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PESTICIDE ACCIDENTS, SPILLS, AND FIRES¹

by M.E. Brewer

Pesticides have an important place in our society. These chemicals are designed to destroy pests, pests that can ruin our crops and buildings and cause many diseases. However, when improperly used or involved in an accident, such as a spill or fire, their destructive power can turn against us. Despite the best of care, accidents happen, and contingency plans are needed. The purpose of this presentation is to help you prepare these contingency plans, so you can handle agricultural chemical spills and fire emergencies as safely as possible. Many of these guidelines are also applicable to spills and fires involving nonagricultural chemicals.

Pesticides account for less than 2 percent of the chemical sales in the United States and more is known about their toxicity than most other chemicals. What are pesticides? In simple terms, there are chemicals or mixtures of chemicals used to control any living thing considered a "pest." Pesticide is the overall name given to several specialized categories such as insecticides, herbicides, fungicides, and several others.

The human hazard of pesticides is poisoning. Poisons enter the body by any of four routes: 1) skin contact, 2) inhaling, 3) swallowing, and 4) injection. Many pesticides are readily absorbed through the skin. The area near the eyes is particularly susceptible because the inside surface of the eyelids is very absorptive. Many pesticides can pass through the skin without causing any skin sensation, so don't rely on this for warning. Inhaling some pesticide vapors, particularly concentrated fumigants, can quickly poison an individual. Also, a massive exposure to a low toxicity pesticide can be as harmful as a minor exposure to a highly toxic pesticide. Accidentally eating a

pesticide is, of course, easier to avoid. However, poisoning can also occur by smoking or eating around pesticides. The fourth route, injection, is rare and normally suicidal. Therefore, it is not a hazard to emergency service personnel at a spill or fire. But, skin contact and inhalation are likely hazards. And when exposed to pesticides, it is important to know if poisoning may have occurred.

Some of the possible symptoms are nausea, drooling, tears, unusual amount of sweating, stomach cramps, and trembling. But there are many others, and one or several may be present. Rather than memorizing a long list of possible symptoms, it is easier to remember that any feeling of discomfort or illness, or unusual appearance, can be a symptom of pesticide poisoning. And note, these symptoms may be delayed up to 12 hours. Many of the symptoms are the same as those for heat prostration, smoke inhalation, and the flu. Therefore, pesticide poisoning, unless suspected, can be overlooked as the cause of an illness.

In case of contact with pesticides, move the victim away from further possible contact and proceed with first aid. For eye contact, flush with water for at least 15 minutes and get medical attention immediately. Delay of even a few seconds in flushing the eyes can greatly increase the extent of the injury. Also, refer to the product label for further instructions. For skin contact, wash thoroughly with soap and water. Again, refer to the label for instructions. If so directed or in doubt about the nature of the material, get medical attention immediately. If clothing becomes contaminated, remove the clothing and proceed as for skin contact. Wash clothing in a strong detergent and bleach before reusing unless the label says to

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destroy them. Of course, as taught in first aid courses, also stop wounds from bleeding, give artificial respiration, and treat for shock, when necessary.

When seeking medical help, take along an uncontaminated labeled container whenever possible. In addition to first aid statements, as described above, many labels contain additional medical information for physicians, including antidotes when applicable. Several chemical companies also maintain emergency medical centers and will provide toxicological data on their products on a 24-hour, 7-day-a-week basis. Chevron's emergency number is being printed on all our product labels, many of our publications, and even on the back of our business cards. Help is available, but it is almost totally dependent upon proper identification of the product involved. The exact product and brand names, the correct and complete spelling must be known.

Both the product and brand names are clearly shown on the front panels of the labels. As mentioned earlier, take along an uncontaminated labeled container. If possible, write down the product and brand names and double check.

The EPA product registration number on the label also identifies the pesticide. However, this is a relatively new requirement and not all emergency centers are set up for quick information retrieval based solely on this number. In addition, be careful not to confuse the EPA product registration number with the EPA establishment number.

Pesticide labels contain even more data which may be helpful to emergency service personnel. Pesticides are grouped into four toxicity categories — high, moderate, slight, and low. The proper category is shown by signal words prominently displayed on the front panel of each pesticide label. The most highly toxic pesticides are identified by a skull and crossbones and the signal words "danger-poison." Moderately toxic pesticides are identified by the signal word "warning." Slightly toxic and compounds of low toxicity are identified by the signal word "caution." These signal words are set by law and all pesticide manufacturers must use the proper one. It provides a quick way to easily determine how toxic a

product is. Other data that may be helpful are the special chemical and physical hazard statements. This information is shown on the side panel. The wording, such as extremely flammable, flammable, etc., is set by EPA regulations.

Another label requirement is the ingredient statement. The terms "active" and "inert ingredients" refer to their functions as a pesticide, not to other characteristics such as their possible fire hazard. Since only the active ingredients must be listed, some solvents and other chemicals can be present without being specifically named. But help in identifying all the hazards is available.

Chemtrec

Government agencies and the chemical industry remain active in programs to improve the safety of containers and their reliability in shipping. However, despite precautions, accidents do occur, such as minor accidents with little spillage and no appreciable interruption to traffic, or a major truck incident, possibly even involving fire and perhaps several lanes, or even a highway blocked, or even a major railcar derailment.

Emergency service personnel, fire and police, are normally well prepared to cope with spills and fires of common materials, including certain flammables such as gasoline, but the characteristics of many chemicals are not as well known to these people. For these, emergency service personnel need accurate and clear information from a quick source to help them evaluate the situation and use the proper precautions for everyone's safety.

Realizing that manufacturers have the necessary expertise, officials of several federal agencies asked MCA, the Manufacturing Chemists Association, to develop a response system. MCA is a trade association of chemical manufacturers who produce more than 90 percent of the industrial chemicals in the United States and Canada. The outgrowth is CHEMTREC, which stands for the Chemical Transportation Emergency Center. It was established and continues as a voluntary project of the chemical manufacturing industry, wholly supported through the MCA. Operations began in September of 1971.

How does the system work? Briefly, CHEM-

TREC will do two things. First, it will give immediate action information on an identified product. This information will be read from files prepared in advance. Second, it will contact the manufacturer or other expertise for additional assistance. The service is available to everyone by calling a toll free number from any state within the continental United States. Help is available around-the-clock, every day of the year (Fig. 1).

Emergency Numbers

Police _____

Fire _____

Medical _____

Chemical Emergencies

For spill, leak, fire, exposure or accident, call CHEMTREC day or night:

CHEMTREC -- Any Chemical ____*(800) 424-9300
(toll free)

Chevron Chemical Products ____ (415) 233-3737
(collect)

*For calls originating outside the continental U.S. (Alaska, Hawaii, Puerto Rico): (202) 483-7616—Washington, D.C.—Collect.

Fig. 1.

On receipt of a call, the CHEMTREC communicator will first ask if there is a chemical emergency. CHEMTREC is not intended nor equipped to function as a general information source, such as how a shipment should be marked. This line must be kept open for emergencies. After determining that an emergency exists, the communicator will ask for certain information. One of the most important is the exact product and brand name. Until the product is precisely identified, most of the effort must be directed toward getting this information.

If you cannot get to the cargo to identify the pro-

duct or the manufacturer, look for the shipping papers in the cab of a truck or caboose of a train. Department of Transportation (DOT) regulations require the identification of hazardous materials on these papers. Many manufacturers also print their emergency contact telephone number on these papers. Many also include CHEMTREC's number.

If the papers cannot be found, try to develop some vehicle identification, such as the tractor or trailer number or license and the carrier's name. Some railcars have a stencil which shows the name of the product, for example, "hexamethylene diamine only." Some even show the name of the manufacturer. Or, write down the car number, such as GATX 46714, located at the left end of every railroad car. Carriers work closely with CHEMTREC in these searches.

Once the product has been identified, the communicator takes the appropriate chemical card from the files and reads the response/action information. This includes information such as hazards and what to do as well as what not to do, in case of spills, leaks, fire, and exposure. This is CHEMTREC Step 1. Provide immediate advice for those at the scene to control the emergency. The communicators are dependable and experienced in dealing with emergency situations. However, they are not scientists nor chemical "geniuses" capable of answering all questions. They are not permitted to "ad lib." They will respond with pre-established advice.

CHEMTREC has data on over 3,700 chemicals having more than 14,000 trade names. This information has been supplied by manufacturers, trade associations, and several other sources. The cards are in the same general format as chem-cards but contain more information, such as odor, effect with water, nature of hazards, along with details on what to do in case of spill, leak, fire, or exposure. (Product flash point, ignition temperature, and vapor density are also included when they apply.) On the back, CHEMTREC lists the name of the product manufacturers.

Next, the communicator will relay the details of the accident to the manufacturer. This is CHEMTREC Step 2. Once notified, the manufacturer becomes responsible for any future assistance in the emergency.

If the product is a pesticide, the communicator will call the pesticide safety team network if he cannot get in touch with the manufacturer. The pesticide safety team network is a mutual aid agreement operated by the National Chemicals Association (NACA). NACA, like MCA, is an industry trade group.

NACA has divided the United States into ten areas, each headed by an area coordinator and several alternates. These people are trained to provide assistance in pesticide emergencies. Each area has several pesticide safety teams that can be sent to emergency scenes to provide on-site assistance. There are about 45 teams nationwide. Many chemical companies also have additional teams in their operating areas.

Each team has a kit that contains personal protective equipment, decontamination supplies, traffic control devices, and clean-up instructions. Most kits are portable so they can easily be loaded onto a pick-up or even into a station wagon.

In summary, the chemical industry recognizes the need to support emergency services personnel. CHEMTREC can provide this help. First, by providing immediate advice for those at the scene of the emergency, and secondly, by contacting the manufacturer for more detailed assistance.

Spills

Containers used for shipping chemicals are designed to effectively carry the products under normal handling procedures and practices. But even the DOT specification containers will not withstand all excessive ill-treatment. A minor accident has occurred. Pesticide is leaking. What should be done?

Rescue people as necessary, but be aware of possible hazards, don't charge in blindly. Stay upwind as much as possible. Look for the hazard signal words on the product label. Wear protective equipment if necessary. Don't let people who know nothing about the hazards assist as they might be exposed.

Administer first aid. In addition to stopping bleeding, performing artificial respiration, and treating for shock, pesticide contact must also be considered. Also, watch for and advise the victim

about the symptoms of pesticide poisoning.

Whenever possible, use volunteers to call the ambulance, police, fire department, and others. Contact CHEMTREC for information on the product. Remember to get the exact and complete product name.

Contain the spill in order to keep the accident from getting worse. Dike off the area, stop the leak, upright the leaking container, close valves. Do whatever is possible to keep the spill from spreading. Do not wash down the spill unless advised to do so by a person who understands the properties of the chemical. Most often, the problem is just made worse. A much larger area must then be decontaminated.

Keep people and vehicles away. An isolated and contained spill is not usually a serious problem. Rope off and direct traffic around the area. Do not use flares if a flammable or combustible pesticide is leaking. If you know or suspect that a hazardous material is leaking, do not open the truck or railcar unless you have been advised by the manufacturer and you are wearing the appropriate protective equipment.

When an area coordinator or manufacturer dispatches a safety team, they will proceed to the site to assist with or handle the cleanup. The following basic procedure should be used by anyone handling the clean-up.

Use as small a crew as possible to minimize exposure. Put on safety gear and proceed with any of the immediate steps not already taken care of.

Separate leaking containers from intact containers. Transfer the remaining contents of the leakers into a container that can be safely removed from the site. Place the leaking containers in a drum or plastic bag so they can be safely removed from the area.

Pick up the spilled chemical by using absorbent material. Spread the absorbent material around the spill and sweep toward the center. Then, sweep the absorbent and place the contaminated material in a disposable plastic bag or drum.

In the case of a dust or powder spill, minimize spreading by dampening the dust with a fine water spray, or cover it with a tarp. Most kits contain plastic tarps for this purpose. However, in an emergency, a tarp from a truck can be used even

though it may have to be discarded later if it cannot be effectively decontaminated. When using a tarp, roll it back little by little as you sweep up the spilled material.

If may be necessary to decontaminate or neutralize the small amount of material remaining. Decontaminating and neutralizing materials will vary. If you are not certain what to use, consult with the manufacturer. Spread the decontamination solution on the spill area and work it into the pavement. Use a coarse broom in a manner similar to a scrub brush. Pick up this solution by using fresh absorbent material. Spread it around the entire spill area and sweep it toward the center. Then sweep it up and place it in a plastic bag or drum similar to the one containing the initial absorbent material that was spread on the spill. Then repeat the decontamination. As a substitute for absorbent material, dirt, particularly that high in clay content, can be used. However, it is not as effective.

If the road shoulder becomes contaminated by the spill, remove all contaminated soil to a depth of at least 2 inches below the moist soil. Place this in a plastic bag or drum and replace with fresh topsoil.

Before moving any of the vehicles involved, use decontamination solution and clean off all contaminated parts that might be exposed to the public or the highway. At this point, it may then be possible to wash off the spill area. This, of course, is subject to certain environmental factors.

The contaminated absorbent and other material must be properly disposed of, generally, at a Class I disposal site or a remote burial area approved by the local public health authorities.

Back at the plant, decontaminate tools and equipment and discard or destroy contaminated porous material and equipment such as brooms and leather shoes. These cannot be effectively decontaminated. Depending on the chemical and degree of contamination, it may also be necessary to replace wooden truck beds.

After burial of the contaminated waste, wash the personal protective equipment in a strong detergent solution, rinse and allow to dry thoroughly before replacing it in the decontamination kit. Except for preparing reports required by

various agencies, the work is completed.

Fires

Agricultural chemical fires can be dangerous. The possibility of poisoning must be considered in addition to the usual fire hazards. In this section we will discuss typical facilities and storage practices so you will have a good understanding of where agricultural chemicals can be found and what you can expect to find at a typical facility.

Where are agricultural chemicals stored? The answer, of course, is almost everywhere. Homeowners have small supplies in their garages or backyard storage sheds. Generally these are low toxicity chemicals. You will find garden and home type chemicals at nurseries, hardware stores, discount department stores, and even grocery stores. Farmers have supplies in their storage sheds or outbuildings. These represent a larger and generally more toxic supply. Similar storage supplies can be found at pest control operator facilities. Airports, particularly those in rural areas, may store pesticides for aerial application. Since these are usually commercial pesticides, their toxicities will range from low to high. Public warehouses are another possible location. They may store low, moderate and/or highly toxic chemicals. These locations are often overlooked since they do not display typical agricultural chemical advertising signs as seen at manufacturer and dealer warehouses and small formulation facilities. These are generally located in rural areas, but not always, particularly if the town has expanded around the facility. These facilities generally carry commercial type products. Some are highly toxic.

Pesticide use is very seasonal and affects the amount of storage in almost all locations mentioned. Generally, inventories are high just before and during the use period and considerably lower at other times.

The most obvious pesticide storage locations are major formulation facilities and chemical plants. They may manufacture a single or many products with varying toxicities. We will concentrate on manufacturer and dealer warehouses and small formulation facilities. Inside you will often find first-aid fire-fighting equipment in the form of

ABC, multi-purpose, dry chemical extinguishers. Many also have water protection in the form of ¾-inch garden hoses and perhaps 1½-inch fire hoses.

All employees at these facilities should be trained on the use of this equipment. When permitted by local regulations, this training should include practice on small live fires.

"No smoking" signs are placed so they are visible from every entrance. Smoking is not permitted because of the possible fire hazard.

Containers are stored upright to prevent leakage. Storage is palletized for ease of handling. Each type of product is generally assigned to a particular area. Flammables are separated as much as possible from nonflammables and oxidizers. Labels are oriented so that some are always visible from the main aisles, and adequate lighting provided so that the products can be identified. Aisles are well marked so they remain clear for proper operating and fire access.

Wide aisles are important to prevent product damage and spills which could lead to a fire. Damaged containers are removed from storage piles and kept in a specially-designated area. Good housekeeping is stressed as the most important item contributing toward a safe facility.

Lastly, it is recommended that entrances to pesticide facilities be secured when unattended, preferably, both at the building doors and at the gate on the perimeter fence.

Burning characteristics. Most agricultural chemicals decompose in the heat of a fire and can release toxic gases, vapors, and smoke. With some products you may see toxic gases escaping, but often the gases are colorless. Warehouses, distributors, and dealers usually store a combination of products. So, unless you know specifically what is burning, assume the worst condition. I will mention the burning characteristics of four types of pesticides and four types of fertilizers.

The first is a wettable powder. Wettable powders are generally pesticides on clay and clay will not burn. So, once the bags burn, we have little or no fire.

The next type is a solvent-based pesticide. The pesticide itself may or may not burn but the sol-

vent carrier will. Most solvents in these products are flammable or combustible liquids, like xylene and kerosene.

The next is a water-based pesticide or most liquid fertilizers. Because of the water, most will put out fires. However, the heat will decompose the material and, as you will readily understand, we do not recommend it for fire fighting.

A big fire problem in the industry is powdered sulfur. (Sulfur begins melting at 234°F and flashes at 405°F.) A pile will burn slowly in an ever increasing circle with little or no visible flame. However, sulfur dust ignites very easily. It flashes, and can explode. Combustion produces oxides of sulfur; very toxic gases.

The next product is anhydrous ammonia, a compressed gas. Anhydrous ammonia is not generally a fire hazard due to its narrow range of flammability (16 to 25 percent) and its high autoignition temperature (1204°F). However, it is a hazardous gas and contact with liquid and vapors must be avoided. Since the vapors are extremely water soluble, a fine water spray will effectively control a leak. You have just made aqua ammonia; a mixture of anhydrous ammonia and water, a very common fertilizer. It, like other water-based fertilizers, is not considered a fire hazard.

The last two chemicals we will discuss are dry fertilizers. For the purposes of this presentation we will divide them into two classes: 1) ammonium nitrate-containing fertilizers bearing a yellow "oxidizer" label, and 2) most others.

Fertilizer-grade ammonium nitrate is different from the grade used for explosives. Uncontaminated, fertilizer-grade ammonium nitrate, burning freely where the products of combustion can readily escape, is not considered an explosion hazard. A pile of ammonium nitrate will not readily decompose until sustained temperatures of over 370°F are applied, such as you get by placing it on hot coals. Decomposition produces very toxic oxides of nitrogen characterized by light brown to reddish brown smoke. One of these, nitrous oxide, is an oxidizer and increases the burning rate of the fire.

The other fertilizers are not oxidizers. Generally, they contain ammonium sulfate and/or ammonium phosphate as contrasted with the ammonium

nitrate just discussed. These fertilizers do not burn as we commonly understand the term. However, at very high temperatures, they will decompose and some may release toxic gases or smoke.

In summary, burning agricultural chemicals, particularly pesticides, will likely produce toxic gases, vapors, and smoke. Avoid them, stay upwind, wear appropriate personal protective equipment.

Fire fighting tactics. There are special tactics for agricultural chemical fires. Step 1 is to get in touch with the facility manager. Shortly after arriving at the site, a decision must be made whether to fight the fire or let it burn. Step 2 is to alert medical personnel about possible treatment of poisoning gases, both the fire fighters and the public downwind. Step 3 is to get in touch with the facility's major supplier, either direct or through CHEMTREC. Step 4 is normally handled by the police department. Evacuate areas downwind and isolate the immediate area. Wear personal protective equipment. Stay upwind of the smoke. It may be toxic. Also, remain a safe distance from burning bottles, drums, metal, and aerosol cans.

Prevent the fire from spreading by cooling nearby containers and buildings. If possible, move vehicles way from the fire site.

Use as little water as possible on pesticide fires. This is a very important point and contrary to nor-

mal fire fighting practices. There are several reasons. The run-off may become contaminated with pesticides. The water will cool the burning pesticides, resulting in incomplete combustion. What we are faced with may be intermediate compounds of unknown properties, perhaps more toxic than the original chemicals. A hot fire will decompose the pesticides to less toxic compounds and cause less air pollution. The water will boil and cause steam to rise, possibly carrying toxic pesticides into the air. As this drifts to cooler air away from the fire, the pesticides drop as toxic fall-out. The chemicals involved in the fire are ruined anyway. Too much water just leaves more toxic debris and contaminated water to be safely disposed of.

For ammonium nitrate fertilizer fires, just the opposite is recommended. Use as much water as possible and play it directly onto the pile.

For pesticide fires, a fog spray is more effective for control than straight streams of water. Straight streams will break bags and bottles, adding fuel to the fire and increasing the contamination. They can also raise dust clouds which may ignite violently as discussed for sulfur dust.

And lastly, in case of contact with the product, smoke, mist or run-off, leave the site immediately and wash face and hands before eating or smoking.

ABSTRACT

Chadwick, L.D. 1978. **The Council of Tree and Landscape Appraisers.** American Nurseryman 158(3): 13, 110-116.

The Council of Tree and Landscape Appraisers has been trying to encourage people — homeowners, insurance agencies, government officials and the Internal Revenue Service — to think about trees. In the three years of its existence, there has been some progress made, but there is much more to be done. What is CTLA? The Council is composed of a representative from each of the five supporting organizations — International Society of Arboriculture, American Society of Consulting Arborists, National Arborist Association, American Association of Nurserymen, and the Associated Landscape Contractors of America. The activities of the Council, during the latter part of 1977, and to date in 1978, fall into four major categories: contacts with Insurance Services Office, contacts with IRS and other governmental agencies, public relations activities and revision of the Evaluation Guide and a related activity.