

THE REPOSE TO HAZMAT SPILLS

Hazmat incidents occur at three levels: personal (at home and in the workplace), local community, and state or regional. At every level the best way to deal with hazardous materials is to prevent their release. Having to respond to hazmat incidents is admitting failure to have adequate mitigation and preparedness. Because of the great risk of personal and environmental injury, the reader should seek information from professional trainers and schools regarding the correct methods for responding to hazmat spills. In this book only some common situations in which hazmat spills occur are summarized.

Responders

A number of qualified agencies may assume responsibility for hazardous materials. Common qualified local responder groups include fire departments, law enforcement agencies, allied medical and health professionals, public works departments, county health agencies, and county agriculture departments. State hazmat responders often include the highway patrol, state department of transport, state health departments, and state environmental management agencies. Federal hazmat responders include the EPA, Department of Natural Resources (DNR), and the U.S. Coast Guard. Other hazmat responders often include the responsible party and industry cooperatives. Unlike many other emergencies, in which volunteer help is often welcome, in a hazardous materials emergency the best thing for untrained members of the public to do is to stay at a safe distance.

Personal Level Hazmat Incidents

Hazardous materials are common in many households and animal care facilities. Common compounds such as detergents, cleaning materials, herbicides, and pesticides are potentially dangerous if persons or animals are exposed through incorrect handling or spillage.

The most common hazmat spills and exposures occur in homes and in the workplace. These are best mitigated by appropriate storage and by knowing in advance how to handle materials correctly. The instructions on the labels should be read and followed carefully.

CHECK OFF APPROPRIATE BOXES		CHEMICAL NAME:	
ROUTE OF ENTRY			
<input type="checkbox"/> INHALATION	<input type="checkbox"/> SKIN ABSORPTION		
<input type="checkbox"/> INGESTION	<input type="checkbox"/> SKIN OR EYE CONTACT		
HEALTH HAZARDS			
<input type="checkbox"/> NO HEALTH HAZARD	<input type="checkbox"/> IRRITANT		
<input type="checkbox"/> TOXIC	<input type="checkbox"/> CORROSIVE		
<input type="checkbox"/> HIGHLY TOXIC	<input type="checkbox"/> SENSITIZER		
<input type="checkbox"/> REPRODUCTIVE TOXIN	<input type="checkbox"/> CARCINOGEN		
PHYSICAL HAZARDS			
<input type="checkbox"/> NO PHYSICAL HAZARDS	<input type="checkbox"/> PYROPHORIC		
<input type="checkbox"/> COMBUSTIBLE LIQUID	<input type="checkbox"/> ORGANIC PEROXIDE		
<input type="checkbox"/> COMPRESSED GAS	<input type="checkbox"/> WATER REACTIVE		
<input type="checkbox"/> OXIDIZER	<input type="checkbox"/> UNSTABLE (REACTIVE)		
<input type="checkbox"/> FLAMMABLE GAS			
<input type="checkbox"/> EXPLOSIVE			
<input type="checkbox"/> FLAMMABLE LIQUID/SOLID			
TARGET ORGANS & EFFECTS			
<input type="checkbox"/> LUNGS	<input type="checkbox"/> SKIN		
<input type="checkbox"/> HEART	<input type="checkbox"/> PROSTATE		
<input type="checkbox"/> KIDNEY	<input type="checkbox"/> LIVER		
<input type="checkbox"/> EYES			
<input type="checkbox"/> CENTRAL NERVOUS SYSTEM			
<input type="checkbox"/> CARDIOVASCULAR SYSTEM			
<input type="checkbox"/> MUCOUS MEMBRANES			
<input type="checkbox"/> AUTONOMIC NERVOUS SYSTEM			
<input type="checkbox"/> RESPIRATORY SYSTEM			
<input type="checkbox"/> BLOOD			
<input type="checkbox"/> MUTAGEN			
<input type="checkbox"/> TERATOGEN			

HEALTH HAZARD 4 Deadly 3 Extreme danger 2 Hazardous 1 Slightly hazardous 0 Normal material	FIRE HAZARD FLASH POINTS 4 Below 73°F 3 Below 100°F 2 Above 100°F, not exceeding 200°F 1 Above 200°F 0 Will not burn
SPECIFIC HAZARD Oxidizer OX Acid ACID Alkali ALK Corrosive COR Use NO WATER W Radioactive ☢	REACTIVITY 4 May detonate 3 Shock and heat may detonate 2 Violent chemical change 1 Unstable if heated 0 Stable

FIG. 11-2 Hazard codes used to label chemicals. (From Lab Safety Supply, Inc. Janesville, Wisc.)

Hazardous chemicals should be stored in safe places where children and animals cannot be exposed to them. Storage areas must guard against freezing and overheating of hazardous materials. They also should have separate locks. Chemicals should be stored on the floor or lower shelves to prevent falling and spilling. Lips are recommended for all shelving upon which hazardous materials are stored.

The appropriate approach to cleanup is to use rags or newspaper that can be wrapped and sealed in a plastic bag or other suitable container. All chemicals must be disposed of correctly.

Following are examples of hazmat spills in the home and workplace that involve animals:

- A car's leaky radiator allows antifreeze/coolant to drip onto the ground. The sweet taste encourages a dog to lick it up. Hours later the dog dies of peracute kidney failure.
- A technician performs a regular cleaning of a bathtub in a veterinary practice with bleach. However, just before the cleaning a dog was scrubbed in the tub with Betadine. The mixing of the Betadine and bleach causes a chemical reaction and the liberation of free bromine gas. The air-conditioning system carries this corrosive gas throughout the practice, prompting temporary evacuation.
- High winds on a horse farm blow open a door of a barn where chicken feed containing Monensin is stored. Horses gain access to the feed and ingest toxic amounts. Acute diarrhea and renal failure occur.
- A farmer buys some new calves and uses old barn siding to construct a pen. A week

later he finds two calves dead, two that are extremely excitable, and some that appear blind. Most of the others have lost their appetite. On investigation it is revealed that the paint on the old fencing material is lead based and that the calves had been licking it. Human exposure and disposal of the fencing are also of great concern.

The following precautions should be taken if exposure to chemicals is threatened or has occurred:

- Store chemicals in safe places where children and animals do not have easy access (e.g., do not store chemicals under household sinks or on open shelves).
- Follow label instructions for handling, use, and disposal.
- Dispense chemicals only in accordance with legal requirements.
- Prevent exposure to the skin by using waterproof aprons and butyl rubber gloves to handle the substance or contaminated animal.

Table 11-2 Some typical signs and symptoms of chemical poisoning in humans

Difficulty breathing
Headache
Blurred vision
Irritated eyes, skin, and throat
Clumsiness
Stomach cramps
Vomiting and diarrhea
Changes in skin color
Dizziness
Unusual behavior

- Prevent exposure to the eyes and mucous membranes by wearing a mask.
- Clean exposed areas with running water and soap (not detergent). If exposure to the eyes occurs, flush water to outside corner of the eye.

Another approach is to use less toxic alternatives in the home. Examples of these are given in Tables 11-3 and 11-4.

Table 11-3 Some common household chemicals and “natural” alternatives

Household use or pest to repel	Alternatives
Drain cleanser	Pour boiling water down the drain; to clean pipes and avoid clogging, use two handfuls of salt followed by water
Sink declogger	Use one or two handfuls of baking soda, followed by 1 cup of vinegar; let set for an hour before running water through
Laundry detergent	Use a nondetergent, natural laundry soap; add 1/2 to 1 cup vinegar to brighten
Brass cleaner	Mix equal parts of salt and flour with enough vinegar to make a stiff paste; cover surface and allow to dry before rinsing off
Silver polish	Combine equal parts of water, baking soda, and salt; add a piece of aluminum foil to solution; soak silver
Furniture polish	Mix 1/2 cup vinegar, 1/2 cup rubbing alcohol, and 1 cup linseed oil; shake well before using
Oven cleaner	Line oven with aluminum foil; sprinkle salt on spills while still warm and scrub with baking soda and water
Air freshener	Set out dish filled with warm vinegar, or add cloves and cinnamon to boiling water and allow to simmer
Cockroaches and ants	Sprinkle equal parts of confectioners' sugar and borax (i.e., boric acid) in dry areas where these pests are found
Flies	Repel with mint plants in windowsills
Other houseplant pests	Wash leaves with soapy water (1 lb nondetergent soap to 5 gallons water); rinse
Aphids	Repel with garlic, chives, petunias, and nasturtiums
Other pests	Many insects are repelled by the smell of pepper
Slugs and snails	Pour beer in a flat receptacle and place below ground level in the infested area
Crabgrass	Place a teaspoon (or less) of salt in the center of each plant

Modified from Robertson D and others: *Environmental Management* 11(6):735-742, 1987.

Caution: many chemicals, when combined, can make dangerous new products. Do not combine materials without specific directions on their combined safety.

Local

Table 11-4 Some common household chemicals and their potential health effects

Chemical	Consumer products	Health effect
Carbon tetrachloride	Paint/varnish remover, liquid degreasers, spot removers, old fire extinguishers	Suspected carcinogen and kidney damage
Trichloroethylene	Clean, strippers, upholstery cleaner	Suspected carcinogen; CNS and organ damage
Toluene	Spray paint, paint thinners, glue, cosmetics, gasoline	Possible reproductive toxin; liver and kidney damage
Tetrachloroethylene (PERC)	Stain remover, paint stripper, contact cement, degreasers, wax removers, shoe polish, pesticides, rug cleaner	Suspected carcinogen and mutagen; liver and blood damage
M-xylene	Spray paint, paint removers, degreasers, gasoline	Possible reproductive toxin; liver and kidney damage
Naphthalene	Bathroom deodorant, insecticides, moth repellent, rug cleaners	Liver damage; blood disorders
Benzenes	Spot removers, gasoline	Carcinogen
Chloroform	Cough medicine, liniments	CNS depression; liver and kidney damage
O-phenylphenol	Disinfectants, preservatives	CNS depression; irritant
Phenol	Disinfectants, deodorants, furniture polish	May cause severe burns upon skin contact; CNS depression
Chlorobenzenes	Deodorizers, dyes, metal polish, moth repellents, disinfectants	Irritant; possible liver and kidney damage
2,4,5-T	Pesticides	Suspected animal carcinogen, may contain dioxin
Pentachlorophenol	Wood preservatives	Toxic to liver, kidney, and CNS; contains hexachlorobenzene, which is carcinogenic in rats and mice; may contain dioxin
Methylene chloride (dichloromethane)	Pain relievers, degreasers, refrigerants	Respiratory irritant; CNS depression; alters ability of blood to carry oxygen to body tissue

CNS, Central nervous system.

Modified from Robertson D and others: *Environmental Management* 11(6):735-742, 1987.

Community Level Hazmat Incidents

The following are examples of community level hazmat incidents involving animals:

- After heavy rains an oil separator overflows and about 30 gallons of oil mixture is spilled into a river where Canada geese gather and feed. About 30 birds are oiled, four of which die because of liver necrosis, and another dies because of injuries sustained trying to escape.
- A farmer takes a tight turn while fertilizing a field with anhydrous ammonia.

Unfortunately, his tractor-trailer hits a rock, jolts the fertilizer wagon, and knocks off the valve. Anhydrous ammonia immediately starts hissing from the pressurized container. The wind carries the anhydrous materials across a highway where all traffic is stopped and toward the farmer's pastures where cattle are grazing.

- The inadvertent mixture of Terbufos into a dairy herd ration by an inexperienced farmer caused the death of 130 cows. All cattle were affected, and because of the concern for human safety, all milk had to be discarded for several weeks until contamination of the milk could no longer be detected.
- After a flood, rescue workers trying to save cows and horses that are threatened by floodwaters have to abandon their efforts as chlorine tanks come loose and threaten to release chlorine gas. Chlorine is commonly used on farms to sterilize water.

Should a hazmat spill occur in a community, the following precautions may be helpful:

- Listen on the radio or television for official instructions on what to do.
- Close all windows.
- Turn off the heating, air conditioning, and fire damper.
- Go to the highest room in the house that does not have windows.
- Avoid going to the basement because many gases will travel to the lowest point.
- Place wet towels in door jams, tape any gaps, and stay away from windows.
- If you are required to evacuate, turn off lights and gas. When leaving do not take shortcuts because they may lead closer to the incident scene.

State and Regional Hazmat Incidents

The following examples show state and regional hazmat incidents that involved animals:

- In 1971 over 60 horses in stables close to Times Beach, Missouri, developed unexplained illnesses, and some died. The association was made with spraying the area with oil to reduce the amount of dust. The oil turned out to be contaminated with dioxin. In 1983 the town of Times Beach was bought out and all residents were relocated.
- In 1989, 42 million liters of crude oil leaked from the *Exxon Valdez* tanker in Prince William Sound, Alaska. Hundreds of miles of beach and marine habitat were destroyed. Among the animal casualties were 13% (300) of all harbor seals, 3500 to 5500 sea otters, and approximately 250,000 seabirds of 90 species. The next year 1.9 million fewer adult pink salmon returned to the Sound, which is believed to have been the result of toxic effects on eggs.
- In 1996 a train derailed in Weyauwega, Wisconsin. All 1700 residents were evacuated. They were forced to stay away from their homes for 18 days. Many pet owners were at work at the time of the evacuation and could not evacuate their pets. The EMA organized a pet rescue that required armed vehicles to transport the pet owners, who had to wear flak jackets.

Sources of Advice and Help for Hazmat Incidents Involving Animals

Owners should not treat contaminated animals themselves. Professional help is available. Most veterinarians can advise on how to treat the clinical aspects of common poisonings. In addition, the National Animal Poison Control Center in Urbana, Illinois, any college or school of veterinary medicine, a state animal disease diagnostic laboratory, and some human poison control centers can provide information on how to deal with animal poisonings. Some may charge for these services.

For livestock that graze or live outside, hazardous materials can present additional problems. Animals that ingest or otherwise come into contact with low levels of hazardous material may not appear clinically affected, but their meat, milk, and eggs may contain residues that present exposure for humans through ingestion. If there is any suspicion of contamination of livestock from hazardous materials, it is vital that livestock producers seek a specialist for advice on how to deal with this contamination and control the implications for human food safety.

Representatives from the U.S. Department of Agriculture, Food Safety and Inspection Service, are trained and qualified to make these decisions. Other sources of information are the federal and state Food and Drug Administration, the National Animal Poison Control Center, colleges and schools of veterinary medicine, state disease diagnostic laboratories, and state chemists, whose role includes the safety of animal feeds.