

***Iowa Farmer Today***

# Anhydrous ammonia can be deadly, but there is time to react

By Mandy Archer

Mar 13, 2023



Anhydrous ammonia is widely used but comes with significant risks. Work safely and use the right PPE to reduce your chances of an injury.

Photo courtesy of Iowa's Center for Agricultural Safety and Health (I-CASH)

If you have ever caught a whiff of ammonia while cleaning your kitchen or bathroom, you will know it has a strong, pungent smell that resembles the smell of urine. Likewise, when you are outside you can smell anhydrous ammonia (or  $\text{NH}_3$ ) at low concentrations, around 25 ppm (parts per million).

Fortunately, it takes greater than 220 ppm for  $\text{NH}_3$  to cause irreparable damage to humans. This gives you time to clear the area if you smell ammonia, and since  $\text{NH}_3$  is a colorless gas, your sense of smell can help you to escape a leak before any critical damage is done.

However, there are more effective ways that you can protect yourself from anhydrous ammonia other than smell alone.

Anhydrous ammonia is a common fertilizer, but just because it is widely used does not mean that the safety risks are minimal.

The word “anhydrous” means “without water,” and  $\text{NH}_3$  is waiting to bond with water to create  $\text{NH}_4^+$  which will attach to soil particles. When anhydrous is injected, this reaction occurs underneath the ground when  $\text{NH}_3$  comes into contact with moisture. However, if the vapor gets into the air before combining with the soil, it will be extremely attracted to any moisture it can find, including on your body.

If that occurs, your eyes are especially vulnerable — they are about 92% water — followed by your mouth, nose, throat, lungs, and skin. An exposure to anhydrous can lead to partial or complete loss of sight as well as lung damage, up to third-degree burns, blisters and death.

When it comes to protection, there are personal protective equipment (PPE) options to keep you safe. Vented goggles or a full face shield will protect your eyes.

You should never wear contact lenses while working with anhydrous ammonia. The gas can build up between your contacts and corneas, causing your contacts to fuse to your eyes.

In addition, you should wear gloves and heavy-duty clothing material like coveralls. Gloves can be rubber or a non-rubber ammonia-proof material. They should be loose-fitting and have a long cuff that goes beyond where your clothing stops and exposes your skin.

Good handling practices can also reduce the risk of a spill and exposure.

NH<sub>3</sub> is typically gaseous, but under the compression and pressure of a nurse or storage tank, it becomes a liquid. Warm outdoor temperatures will cause anhydrous liquid to expand in the tank. To account for this, only fill NH<sub>3</sub> to 85% or less of the tank's capacity.

To avoid leaks, inspect all the components of the nurse tank before filling. Check for cuts and other abnormalities on the hoses (flattening, soft spots, bulges), properly inflate tires, and tighten wheel bolts. If the nurse tank has any dents, leaking or cracks it must be immediately repaired or replaced. Make sure you park the nurse tank on level ground, downwind from where you will be applying. Hold valves firmly by the body and not the handle as they may accidentally open.

Finally, communicate with family and co-workers about when you are using anhydrous ammonia so that those around you are aware of the risks.

The best way to counter an ammonia exposure is with water. All farm vehicles transporting anhydrous must be equipped with a 5-gallon supply of clean water, which should be used if you encounter NH<sub>3</sub>. A second 5-gallon water container should be kept on your tractor or other nearby vehicle. Finally, carry a 6- to 8-ounce plastic eye wash

bottle filled with water on your person to quickly flush out your eyes if needed.

NH<sub>3</sub> can cause clothing to adhere to the body. Rinse the clothing under water to soften it before removing it or it can pull at the skin and cause skin damage.

Contact 911 immediately if you are exposed to anhydrous. Wash your eyes and/or body for at least 15 minutes if possible with the water sources on your vehicles.

If you inhale the vapor, drink large amounts of water to dilute the chemical in your body.

In addition, call the National Response Center at 1-800-424-8802 to report an anhydrous leak if the release is 100 lbs. of NH<sub>3</sub> or more in the first 24 hours, and be prepared to contact other local, environmental authorities.

Ultimately, if you work with anhydrous ammonia on the farm, you are at risk of an exposure. Being informed and having the proper PPE and water to combat the chemical will reduce your risk for injury.

Take care of yourself and others by using extreme caution when you work with ammonia. You will not regret taking the time to keep you and those around you safe.

---

*Mandy Archer is the Communications and Podcast Coordinator for the Great Plains Center for Agricultural Health at the University of Iowa College of Public Health.*

