



## Confined Spaces on Dairy Farms

Confined spaces on dairy farms can include, indoor silage clamps, tower silos and slurry storage systems. They do not necessarily have to be fully enclosed.

Hazards or conditions inside the confined space can provide risks of: -

- Drowning
- Loss of consciousness from lack of oxygen or release of poisonous gases
- Asphyxiation from a free flowing solid e.g. grain
- Injury from fire or explosion.

Areas on Dairy farms that may release dangerous gases include: - slurry pits, dirty water treatment tanks, inspection pits associated with weeping wall systems, indoor silage clamps and milk tanks. Entering into a confined space may even include reaching in or putting your head into a tank.

### Milk Tanks

Hazardous gases don't usually accumulate but the cleaning and disinfecting chemicals can produce some toxic gases that can be irritating in small quantities. Installing an automated washer system prevents people having to enter tanks.

### Manure & slurry storage



This can be in ponds, tanks or pits and the breakdown of the materials leads to the release of hazardous gases. As the liquid slurry ferments it releases the gases some of which can be trapped in bubbles. If the slurry is agitated these bubbles can be quickly released giving off high volumes of colourless toxic gases, which even in small concentrations can cause unconsciousness and death in seconds.

Work that releases these hazardous gases includes: -

- Agitation during pumping
- Cleaning, maintenance, and repair of equipment, such as agitators and pumps
- Unblocking pumping systems
- Recovering materials such as scraper parts, brooms, or tools dropped in the pits.

Another hazard of these types of confined spaces is that workers may accidentally fall into the pits (or through a crust on the surface), become engulfed, and drown.

As the gases are heavier than air, confined spaces can be temporarily created especially when the slurry is first agitated and most gas is given off. If the tank is part buried or surrounded by a wall or high piece of ground the gases can accumulate in this space.

All people should know the hazards and it recommended that areas within a 6m radius of the tank should be fenced off during agitation.



Pump chambers also move raw liquid manure to a higher level. Again agitation or mixing of the slurry can release pockets of gas into the atmosphere. Risks increase if you have to enter the pit to carry out cleaning or maintenance. Avoid entering the pit to carry out repairs.

### Precautions When Agitating Slurry

- Ventilate
  - Choose a windy day if possible
  - Open all doors and outlets
- Evacuate
  - All persons
  - All animals
- Agitate
  - Do not stand near slats
  - Do not enter the building for one hour
  - Avoid smoking and naked flame
- Protect Openings
  - Install a manhole safety access cover
  - If slat(s) has to be removed, provide adequate temporary protection of openings
  - Warn children and visitors
  - Use warning signs

Specific safe systems of work are required if you need to enter an empty slurry pit including; use of breathing apparatus, harness and life line and having full emergency and rescue procedures in place.

### Precautions around slurry lagoons and scraping ramps

The lagoon should be securely fenced with gated access to the ramp. Provide a tractor stop barrier on the scraping ramp to prevent accidents. Other vehicles should not enter the slurry pit area. Normally, barriers need to be a third of the height of a rear tractor tyre, and be made of steel or other strong material rather than wood.



More information can be found at: -

<http://www.hse.gov.uk/pubns/ais9.pdf>

<http://www.hse.gov.uk/pubns/ais26.pdf>

The following table describes some of the toxic gases that may be present in confined spaces on dairy farms and the dangers of exposure to these gases.

Contaminant	Where does it come from?	What are the dangers
Hydrogen Sulfide (H <sub>2</sub> S)	Released when organic material such as manure breaks down without oxygen (e.g. in animal barns, manure piles, tanks, pits or ponds)	<ul style="list-style-type: none"> <li>• Very toxic – cause lung failure and death</li> <li>• Extremely flammable</li> <li>• Can be released when fluids are agitated bursting bubbles of trapped gas</li> <li>• Heavier than air – so can accumulate at the bottom of a confined space</li> <li>• Colourless and at high concentrations odourless.</li> </ul>
Ammonia (NH <sub>3</sub> )	Produced when high nitrate organic materials e.g. manure and urine are decomposed by bacteria e.g. in manure pits	<ul style="list-style-type: none"> <li>• Toxic – can cause irritation to the eyes and nose and lungs, can cause lung damage and death at very high concentrations</li> <li>• Flammable at high concentrations</li> <li>• Lighter than air so can accumulate at the top of a confined space</li> </ul>
Methane (CH <sub>4</sub> )	The main gas produced during the bacterial digestion of manure so found in manure pits, composting facilities, silos and bins.	<ul style="list-style-type: none"> <li>• Accumulates in areas of poor ventilation</li> <li>• Displaces oxygen</li> <li>• Flammable &amp; Explosive</li> <li>• Lighter than air so can accumulate at the top of a confined space</li> </ul>
Carbon Monoxide (CO)	Comes from sources of combustion (e.g. burners or petrol & diesel engines)	<ul style="list-style-type: none"> <li>• Toxic – can cause suffocation as it replaces oxygen when binding with red blood cells</li> <li>• Can accumulate at the bottom of a confined space in cold weather</li> </ul>
Carbon Dioxide (CO <sub>2</sub> )	Produced by all living organisms that breath oxygen. Levels in enclosed dairy barns can be high if lots of cattle	<ul style="list-style-type: none"> <li>• Displaces oxygen</li> <li>• Toxic in high levels</li> <li>• Heavier than air and can accumulate at the bottom of a confined space</li> </ul>
Nitrogen Dioxide (NO <sub>2</sub> )	Produced as plant material is transformed into silage	<ul style="list-style-type: none"> <li>• Toxic – a respiratory irritant and can cause death at high concentrations</li> <li>• Heavier than air – so can accumulate at the bottom of a confined space.</li> </ul>

