

6 Occupational health and safety

Common sense is a necessary ingredient to avoiding accidents on farms. However, everyone can make mistakes for various reasons, including time pressures, stress, tiredness, and working with unfamiliar or poorly maintained equipment. Therefore, effluent system designers must consider occupational health and safety (OH&S) issues to avoid introducing unnecessary risks.

Several fatalities on dairy farms have resulted from accidents while effluent systems were being maintained. In one instance, a man drowned when the tractor he was using to agitate an effluent pond slid into the pond and sank ([WorkSafe Victoria nd.](#)). In another instance, five people died when one man entered a manure pit to repair an agitator shaft; he and his four rescuers all died of asphyxiation.

General OH&S issues on dairy farms

Dairy-specific publications such as *Dairy Safety: A Practical Guide* ([WorkSafe Victoria 2006](#)) help farm owners to provide a safe work place. *Dairy Safety* applies a three-step process (find the hazards, assess the risks, fix the hazards) to on-farm activities and provides a good summary of potential hazards. Additional information for farmers is available at <http://www.dairysafety.org.au/>.

Effluent systems pose unique hazards, as routinely generated gases pose a safety threat in confined spaces. A confined space is any enclosed or partially enclosed structure (e.g. vat, tank, pit, pipe, silo, container, reaction vessel, receptacle, underground sewer, shaft, well, trench, tunnel) if the space has:

- restricted entry or exit
- hazardous atmosphere
- a risk of engulfment.

Manure gases

Storage, pumping, mixing, spreading and cleaning-out can release large amounts of gases from decomposing manure. There are four gases of primary concern:

- Hydrogen sulphide is a highly toxic gas that is heavier than air. It can cause dizziness, unconsciousness and death. At low concentrations it smells like rotten eggs, but at higher concentrations it deadens the sense of smell, and no odour can be detected.
- Carbon dioxide is an odourless, tasteless gas that is heavier than air. It displaces oxygen in confined spaces, which can result in asphyxiation.
- Ammonia is lighter than air. It has a pungent smell and can irritate the eyes and respiratory tract.
- Methane is also lighter than air. The main hazard is explosion within flammable limits (5%–15% CH₄). Explosive concentrations can occur during agitation or when the gas is trapped in an improperly ventilated space (see chapter 8.1 '[Production and beneficial use of methane](#)'). As methane is odourless, you will not be able to detect dangerous situations by smell.

[ASAE \(2005\)](#) and [Schiffman et al. \(2006\)](#) contain information on the characteristics of these gases and the concentrations at which they pose a hazard.

System design to minimise hazards

Consideration of likely hazards and risks at the design stage can prevent or at least minimise the hazards during subsequent system operation. This is particularly important with confined spaces. Refer to state-based confined-space regulations for further information on situations that constitute a confined space and the duties of designers in such situations.

Under state OH&S acts, designers are required to consider safety in their designs. Where a confined space cannot be avoided, designers are required to either eliminate the need to enter the space or reduce as far as practicable the need to enter it. For example, manure solids will settle in pumped sumps if held for more than 30 min, so some form of mechanical or hydraulic agitation is required (and has traditionally been installed) to obviate the need for the operator to enter the pit to remove solids. A thorough risk assessment at the design stage should highlight the need for such pumps and agitators to be easily removed rather than require someone enter the pit to perform routine maintenance.

System designers should also seek to eliminate the need to use tractors near the edge of effluent ponds (e.g. for agitating or pumping). Where this is not possible, safe systems of work should be specified and adopted, such as using low barriers or chocks to prevent the tractor from moving backwards. A suitable barrier would be required at every access point (see chapter 2.8 '[Desludging and pond closure](#)').

All design plans should include a description of safety procedures for management and maintenance specific to the farm. Plans should include a statement reminding farmers of the need to adopt safe working practices for activities involving dairy effluent. Safe work practices are based on ensuring that workers have appropriate training for the task, have completed a Job Safety Analysis before starting the task, and receive adequate supervision while completing the task. A general list of risks and control measures is provided below.

Checklist of risk controls

The following checklist is a compilation of points raised by state-based guidelines ([DairyCatch 2006](#), [McDonald 2006](#), [NSW Dairy Effluent Subcommittee 1999](#)) with additional information from (WorkSafe Victoria 2006). The list focuses on effluent-specific issues and does not preclude any other requirements (e.g. guards to be fitted, electrical work to be carried out only by a qualified electrician).

Collection and conveyance

- Where pit and platform wash is piped directly to the effluent pond, install a water seal or gas trap to prevent gases from entering the dairy.
- Floodwash tanks must be installed on stable foundations and supports. Supply engineering computations or drawings certified by a structural engineer before construction.
- Children and inexperienced staff must not handle hydrant wash systems, as the high pressures and resulting forces can cause the nozzle to swing wildly.
- Sumps and solids traps must be covered or surrounded by fencing (including a lockable gate) to exclude children and stock. In some cases, standard swimming pool fencing could be used.
- Observe the requirements of confined-space regulations.
- Do not enter manure pits without a respirator and an emergency plan. An observer who understands safe rescue procedures should supervise any manure pit work.

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- Do not smoke, weld, grind or use an open flame in a poorly ventilated area.
- Ensure that any exposed moving part on an effluent pump is guarded.

Storage and treatment

- Effluent ponds can form a substantial crust that supports subsequent weed growth. Although the crust may look like solid ground, it may not support the weight of a person or animal. Fence ponds immediately after construction to exclude children and stock.
- A warning sign must be mounted on the fence near the entry gates saying 'Danger—Manure Storage'.
- Locate fences a sufficient distance from banks to allow machinery access around the toe of the batter.
- Eliminate the need to use tractors near the edge of effluent ponds where possible. If this is not possible, use barriers or chocks to prevent the tractor from moving backwards.
- Machinery may collapse unstable or narrow embankments. See chapter 2.5 ['Pond design and construction'](#) for appropriate batter slopes and embankment widths. Investigate and rectify any evidence of slumping or undercutting, or embankments may collapse.
- Maintenance and desludging operations require extreme caution, as clay surfaces can become slippery when wet. Topping the embankment with gravel (at least to designated access points) will help maintain vehicle and pedestrian traction.
- Avoid the frequent use of pond embankments as laneways unless additional width and gravel surfacing are provided.
- Place a rescue rope and float within the fenced-off area around the pond.
- Owing to the risks of gas ignition and explosion, a specialised safety plan is required for any farm with a covered pond or other digester.

At any time

- All farm machinery must be regularly maintained according to manufacturers' instructions, and all controls must be clearly marked. Do not use faulty machinery.
- Observe appropriate hygiene practices: no smoking, eating or drinking around the dairy; wash hand following contact with effluent and manure.
- Provide appropriate clothing and protective equipment such as gloves, aprons, rubber boots, goggles and other skin protection, and ensure that it is worn by staff who come in contact with animal effluent and manure.
- Maintain or replace all personal protective equipment regularly.
- Avoid inhalation of aerosols during reuse of effluent for yard or alley washing or spray irrigation.
- Follow effluent and manure management guidelines; poor practices increase the health risks associated with flies and insects.
- Supervise children visiting the dairy.
- Whenever chemicals are used, read and understand the Material Safety Data Sheet for the chemical involved and follow the safety precautions prescribed.
- Vaccinate people for Q fever. Vaccinate livestock for leptospirosis.

References

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