

# Anhydrous ammonia (NH<sub>3</sub>)

## Safety on the Farm

### Potential hazard

Anhydrous (“without water”) ammonia (NH<sub>3</sub>) is a form of nitrogen fertilizer commonly used on Manitoba farms. Contact with NH<sub>3</sub> at any concentration is hazardous – it presents a range of safety and health risks to farmers, from temporary irritation to severe injuries and death.

NH<sub>3</sub> is hygroscopic, which means that it seeks water from the nearest available source. This includes any moisture found in the human body. When NH<sub>3</sub> combines with water, a corrosive substance is formed.

Low concentrations (<25 parts per million or ppm) of NH<sub>3</sub> will irritate the eyes, skin and respiratory tract, and produce temporary symptoms such as coughing and wheezing (through inhalation).

Exposure to higher concentrations (>35ppm) of NH<sub>3</sub> for any length of time is extremely dangerous, and may result in immediate and permanent severe chemical burns to the eyes, skin and respiratory tract. NH<sub>3</sub> burns can cause pulmonary edema, a condition in which the respiratory system becomes paralyzed by pain, resulting in respiratory failure, cardiac arrest and death.

### Characteristics of NH<sub>3</sub>

- Very toxic
- Strong and sharp pungent odour
- Colourless gas at normal temperature and pressure
- Flammable gas at high concentration (15%)
- Corrosive
- Hygroscopic (seeks out moisture)
- Transported under pressure as a liquefied compressed gas

### How to control the hazard

Exposure to NH<sub>3</sub> can be sudden and unexpected. Farmers are most commonly exposed to NH<sub>3</sub> through transfer from nurse tank to applicator (e.g., through transfer hoses and valves); malfunction of equipment (e.g., gauges, couplers, hoses); and during transportation or application of NH<sub>3</sub> in the field.

A large water supply (at least four to five gallons) should be accessible at all times while working with NH<sub>3</sub>. Workers should also carry a supply of water on their person (e.g. in a squeeze bottle) to immediately flush eyes in the event of exposure.

**NH<sub>3</sub> workplace exposure limits**  
**Time weighted average (TWA) 25 ppm**  
**Short-term exposure limit (STEL) 35 ppm**

**Time weighted average:** average exposure limit over an eight-hour work day.

**Short-term exposure limit:** exposure limit for 15 minutes or less.

(see next page)



## First aid

Take these **immediate steps** when a worker has been exposed to NH<sub>3</sub>:

- Seek medical attention.
- Move the victim away from exposure into fresh air.
- If the worker is not breathing, begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel.
- Flush affected areas with large amounts of clean water for at least 15 minutes, continuing to flush until medical aid arrives.
  - **Eyes:** hold eyelids apart while flushing affected areas.
  - **Skin:** remove contaminated shoes, clothing and constrictive jewelry while flushing affected areas. **Note:** Clothing may freeze onto the skin as a result of exposure to NH<sub>3</sub>, and removing clothing too quickly can cause tearing of the flesh. Exercise caution and do not remove clothing until a large amount of water is flooded onto clothing.
- Where skin surface is damaged, apply a clean dressing. Where skin surface is not damaged, cleanse affected areas thoroughly by washing with mild soap and water.
- If NH<sub>3</sub> is ingested, the exposed person should drink large quantities of water (four to eight ounces). If the worker is unconscious, **DO NOT** give anything by mouth.
- **DO NOT INDUCE VOMITING.** If vomiting occurs, hold exposed worker's head down below hip level to prevent vomit from entering lungs.

## Personal protective equipment (PPE)

**ALWAYS** wear NH<sub>3</sub>-approved PPE. Safety equipment suppliers and manufacturers can provide recommendations. The following PPE is required when working with NH<sub>3</sub>:

- Non-vented goggles and full face shield.
- Appropriate respirator for the concentration of NH<sub>3</sub>.
  - < 300 PPM: Use an approved chemical cartridge air purifying respirator with full face piece.
  - > 300 PPM: Use a supplied air respirator (e.g. SCBA) for emergency response, or for entry into unknown NH<sub>3</sub> concentrations.
  - **NOTE:** Leave area **immediately** if you can smell, taste or detect NH<sub>3</sub> while wearing a respirator.
- Ammonia resistant gloves (14")
- Ammonia resistant protective suit
- Protective boots

## Ensure:

- Everyone working in all aspects of NH<sub>3</sub> is trained on the safe handling and use of NH<sub>3</sub> (e.g. storage, transport and application).
- Personal protective equipment (PPE) is supplied, available and is being worn when handling NH<sub>3</sub> and during equipment maintenance.
- Workers are trained in emergency plan for NH<sub>3</sub> exposure (including telephone numbers, meeting points, etc.).
- All NH<sub>3</sub> equipment is inspected daily and maintained, including the repair of broken and worn parts before use.
- Workers stay upwind when working with NH<sub>3</sub>.
- Safe work procedures are developed and implemented for working with NH<sub>3</sub>, including safe operating procedures for chemical handling and transport.
- Transport Canada regulations for NH<sub>3</sub> are followed\*.
- Manufacturer and input dealers' instructions are followed.
- Material Safety Data Sheet (MSDS) for NH<sub>3</sub> is up-to-date and readily accessible.
- Bystanders are prohibited in the area(s) where NH<sub>3</sub> is being used.
- Workers never wear contact lenses where NH<sub>3</sub> is present (traps vapours against eyes).

### SAFE Work Manitoba contact information:

Winnipeg: 204-957-SAFE (7233)

Toll-Free: 1-855-957-SAFE (7233)

Publications and resources available at: [safemanitoba.com](http://safemanitoba.com)



**Reference to legal requirements under workplace safety and health legislation:**

- Workplace Hazardous Materials Information Systems: *Workplace Safety and Health Regulation*, M.R. 217/2006, Part 35:
- Chemical and Biological Substances: *Workplace Safety and Health Regulation*, M.R. 217/2006, Part 36

**For more information about ammonia safety practices, please visit:**

The Fertilizer Safety and Security Council at [www.fssc.ca](http://www.fssc.ca) and [info@fssc.ca](mailto:info@fssc.ca)

Canadian Association of Agri-Retailers at [www.caar.org](http://www.caar.org)

Your local Manitoba agricultural retail dealer

**\*Dangerous Goods Act and Regulations:**

Anhydrous ammonia (NH<sub>3</sub>) is a dangerous good and falls under the *Transportation of Dangerous Goods Act and Regulations*. Every person (including owners, workers, family members) handling and transporting anhydrous ammonia must be trained and hold a valid training certificate. Contact your local dealer to receive training and certification. For information regarding training and certification, contact your local Manitoba agricultural retail dealer.

**For more information on Transport Canada regulations pertaining to anhydrous ammonia, contact:**

Transport Canada | Transports Canada

Transport Dangerous Goods | Transport des marchandises dangereuses

Prairie & Northern Region | Région des Prairies et du Nord

Telephone | Téléphone: 1-888-463-0521

E-mail | Courriel: [tdg-tmdpnr@tc.gc.ca](mailto:tdg-tmdpnr@tc.gc.ca)

Internet: [www.tc.gc.ca/tdg](http://www.tc.gc.ca/tdg) | [www.tc.gc.ca/tmd](http://www.tc.gc.ca/tmd)

**Additional workplace safety and health information available at: [safemanitoba.com](http://safemanitoba.com)**

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