

# emergency action plans and safety



## EMERGENCY ACTION PLANS

Although not required by law, emergency action plans should be developed to meet current animal manure management regulations. Your plan can then be implemented in the event that manure from your operation is leaking, overflowing, or running off the site. You should NOT wait until manure reaches surface waters or leaves your property to consider that you have a problem. This plan should be available and understood by all employees at the facility because accidents, leaks, and breaks could happen at any time.

Emergency action plans must include provisions for emergency spreading or transfer of manure from all manure storage structures in the system. This may include emergency pumping or spreading (to prevent overtopping of a storage structure) during periods when the soil or crop conditions are not conducive to normal spreading or application. The Iowa Department of Natural Resources must be contacted for guidance in land-applying waste in this case. You should consider which fields are best able to handle the manure without further environmental or crop damage. Application rates, methods, and minimum buffer distances must be followed.

The main points of the emergency action plan, including the order of action and the relevant phone numbers, should be posted by all telephones at the site. A copy also should be available in remote locations or vehicles if the land application sites are not close by the facility office. It is the responsibility of the facility owner or manager to ensure that all employees understand what circumstances constitute an imminent danger to the environment or to the health and safety of workers and neighbors. Employees should be able to respond to such emergencies and notify the appropriate agencies of conditions at the facility.

Your plan should include these items: (1) stop the release of manure; (2) assess the extent of the spill and note any obvious damage; (3) contact the appropriate agencies (notification is required within six hours of an emergency); and (4) implement procedures to rectify the damage and repair the waste management system. The order in which they are accomplished will

depend on the situation at the time.

### 1. Stop the release of manure.

Depending on the situation, this may or may not be possible. Suggested responses to several problems are listed below.

#### A. Lagoon or earthen basin release

*Stop the release:*

- Add soil to the berm to increase the elevation of the dam.
- Plug any line or valve at the basin that is leaking.
- Stop all additional flow to the structure (waterers, flushing system, surface runoff etc.).
- Ensure that no surface water is entering the storage structure.

*Intercept the released liquid:*

- Push up a small berm in the drainage way to stop overland flow.
- Plug tile outlets that are carrying contaminated liquid.

*Prevent release from reaching water sources:*

- Drive a pipe section down over tile risers, or pile soil around them.
- Pump waste to fields at an acceptable rate.
- Call a pumping contractor or neighbor with useful equipment if necessary.

#### B. Runoff from in-field manure application

- Immediately stop waste application.
- Create a temporary diversion or berm to contain the waste on the field.

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- Incorporate waste to reduce further runoff.
- Evaluate and eliminate the reason(s) that caused the runoff.
- Evaluate the application rates for the fields where runoff occurred.

## C. *Tile discharge*

- Stop application.
- Plug tile or tile inlets.

## D. *Leakage from base or sidewall of lagoon or earthen storage structure (Often these are seepage rather than flowing leaks.)*

- Dig a small well or ditch to catch all seepage, put in a submersible pump, and pump the seepage back into the lagoon.
- If holes are caused by burrowing animals, trap or remove animals, fill the holes, and compact with a clay-type soil.
- Other holes may be likewise temporarily plugged with clay soil.

*Note: Problems with lagoons and earthen storage structures require the consultation of an individual experienced in the design and installation of lagoons for permanent repair measures.*

## 2. **Assess the extent of the spill and note any obvious damage.**

- Did the manure reach any surface waters?
- Approximately how much was released and for what duration?
- Did any damage such as employee injury, fish kills, or property damage occur?

- Did the spill leave the property?
- Does the spill have the potential to reach surface waters?
- Could a future rain event cause the spill to reach surface waters?

## 3. **Contact appropriate agencies.**

(Notification is required within six hours if a spill or hazardous event occurs. In some situations this may be the first action you should take.)

- During normal business hours, call your IDNR regional office. (*See Chart 1 above.*)
- Your phone call should include
  - Your name,
  - Facility,
  - Telephone number,
  - Details of the incident from item 2 (previous page),
  - Exact location of the facility,
  - Location or direction of the spill's movement,
  - Weather and wind conditions,
  - What corrective measures have been undertaken, and
  - The seriousness of the situation.

- 24-hour emergency response notification can be made to IDNR at **(515) 281-8694**. Both IDNR and local officials must be notified of spills or other releases.

- As a last resort, call 911 or the sheriff's department and explain your problem to them. Ask them to contact the appropriate agencies.

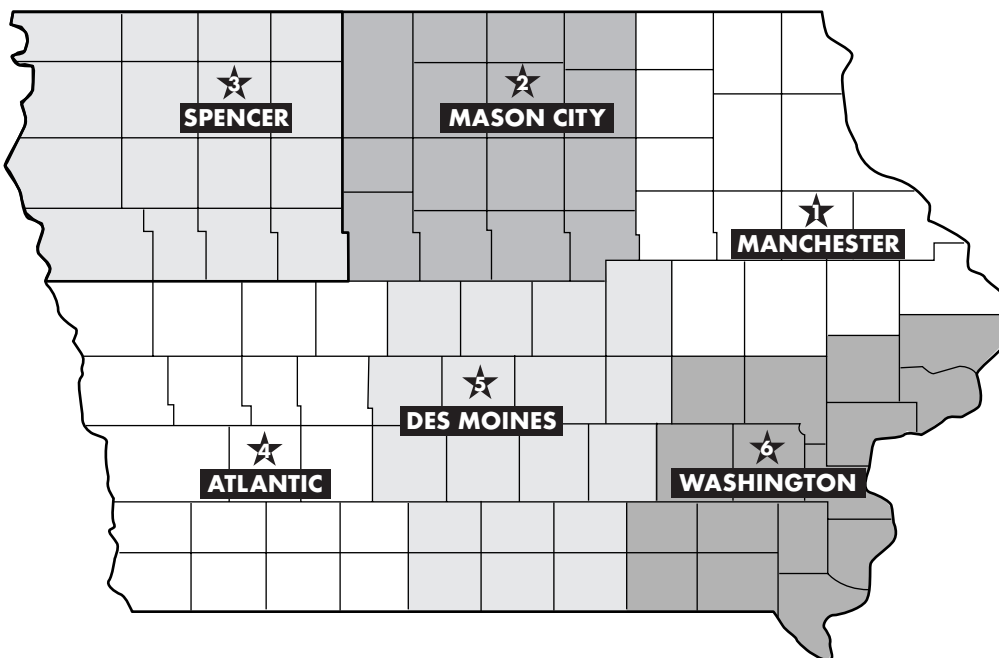
## 4. **Implement procedures.**

- Implement the procedures advised by the IDNR and technical assistance agencies to rectify the damage, repair the system. Reassess the emergency management

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**CHART 1**

**FIELD OFFICE LOCATIONS  
ENVIRONMENTAL PROTECTION DIVISION**



FIELD OFFICE	LOCATION	PHONE NUMBER	CONTACT
1	909 W. Main, Suite 4 • Manchester, IA 52057	319-927-2640	Jerry Rattenborg
2	2300 15th St. SW • Mason City, IA 50401	515-424-4073	William Jinkinson
3	1900 North Grand Ave. • Spencer IA 51301	712-262-4177	Barb Lynch
4	706 Sunnyside Lane • Atlantic, IA 50022	712-243-1934	Chuck Corell
5	607 E 2nd St. • Des Moines, IA 50309	515-281-9069	Jim Stricker
6	1004 West Madison • Washington, IA 52353	319-653-2135	Allan Goldberg

plan to prevent future problems with manure releases.

accident prevention.

## PERSONAL SAFETY

Behind every accident is a chain of events that leads to an unsafe act, unsafe conditions, or a combination of both. Safety in the workplace should be everyone's concern. Communication between supervisors and employees generates ideas and safety awareness that leads to

Each year livestock producers, their employees, and their family members are injured in confinement livestock production. Manure storage structures and many livestock buildings are considered to be confined spaces.

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There are three types of liquid manure storage structures, plus solid manure storage:

- Formed storage (deep pits and outside tanks)
- Lagoon systems
- Earthen slurry basins (holding ponds)
- Solid manure piles

Dangerous situations can be associated with the five main gases that are produced in livestock and poultry buildings and manure storage structures. These gases are listed in Table 1 (*see emergency and safety page 8*), along with some of their characteristics. All of these are colorless.

## Manure Gases

Five gases are of primary concern with livestock facilities: ammonia, carbon dioxide, carbon monoxide, hydrogen sulfide, and methane. Hydrogen sulfide is especially dangerous during agitation and pumpout of enclosed pits. It can reach lethal concentrations and kill animals, both livestock and humans.

### • Hydrogen sulfide

Hydrogen sulfide ( $H_2S$ ) is the most toxic gas generated from liquid manure storage. Exposure to 200 ppm for an hour can cause headaches and dizziness; exposure to 500 ppm for 30 minutes can cause severe headaches, nausea, excitement, or insomnia. High concentrations of 800 to 1,000 ppm can cause immediate unconsciousness and death—from just a few breaths—through respiratory paralysis unless the victim is moved to fresh air and artificial respiration is immediately applied. Be aware—even the characteristic rotten-egg smell of hydrogen sulfide does not give adequate warning. The sense of smell is rapidly fatigued by the gas, and high concentrations do not give a proportionately higher odor intensity. Dangerous concentrations can be released by agitating stored liquid manure. Concentrations reaching 200 to 300 ppm have been reported in buildings a few minutes after starting to pump waste from a storage pit and can be as high as 800 ppm during vigorous

agitation.

### • Methane

Methane ( $CH_4$ ) is a product of manure decomposition under strict anaerobic conditions, such as those found in an anaerobic or biogas digester. It is insoluble in water and lighter than air; thus it will accumulate in stagnant air corners in the tops of enclosed, unvented pits or buildings. Methane is not toxic, but at high concentrations it may cause an asphyxiating environment. Methane concentrations in confinement housing normally are well below the levels that may be explosive (*See Table 1, emergency and safety page 8*). However, explosions attributed to methane have occurred around manure storage pits without proper vents.

## First aid for victims of manure gas asphyxiation

1. **Do not** attempt to rescue a victim from a hazardous gas situation unless you are protected with a supplied-air breathing apparatus. Holding your breath is not an option.
2. Have someone telephone for an emergency medical rescue squad, informing them there is a “victim of toxic gas asphyxiation.”
3. If the victim is free from the immediate area of danger and there is no personal threat to life, do the ABC of first aid:
  - Airway check
  - Breathing check
  - Circulation check

If you are trained, do CPR or mouth-to-mouth if necessary.

Training courses for rescue breathing and CPR are available through your local Red Cross chapter.

## Effect of air quality on human health

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Health problems associated with poor air quality include coughing, phlegm production, wheezing, chest tightness, headaches, shortness of breath, eye irritation, sneezing, runny nose, and nasal congestion. Problems usually are greater the more time a worker spends in the presence of the contaminant and the higher the concentrations of airborne contaminants. In addition, some people are more susceptible than others.

Health problems may be chronic (lasting a long time) or acute (severe but short term). Since chronic and acute problems can be mistaken for other health problems, such as the flu or allergies, the work environment often is overlooked as a cause of the symptoms, so precautions are not taken. Table 2 (*see emergencies and safety page 8*) lists some symptoms swine facility workers in Iowa have experienced as the result of poor air quality in swine buildings.

You should consider the following safety points when constructing, operating, and managing animal manure management systems:

- Do not enter a manure pit unless following specific procedures for entering a confined space.
- When agitating a manure storage structure, always have at least one additional person available to seek help if trouble occurs.
- Use properly designed and operated ventilation systems to reduce the concentration of gases within buildings.
- When possible, construct lids for manure pits and tanks and keep them in place. If an open, ground-level tank or pit is necessary, build a fence around it and post with **Keep Out** and **Danger: Manure Storage** signs.
- Get help before attempting to rescue livestock or people that have fallen into a manure storage structure.
- Build railings along all walkways or piers of open manure storage structures.
- Place locked entry guards on permanent ladders on the outside of above-ground tanks unless the ladders cannot be reached from the ground. Never leave a ladder standing against an above-ground tank.
- Construct permanent ladders on the inside wall of all pits and tanks, even if covered. Use non-corrosive material to prevent deterioration of the ladders.
- Fence in earthen storage basins and lagoons, and erect signs: **Danger: Manure Storage**. Additional precautions include a minimum of one lifesaving station equipped with a reaching pole and a ring buoy on a line.
- Place barriers strong enough to stop a slow-moving tractor on all push-off platforms.
- If possible, remove animals from buildings before agitating manure stored in in-house pits. Otherwise:
  - If the building is mechanically ventilated, turn fans on full capacity before starting agitation, or
  - If the building is naturally ventilated, do not agitate unless there is a brisk breeze. Watch animals closely when beginning to agitate, and turn off the pump at the first sign of trouble.
- If the manure storage is outside the livestock building, use a water trap or other device to prevent gases from entering the building.
- During agitation, if an animal becomes affected by toxic gases, do not try to rescue it; you could become the victim. Turn off the agitation pump, ventilate the building, and do not enter the building until gases have had a chance to escape.
- Do not smoke, weld, or use an open flame

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in confined, poorly ventilated areas where methane can accumulate. Use only explosion proof electric motors, fixtures, and wiring near manure storage structures to prevent a spark from igniting the methane.

- Keep all guards and safety shields on all mechanical equipment.

## SUMMARY OF KEY POINTS

- There are two primary safety concerns in manure storage and handling: environmental safety and personal safety.
- Every livestock facility should have an environmental emergency action plan available to all employees.
- Emergency action plans should include
  - A plan to stop potential uncontrolled releases of manure,
  - Phone numbers of those who can help stop any release,
  - Notification plan including agency phone numbers,
  - A cleanup plan.
- Notification of IDNR field or state office and local law enforcement officials is required in the event of a spill or other release.
- If runoff results during manure application, stop applying immediately.

- Ammonia,
- Methane,
- Hydrogen sulfide,
- Carbon monoxide, and
- Carbon dioxide.

- Hydrogen sulfide is the most dangerous of these gases. At high concentrations it can kill with just a few breaths.
- Always use maximum ventilation during agitation and pumping from deep pits.
- If one or more animals go down during agitation and pumpout, shut off the pumps but do not try to rescue the animals immediately.
- Poor air quality in livestock facilities can cause long-term illness.

- The five main gases produced by animal facilities are

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**TABLE 1**

**CHARACTERISTICS AND EFFECTS OF GASES PRODUCED IN LIVESTOCK BUILDINGS AND MANURE STORAGE STRUCTURES**

GAS	ODOR	DENSITY	HEALTH EFFECTS
Ammonia (NH <sub>3</sub> )	Pungent	Lighter than air	Irritation to eyes and nose. Asphyxiating at high levels.
Carbon dioxide (CO <sub>2</sub> )	None	Heavier than air	Drowsiness, headache. Can be asphyxiating.
Carbon monoxide (CO)	None	Lighter than air	Headache, chest pains, potential for problems with developing fetuses. Can be asphyxiating.
Hydrogen sulfide (H <sub>2</sub> S)	Rotten-egg smell	Heavier than air	TOXIC: causes headache, dizziness, nausea, unconsciousness, death.
Methane (CH <sub>4</sub> )	None	Lighter than air	Headache, asphyxiating, explosive 5 to 15 percent

**TABLE 2**

**HEALTH SYMPTOMS OF IOWA SWINE FACILITY WORKERS**

SYMPTOM	PREVALENCE (PERCENT)
Cough	67
Sputum or phlegm	56
Scratchy throat	54
Runny nose	45
Burning or watery eyes	39
Headaches	37
Chest tightness	36
Shortness of breath	30
Wheezing	27