tactics

For Fire Departments fighting fires involving pesticides and fertilizers.

1	Contact facility operator. Determine type, quantity and hazards of products. Determine if fire should be fought at all. Weigh fire fighting and postfire hazards vs. possible salvage.
2	Notify hospital to stand by. Hospital may obtain poison control information by contacting the manufacturer.
3	Contact chemical manufacturer. Maintain liaison for specialized information, particularly during a large fire.
4	Evacuate downwind and isolate area. Patrol area to keep spectators out.
5	Wear personal protective equipment. Wear rubber or neoprene gloves, boots, turnouts and hat. If contact cannot be avoided (such as entering an unventilated building for rescue) also wear self-contained breathing apparatus (Air Paks).
6	Attack fire from upwind and from a safe distance. Bottles, drums, metal and aerosol cans are not vented and may explode.
7	Contain fire and protect surroundings. Prevent spread of fire by cooling nearby containers to prevent rupture (move vehicles and rail cars if possible). Burning chemicals cannot be salvaged.
8	Use as little water as possible and contain runoff. Contaminated runoff can be the most serious problem. Water spreads contamination over a wide area. Construct dikes to prevent flow to lakes, streams, sewers, etc. Cooling effect of water retards high-temperature decomposition of the chemicals to less toxic compounds.
9	Use water fog spray, not straight stream. Fog spray is more effective for control. Avoid breaking bottles and bags which add fuel and contamination. Straight streams spread fire and contamination.
10	Poisoning. Avoid product, smoke, mist and runoff. In case of contact or suspected poisoning, leave site immediately, follow first aid instructions on page 7. Any feeling of discomfort or illness may be a sign of poisoning. Symptoms may be delayed up to 12 hours. Chemicals may poison by ingestion, absorption through skin, or inhalation. Wash face and hands before eating, smoking, or using toilet. Do not put fingers to mouth or rub eyes.

Post-Fire Cleanup

Fire fighting personnel and equipment

- Remove protective clothing upon leaving site and impound with contaminated fire-fighting equipment.
- Upon return to fire stations, shower and shampoo thoroughly with soap and water, change into clean clothing and wash inner clothing with detergent.
- Watch for signs and symptoms of pesticide poisoning.
- Put on coveralls and rubber or neoprene gloves and decontaminate protective clothing and equipment using a strong detergent solution. Decontaminate in an isolated area.
- Contaminated cotton-jacketed hose may have to be destroyed; most are weakened by strong detergents.

Fire site

- Isolate and secure scene to keep people away. Water and runoff may be toxic.
- Contact federal, state, or local health authorities for disposal instructions and approval.
- Handle waste and runoff in the same way as a product spill. Use of personal protective equipment is required.
- If the amount of water and/or runoff is significant or if you have any doubts, contact the manufacturer.

First Aid – in case of accidental contact

Eyes: Flush with water for 15 minutes. Get medical attention immediately. Refer to MSDS or product label for further instructions.

Hands: Wash thoroughly with soap and water. Refer to MSDS or product label for further instructions. If in doubt about nature of material, get medical attention immediately.

Clothing: Remove contaminated clothing and wash skin thoroughly with soap and water. Refer to MSDS or product label for further instructions. If in doubt about nature of material, get medical attention immediately. Dispose of contaminated clothing or wash clothing separately in strong detergent before reusing.

Note: Take labeled container when seeking medical assistance.

Important Note

Should this facility become involved in a fire, the Commanding Officer at the scene should decide whether to let the facility burn if it appears that water applications:

(1) will result in extensive contaminated water runoff, or
(2) could result in incomplete combustion of chemicals, resulting in a release of toxic compounds into the air.

The Incident Commander should have advance written authority from the facility manager to make this decision and this eventuality should be discussed with the insurers of the establishment.

Notes:

Appendix E: First-Aid Procedures

In the event of pesticide contact, perform basic first-aid procedures and get medical attention immediately. Do not attempt to treat symptoms beyond the first-aid level.

Pesticide labeling provides specific first aid instructions. Follow those instructions carefully. Retain the labeled container for positive identification of the pesticide.

Symptoms of pesticide poisoning include blurred vision, difficulty in breathing, severe running nose, nausea, drooling, tearing, unusual amount of sweating, stomach cramps, and trembling. Pesticide poisoning symptoms often resemble those for heat prostration, smoke inhalation, and the flu. Medical attention must be sought if any feeling of discomfort or illness or unusual appearance occurs.

Basic first-aid procedures in the event of pesticide contact include:

- **Swallowed poison —** Induce vomiting ONLY if emergency personnel on the phone or the product label or SDS tells you to do so. It will depend on what the person has swallowed; some petroleum products or caustic poisons will cause more damage if the person is made to vomit.
- **Poison in eye —** Reference the product label or SDS first. Eye membranes absorb pesticides faster than any other external part of the body; eye damage can occur in a few minutes with some types of pesticides. If poison splashes into an eye, hold the eyelid open and wash quickly and gently with clean running water from the tap or a gentle stream from a hose for at least 15 minutes. If possible, have someone else contact a Poison Control Center for you while the victim is being treated. Do not use eye drops or chemicals or drugs in the wash water.
- **Poison on skin —** Reference the product label or SDS first. If pesticide splashes on the skin, drench area with water and remove contaminated clothing. Wash skin and hair thoroughly with soap and water. Later, discard contaminated clothing or thoroughly wash it separately from other laundry.
- **Inhaled poison —** Reference the product label or SDS first. Carry or drag victim to fresh air immediately. If you think you need protection such as a respirator and one is not available to you, call the Fire Department and wait for emergency equipment before entering the area. Loosen victim's tight clothing. If the victim's skin is blue or the victim has stopped breathing, give artificial respiration (if you know how) and call rescue service for help. Open doors and windows so no one else will be poisoned by fumes.

Remain alert to symptoms of pesticide poisoning because they may be delayed up to 12 hours after exposure.

Appendix F: References

AFPMB Technical Guide No. 14, Personal Protective Equipment for Pest Management Personnel, https://www.acq.osd.mil/eie/afpmb/docs/techguides/tg14.pdf

AFPMB Technical Guide No. 15, Pesticide Spill Prevention and Management, https://www.acq.osd.mil/eie/afpmb/docs/techguides/tg15.pdf

DoD Unified Facilities Criteria 3-600-01, Fire Protection Engineering for Facilities, https://www.wbdg.org/FFC/DOD/UFC/ufc_3_600_01_2016_c2.pdf

DoD Unified Facilities Criteria 4-440-01, Warehouses and Storage Facilities (1 October 2014), https://www.wbdg.org/FFC/DOD/UFC/ufc_4_440_01_2014.pdf

National Fire Protection Association 10, Standard for Portable Fire Extinguishers, https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=10

National Fire Protection Association 30, Flammable and Combustible Liquids Code, https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=30

National Fire Protection Association 80, Standard for Fire Doors and Other Opening Protectives, https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=80

National Fire Protection Association 230, Standard for the Fire Protection of Storage, https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=230

National Fire Protection Association 231, Standard for General Storage, https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=231

National Fire Protection Association 251, Standard Methods of Tests of Fire Resistance of Building Construction and Materials, https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=251

National Fire Protection Association 434, Code for the Storage of Pesticides, https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=434.

National Fire Protection Association 704, Standard System for the Identification of the Hazards of Materials for Emergency Response, https://www.nfpa.org/codes-and-standards/all-codes-

and-standards/list-of-codes-and-standards/detail?code=704

Title 29, Code of Federal Regulations, Part 1910, Occupational Safety and Health Standards, https://www.osha.gov/laws-regs/regulations/standardnumber/1910

Title 49, Code of Federal Regulations, Transportation, Parts 100-185, Hazardous Materials Regulations (HMR), https://www.ecfr.gov/cgi-bin/text-idx?SID=1d49a3b137cb1b6fc45251074e634b44&tpl=/ecfrbrowse/Title49/49tab_02.tpl

U.S. Environmental Protection Agency, First Aid in Case of Pesticide Exposure, https://www.epa.gov/pesticide-incidents/first-aid-case-pesticide-exposure