Anhydrous Ammonia: Safety and the Farmer

2019

FERTILIZER CANADA

CAAR
Canadian Association of Agri-Retailers

Anhydrous Ammonia: Safety and the Farmer

2019

Information booklet regarding the safe handling and transporting of anhydrous ammonia under the *Transportation of Dangerous Goods (TDG)* regulations.

Information provided by Fertilizer Canada (fertilizercanada.ca) and the Canadian Association of Agri-Retailers (caar.org)

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This booklet provides a quick reference to topics discussed in the ***Anhydrous Ammonia: Safety and the Farmer*** training program, and enhances training in the safe-handling of anhydrous ammonia.

Please ensure that you have obtained the most recent version of this book before proceeding.

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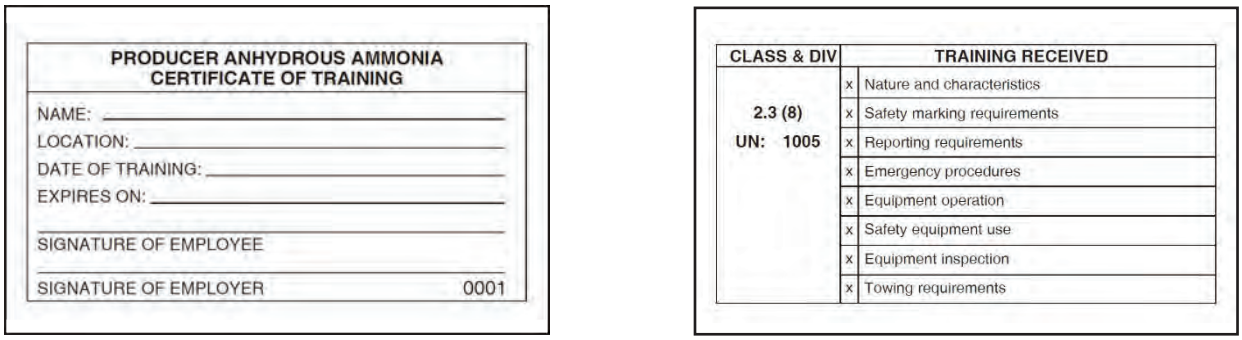
Learning Objectives Checklist:

Introduction

Anhydrous ammonia is considered a dangerous good under the *Transportation of Dangerous Goods* (TDG) Regulations. Every person handling, transporting, or offering to transport ammonia must be adequately trained, and hold a valid training certificate. This legal requirement includes farmers handling the product.

TDG training certificates are only valid if they are signed by both the employer, and employee, once the employee is deemed to be adequately trained. Certification is valid for three (3) years, and must be carried with you at all times. Your agri-retailer is required by law, to ask to see your valid training certificate. The certificate must also be presented to a dangerous goods inspector upon request.



PRODUCER ANHYDROUS AMMONIA
CERTIFICATE OF TRAINING

NAME: _____
LOCATION: _____
DATE OF TRAINING: _____
EXPIRES ON: _____

_____
SIGNATURE OF EMPLOYEE

_____
SIGNATURE OF EMPLOYER 0001

CLASS & DIV		TRAINING RECEIVED
2.3 (8) UN: 1005	x	Nature and characteristics
	x	Safety marking requirements
	x	Reporting requirements
	x	Emergency procedures
	x	Equipment operation
	x	Safety equipment use
	x	Equipment inspection
	x	Towing requirements

Figure 1: Sample TDG training certificate

To assist you in obtaining this certificate, we produced this training package to promote the safe handling of anhydrous ammonia at the farm level. By taking this course, and reading this booklet, you are contributing to your overall training requirements.

To complete the process, you must acquire a TDG training certificate once you have a sound knowledge of all aspects related to your duties handling ammonia. The TDG certificate is valid for three (3) years from the date signed, after which re-certification is required. The card must be kept with you when handling anhydrous ammonia.

In addition to regulatory requirements (municipal, provincial/territorial, federal), agri-retailers are required to comply with Fertilizer Canada's Anhydrous Ammonia Code of Practice.

By taking this program, you agree to absolve Fertilizer Canada, and the Canadian Association of Agri-Retailers of all liability in the event of any incident involving anhydrous ammonia fertilizer.

Further information is available at www.fertilizercanada.ca. Your local agri-retailer or CAAR (www.caar.org) can also assist you in obtaining your certification.

Introduction to TDG and WHMIS

Transportation of Dangerous Goods Information

The Transportation of Dangerous Goods Act is designed to protect the public and environment from hazards associated with shipping dangerous goods. According to TDG Regulations, anhydrous ammonia is classified as a 2.3(8). The numbers 2.3 represent a toxic gas. The 8 indicates a corrosive subclass.

The product identification number for anhydrous ammonia is UN 1005.

All units carrying anhydrous ammonia must have proper safety markings and must be present on the unit before the tanks are filled. For anhydrous ammonia nurse tanks, this includes:

1. Anhydrous Ammonia placard which displays Class 2.3 and UN 1005 , and must be displayed on all four sides of the tank. The placard must be at least 250 mm in length on each side. If this size of placard is unable to be clearly displayed due to the irregular shape of the tank (i.e. the domed shape of the front and rear of the tank), a smaller placard/label is acceptable but cannot be smaller than 100 mm in length;

2. The words: “Anhydrous Ammonia, Inhalation hazard” or “Ammoniac Anhydre, dangereux par inhalation” must appear on a contrasting background on each long side of the tank. Under the Regulations, the lettering on nurse tanks is required to be at least 4 mm wide and 25 mm high, whereas on a highway tank the lettering must be at least 6 mm wide and at least 50 mm high. Your agri retailer is also required to comply with requirements in the Ammonia Code of Practice, which requires the lettering on nurse tanks and storage vessels to be a minimum of four inches in height.;

3. First Aid Procedures displayed on the nurse tank;

4. The Canadian Registration Number (CRN#), Transport Canada Registration Number (TCRN#) or recognized equivalent specifications is legible and is on a dataplate affixed to the vessel. Your agri-retailer is also required to comply with the requirements in the Anhydrous Ammonia Code of Practice to have a valid CRN number on the dataplate; and,

5. Tank inspection markings from a registered testing facility.

Additional elements may be required by your Provincial transportation division, including:

1. A slow moving vehicle sign on the rear;
2. A Max 40 kph decal on the front;
3. Safe-handling instruction decals;

Please consult your local Provincial transportation division for required safety markings.

It is the law that all ammonia nurse tanks must have a valid certification in order to be filled. All anhydrous ammonia nurse tanks must meet Transport Canada regulations. These regulations apply to both company and producer owned ammonia vessels. Contact your agri- retailer or CAAR for more information.

Under the current TDG Regulations, Section 1.24 exempts anhydrous ammonia nurse tanks from TDG documentation (Part 3) and Emergency Response Assistance Plan (ERAP) (Part 7) if they have a water capacity of 10,000 liters (2,654 gallons) or less and are used in transport solely on land and are on public roads for less than 100 km.

Inspections, Markings & Data Plates

Pressure vessels transporting anhydrous ammonia are required to have periodic inspections competed by an inspection facility registered with Transport Canada. The frequency of inspection depends on the type of inspection required, and the construction of the tank.

- Visual Inspection (V) – required annually
- Hose Test – required annually
- Pressure Test (P) – required every five (5) years for tanks that are Post Weld Heat Treated, every three (3) years for non-Post Weld Heat Treated Tanks. Post Weld Heat Treated tank status can be determined by the data plate or U1A. Consult your agri-retailer for assistance.

The tank inspection markings and dataplate markings are depicted below in Figures 2 and 3.

Figure 2 (below) indicates that a visual inspection, a pressure test and leakage inspection was last conducted in June, 2018 by Transport Canada inspector registered facility number 652.

Figure 2: Sample tank inspection markings, highlighting the date of inspection (06 18) and inspector Transport Canada Registration Number (652)

- **06 18 –** Date of Inspection
- **V –** Visual Inspection
- **P –** Pressure Test
- **K –** Leakage Inspection
- **652 –** Inspector Transport Canada Registration Number

Figure 3 (below) shows a sample tank dataplate. On the dataplate, 'HT' indicates that the tank has been Post Weld Heat Treated, and the CRN (Canadian Registration Number) is listed.

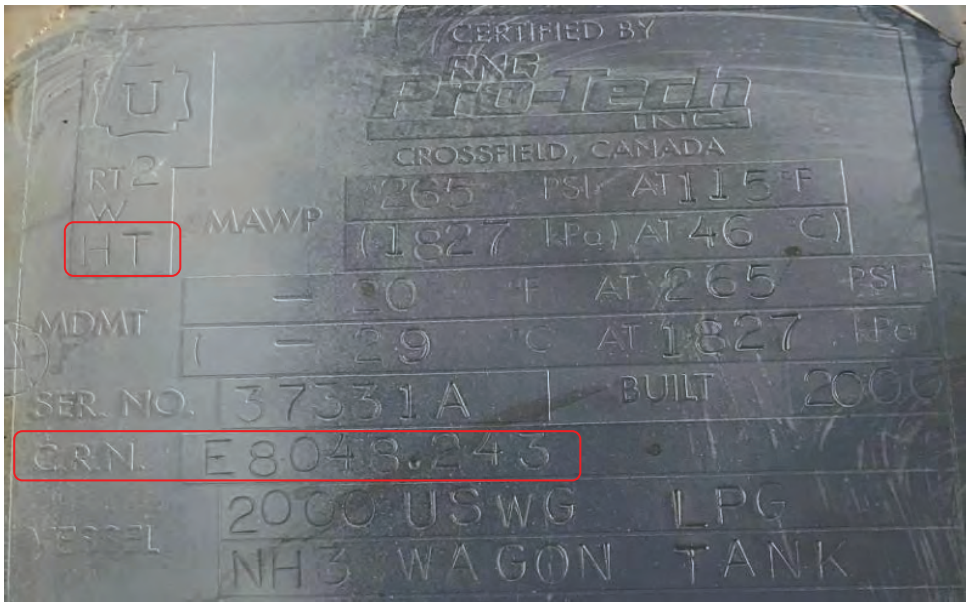


Figure 3: Sample tank dataplate, showing HT (Post Weld Heat Treated status) and CRN (Canadian Registration Number)

Workplace Hazardous Materials Information System 2015

In July 2015, the Workplace Hazardous Materials Information System (WHMIS) was updated to align with the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals. WHMIS 2015 is a comprehensive system for providing health and safety information on the safe use of hazardous products used in Canadian workplaces. WHMIS 2015 is a federal Act and is administered provincially and territorially by the Occupational Health and Safety departments. It is separate from the TDG Act and Regulations; however WHMIS addresses a number of agricultural products – including anhydrous ammonia.

WHMIS 2015 regulations refer to anhydrous ammonia as a compressed gas, and a corrosive and toxic product.

WHMIS 2015 provides information to workers about controlled products through supplier labels on the product packages, and by documents referred to as Safety Data Sheets (SDS). **They contain important information on first aid and product characteristics.**

If you require WHMIS 2015 training, contact your local agri retailer, CAAR, or your Provincial Safety Council to get more information on where to obtain WHMIS training. **This training program does not qualify as WHMIS 2015 training.**

For more information on WHMIS 2015, visit:
http://www.ccohs.ca/topics/legislation/WHMIS/**.**

In addition, under WHMIS, any person handling a controlled product must obtain proper training that includes understanding the supplier label and SDS, product characteristics, and first aid and emergency measures, storage procedures, etc.

See Appendix A for examples of:

- Sample Supplier Label
- Sample Safety Data Sheet

> **Note:** To obtain a copy of a SDS, contact your local agri retailer. The SDS must be reissued every three years, or when a change is made. Always verify the date of preparation or revision when using a SDS.

Characteristics of Anhydrous Ammonia

Anhydrous Ammonia:

1. Is highly alkaline and extremely corrosive to human flesh.
2. Has a high affinity for water and will often seek it out. The human body is composed of a high percentage of water.
3. Has a strong, pungent odor. Even low concentrations will irritate the eyes, skin, and mucous membranes of the nose and mouth.
4. Boils and turns to vapour at -33°C.
5. Is a gas at atmospheric pressure.
6. Is lighter than air and dissipates rapidly when released into the atmosphere under normal conditions. However, with high humidity, the vapor will take on moisture and linger in low-lying areas.
7. Vapours will move with the wind. In the event of an ammonia leak, move to an upwind position immediately.
8. Is extremely corrosive to copper, zinc, brass, and galvanized steel. Use only fittings approved for anhydrous ammonia on your tanks and piping systems. Piping should only be modified / changed by a facility registered to perform such work.

Remember: Always take precautions to ensure ammonia releases to the atmosphere are minimized.

Remember: As the temperature of anhydrous ammonia rises, so does the pressure. Therefore, tanks must never be filled beyond the 85% level.

AnhydrousAmmoniaTemperature and Pressure Relationship:

Temperature (°C)	Pressure (PSI)
-6.72	33.5
-1.02	45
4.5	58.6
10	74.5
15.61	92.9
21	114.1
26.72	138.3
32	165.9
37	191.8
42	217.7
47.7	247.3

Chemical Properties of Anhydrous Ammonia:

Category	Characteristic
Chemical Designation	NH_3
Guarantee	82-0-0
Density	Liquid = 0.63249 kg/L at 15.6°C Vapour = 0.597 kg/L
Odour	Pungent
Colour	Colourless
Physical State	Atmosphere = Gas Pressure = Liquid
Boiling Point	-33.3°C
Freezing Point	-77.7°C
Affinity for Water	Very High
Corrosiveness	Very corrosive to living tissue, copper, zinc, brass, galvanized steel
Auto Ignition Temperature	651°C
Expansion Ratio	850:1
Explosive Limit	16:25% by volume

Personal Protective Equipment and First Aid

Personal Protective Equipment

Safe handling of anhydrous ammonia begins with proper personal protective equipment. When working with this product, the following must be worn:

1. A full-face respirator with cartridges approved for ammonia use;
2. A one/two piece ammonia resistant suit;
3. 14" gauntlet style neoprene gloves; and
4. Leather/rubber CSA approved ammonia resistant boots.

Remember:

1. Make sure the **cuffs on your gloves are rolled up** to prevent ammonia from running onto your arms in the event of a leak.
2. Water is the only first aid treatment for ammonia burns. Make sure all units have a minimum of 20 litres of clean fresh water mounted high enough to provide gravity flow. Handlers must keep a squeeze bottle full of water in their breast pocket.
3. Ensure the emergency water does not freeze when working with ammonia in the Spring or Fall. An additional 20 litre jug is recommended in the tractor cab.

- Never wear contact lenses when working with anhydrous ammonia. Exposure to ammonia vapours can cause complications, and if ammonia gets trapped behind your lenses, it is impossible to remove both the product and the lenses.

First Aid Guidelines

Should exposure to anhydrous ammonia occur, the following first aid procedures will help address the emergency. Note that all exposures to anhydrous ammonia require immediate medical attention.

1. If ammonia contacts the skin or the eye, immediately flush the areas with water for a minimum of 15 minutes to draw out the ammonia. Keep the area moist at all times.

2. If ammonia burns are extensive, submerge the individual in a water tank or place the individual in a shower, if available. Call 911 for medical attention and advise the operator of the anhydrous ammonia related burn.

3. Due to the freezing action of ammonia, clothing may adhere to skin. Flush the area with water to thaw the clothing prior to removal.

4. Do not use creams or salves of any kind to treat ammonia burns. Water is the only remedy. Make sure plenty of clean fresh water is available.

5. A person who has ingested ammonia should drink lots of water, or other potable liquids. Do not induce vomiting.

6. If breathing stops, begin artificial respiration, and call a health care professional to administer oxygen. Be careful not to ingest ammonia while performing mouth-to-mouth resuscitation. Use of a one way breathing mask is recommended.

7. Seek immediate medical attention for any injuries caused by exposure to ammonia. Make sure the doctor or physician is informed that this is an anhydrous ammonia related injury or burn and is provided with a SDS (see page 8 and Appendix A for details).

8. Keep the victim warm and at rest. Activity may aggravate respiratory problems. Watch for signs of shock.

9. People who have inhaled high concentrations of ammonia vapor should be observed by a doctor for delayed effects (e.g. edema).

10. Call 911 in an emergency and remember to keep your agri-retailer's contact number handy at all times. They can provide important emergency health care information (i.e. SDS sheets).

Additional First Aid procedures can be found on the SDS provided by your agri-retailer. Take the time to familiarize yourself with this information before handling anhydrous ammonia.

Safe Handling Practices

General Safe Handling Procedures for Anhydrous Ammonia

It is safe to work with anhydrous ammonia as long as it is stored, transported, and handled properly. This training manual reviews through the safe procedures for doing nurse tank inspections prior to use. Your agri retailer will conduct the inspection prior to filling it with ammonia. Before working with ammonia, ask your agri-retailer to explain the step-by-step procedures for anhydrous ammonia application.

1. Always work from an upwind position.
2. Secure the tank when product is being transferred to avoid it rolling away. Use wheel chocks on the nurse wagon, or secure it to application equipment if the transfer is being done in field.
3. Put on your required personal protective equipment (i.e. full-face respirator, one/two piece ammonia resistant suit, neoprene gloves, and proper foot wear).
4. Make sure an ample supply of fresh water is available (minimum 20 litres).
5. Check that additional non-vented goggles, gloves, and a water bottle, are in the tank's safety kit.
6. Always handle all hoses by the valve body, not the valve wheel.
7. Ensure that bleed valves are closed before opening the main valves, and that they are open prior to disconnecting the couplings.
8. Inspect all hoses before use for cuts, cracks or abrasions. Verify the hose inspection status and hose service date range.
9. Inspect all fittings and gauges before each use.
10. Inspect the nurse wagon running gear such as wheels and tires before each use.
11. Inspect the nurse wagon and applicator hitch for cracks and signs of fatigue, and for the presence of good safety chains.
12. Inspect the nurse wagon for tank mounting bolts and for stress cracks in the frame.
13. Make sure all hitch pins are properly rated, are in good condition, and have safety pins.

Warning: Before you connect or disconnect an ammonia hose put on all items of your personal protective equipment. Then make sure there is no pressure in the lines or the fittings!

Anhydrous Ammonia Farm Location Storage and Security

Due to increased incidents of vandalism and theft of anhydrous ammonia, take extra precautions when leaving your ammonia equipment unattended.

Remember:

1. Park ammonia nurse wagons at farm locations in a manner that will discourage tampering.
2. Secure main access valves when the tank is left unattended.
3. Remember to approach the tank from an upwind position. Always watch for signs of tampering on hoses, withdrawal valves, and bungs.
4. Arrange with your retailer to pick up nurse tanks in a timely manner. Don't leave equipment unattended for extended periods of time.
5. In the ammonia off-season, park nurse wagons at a secured agri-retail facility or park out of the general public's view in a secure area; the use of valve locking devices are required. Never park or store ammonia tanks with product inside a building.

Remember: If you suspect your equipment has been tampered with, call your local Police detachment, and your agri-retailer, immediately.

Working with Anhydrous Ammonia Nurse Tanks

Connecting the Nurse Tank to the Applicator Unit

Serious accidents can occur when connecting a nurse tank to the applicator. If you spot any damage, missing seals, etc., do not use the nurse tank and contact your agri-retailer for assistance. Make sure you follow all safety guidelines listed to minimize the risks of accidents, and reach out to your agri-retailer if you have questions about the procedure.

1. Put on your personal protective equipment (see page 12.)

2. Make sure an adequate supply of water (i.e. minimum 20 litres) is available.

3. Always approach a nurse tank from the upwind position, and position the nurse tank so the applicator is down-wind. This is extremely important when opening bleed valves and lines.

4. Make sure the liquid withdrawal valve on the nurse wagon and the hose end valve are closed. Position the applicator unit in front of the nurse tank.

5. Attach the nurse tank hitch to the applicator using a properly rated hitch pin. Make sure you put the safety pin into the draw pin and secure it. Attach both safety chains. The safety chains should be connected to the main frame of the applicator.

6. Open the bleeder valve on the applicator's breakaway coupler to relieve any pressure.

7. Once pressure is relieved, shake the hose to ensure any pooled ammonia in the hose is discharged through the bleed valve.

8. Next, remove the protective cap from the breakaway coupler. Inspect for the presence of and the condition of the ACME gasket.

9. Before removing the liquid withdrawal hose from the nurse tank, open the bleed valve to relieve any pressure that has built up between the valve and the park plug.

10. Remove the liquid withdrawal hose from the nurse tank park plug. Handle by the valve body, not the wheel.

11. Attach the hose to the break- away coupler on the applicator, and hand-tighten securely. Ensure all threads are clean. If the coupler does not thread easily, have the fittings repaired by your agri-retailer – do not force the fittings.

12. Ensure the hose is not kinked or twisted, is routed to avoid pinch points, and will not drag on the ground during application.

13. Close the bleed valves on the breakaway coupler and the hose end valve.

14. From an upwind position, slowly open the hose end valve. Residual ammonia in the hose may fill the system - check for leaks. If a leak occurs, immediately close the valve and re-tighten the connection.

15. Slowly open the main withdrawal valve on the nurse tank. Check for leaks. If a leak occurs, immediately close the valve and re-tighten the connection. Re-open the valve and check for leaks. If you can't resolve the leak, close all valves and contact your agri-retailer.

16. The system is now charged, and you are ready to apply ammonia. Move the applicator in an upwind direction and open the flow control valve to discharge a small amount of ammonia from the applicator knives. Make sure the knives are in the ground. Ensure each knife is delivering product. A presence of frost on each line will indicate that ammonia is flowing properly. If there is an absence of frost, re-evaluate the connection. See page 23 for the procedure for clearing a plugged knife.

Warning: Never open any valve until all the pressure is released from the line via the bleeder valve and the bleeder valve has been closed.

Warning: The valves must be opened by following the proper sequence.

Open the valves slowly to prevent a pressure surge that could activate the excess flow valve, break a fitting, or rupture a hose.

Always remember to close all valves when leaving the ammonia unit unattended.

Bleed Off Procedures

Make sure you follow all safety guidelines listed to minimize the risks of accidents when bleeding-off an ammonia system. **If you have any questions about the procedure, contact your agri- retailer for assistance.**

1. Put on your personal protective equipment (see page 12. Ensure adequate emergency water (i.e. minimum 20 litres) is available).
2. Approach the tank from the upwind direction.
3. Close the liquid withdrawal valve on nurse tank and hose end valve.
4. With the knives in the ground (to minimize product release to the atmosphere), open the flow control valve. Pull the applicator down the field, in an upwind direction, for two to three minutes. This will drain product from the system.
5. Park upwind, lift the knives, and turn on the flow control valve. If product remains, repeat step 4.
6. Ensure your personal protective equipment is on, stand upwind and open the bleed valve on the breakaway coupler and the hose end valve, relieving any remaining pressure. If the pressure is not relieved in a reasonable amount of time (i.e. 30 seconds), ensure all valves are properly closed, and repeat step 6.
7. Drain any remaining ammonia through the bleed valve by lifting the withdrawal and applicator hoses. The system should be drained of all product.

Disconnecting the Nurse Tank from the Applicator Unit

Serious accidents (i.e. ammonia burns) may occur when disconnecting a nurse tank from the applicator unit. **If you have any questions about the procedure, contact your agri-retailer for assistance.** Make sure you follow all safety guidelines listed to minimize the risks of accidents.

1. Put on your personal protective equipment (see page 12).

2. Always approach a nurse tank from the upwind direction. This is extremely important when opening bleed valves and lines.

3. Make sure an adequate supply of water (i.e. minimum 20 litres) is available.

4. Turn off the main liquid withdrawal valve on the nurse tank, then close the hose end valve. Open the bleed off valve to bleed off all ammonia from the quick coupling and hose end valve prior to unscrewing the coupling. Use bleed off procedures (pg. 18)

5. After confirming the system is bled, slowly remove the hose-end valve from the breakaway coupler holding it away from you and return it to the park plug on the nurse tank. Make sure to close the bleed valve.

6. Replace the protective cap on the breakaway coupler and close the bleed valve.

7. Remove the safety pin from the hitch pin, then remove the hitch pin from the applicator hitch. Make sure the tank's hitch jack is positioned securely to prevent it from falling on your feet.

8. Disconnect the safety chains.

Follow the complete instructions for bleed off procedures.

Warning: Never disconnect any valve until all pressure is released from the line via the bleeder valve.

Never leave a charged applicator sys- tem unattended.

Always close the liquid withdrawal valve before leaving the machinery unattended.

Re-Coupling the Breakaway Coupler

If the nurse wagon and applicator are accidentally uncoupled, the breakaway coupler is designed to automatically close preventing the release of ammonia. You should immediately contact your agri-retailer for assistance. If this happens, the nurse tank hose will be pressurized.

The applicator unit is usually depressurized due to the flow control valve being open when the disconnection occurred. However, make sure the entire system is bled down before attempting to reconnect the hose.

It is very important that you follow the breakaway reconnect procedure for your specific brand of breakaway. Your agri-retailer can help supply you with your breakaway instructions.

To safely reattach the tank:

1. Make sure you are working from an upwind position, you wear your personal protective equipment (refer to page 12), and at least 20 litres of fresh water is available.
2. Close the main withdrawal valve on nurse tank, and hose end valve.
3. You MUST bleed off all ammonia in the system. Refer to page 18 for safe bleed-off procedures.
4. When the pressure is relieved, remove the male end of the breakaway coupler from the hose end valve. Inspect all components for damage.
5. Make sure all pressure has been relieved from the system. **If an attempt to reconnect the breakaway coupler is made with pressure in the system, an immediate release of ammonia will occur.**
6. Inspect all components for damage, including hoses. If no damage is present, stand in an upwind position and reconnect the breakaway coupler.
7. Close the bleeder valves on the breakaway coupler and hose end valve.
8. Re-attach the liquid withdrawal hose to the breakaway coupler. Slowly open the nurse tank withdrawal valve. Check for leaks.

Emergency Shut Off System

The nurse tank may also be equipped with an emergency shut off system that can be manually or automatically engaged in the event of a release.

There are a number of systems that can be used to shut down the flow of product in an emergency. Typically, an internal self-closing valve is partnered with the following mechanisms:

- Cable-pull
- Air-actuated control
- Electronic-actuated control

Cable Pull

In the event of a tank separation from the applicator, a cable running from the emergency shutoff valve on the main frame of the applicator is intended to close the emergency shut off valve as the hose stretches and breaks. This will stop the flow of anhydrous ammonia.

Under the CSA B620 Standard[1], after 2021 cable pull mechanisms will have to be actuated from within the cab to meet requirements of emergency shutoff systems.

Air Actuated Control

With this technology, a ¼" airline is attached to the pneumatic valve actuator and compressed air is used to keep the valve open. A small air compressor is kept inside the cab of the tractor and is activated during product application. In the event of an emergency, the operator can close the emergency shutoff valve from inside the tractor cab, and release the air pressure holding the emergency shut off valve open. In the event of equipment separation between the tractor and the nurse tank, the airline will separate and close the valve, stopping the flow of anhydrous ammonia.

Electronic- Actuated Control

With this technology, the emergency shutoff valve is held open by an energized magnet. The operator can close the valve from the tractor cab, or in the event of an equipment separation, the magnet is de-energized causing the valve to close. This will stop the flow of anhydrous ammonia.

Talk to your agri-retailer about the safety features available on your tank.

[1] The CSA B620 Standard provides specific requirements for highway tanks and portable tanks for the transportation of dangerous goods. The CSA B620 Standard is incorporated by reference into the Transportation of Dangerous Goods Regulations (TDGR).

Equipment Inspection and Maintenance

Regular maintenance is crucial to ensure your system is operating properly. **Maintenance should only be conducted by a trained individual. Always contact your agri-retailer for assistance.** Have your agri-retailer do a pre-season inspection of your equipment, and be sure to perform your own daily inspections throughout the season.

You must ensure the following procedures are performed:

Breakaway Couplers

Inspect your breakaway coupler as per the manufacturer recommendations to ensure that it is functioning properly. Before connecting the nurse tank to the applicator unit:

1. Inspect all hoses for abrasion, and verify that they are not expired.
2. Inspect breakaway couplers. Pay attention for worn O-rings.
3. Ensure the coupling bracket swivels freely to allow easy turning of equipment.
4. Make sure plunger valves depress and release freely. If not, have your agri-retailer replace them immediately.
5. Check that locking devices move freely, and are free of dirt and contaminants. Replace at the first sign of corrosion or defects, or as per manufacturer's recommendation.
6. Lubricate the male and female breakaway coupler prior to the application season.

Flow Control Regulator

Occasionally, the screen on the flow control regulator will become clogged with dirt. To service:

1. Work from an upwind position, wear your personal protective equipment (refer to page 12), and have a minimum of 20 litres of fresh water available.
2. All valves MUST be closed. Bleed off all ammonia in the system. Refer to page 18 or safe bleed-off procedures.

3. Remove the cap or fitting covering the flow control regulator screen. The regulator housing the screen will contain ammonia.

4. Remove the screen and clean by tapping, cleaning with a solvent (e.g. varsol), and/or the use of air pressure. Once clean, inspect the screen to ensure it is not excessively damaged. Replace if necessary.

5. Inspect the O-ring seals and gaskets. They should be replaced regularly to prevent leaks. Ask your agri-retailer for specific information on O-ring replacement.

6. Reinstall the screen, tighten the protective cap.

7. Close the bleeder valves on the hose end valve and the breakaway coupler.

8. Slowly reopen the hose end valve, then the liquid withdrawal valve, to charge the system. Pay attention for leaks.

Your agri-retailer may also provide assistance.

Knife Outlets

Knife outlets will plug under certain soil conditions. Plugged knives are identified by a lack of frost on the hose.

Warning: Never blow into the hose or the tube on the applicator knife with your mouth. Ammonia may be present and can cause severe burns.

Before attempting to clear a plugged knife:

1. Make sure you are working from an upwind position, you are wearing your personal protective equipment (refer to page 12), and a minimum of 20 litres of fresh water is available.

2. You MUST shut off all valves and bleed off all ammonia that is in the system. Refer to page 18 for safe bleed-off procedures.

3. Position yourself upwind before attempting to unplug the knife.

4. Use a piece of wire or tool to unplug the outlet. Pay particular attention for broken parts leading to the applicator knife.

5. Close the bleeder valves on the hose end valve and the breakaway coupler.
6. Slowly reopen the hose end valve, then the liquid withdrawal valve, to charge the system. Pay attention for leaks.

7. Before allowing product to flow to the applicator knives, make sure the unit is positioned so that

any ammonia released is carried away from the applicator and tractor, and risk of exposure to others is minimized.

8. Open the flow control valve. Ammonia should be flowing in the line that was plugged – watch for a presence of frost. If ammonia is not flowing, repeat Steps 1– 8, or replace the knife.

Nurse Wagons

Visually inspect the nurse wagon and running gear daily during application season, and before and after each use. This includes the tires, lug nuts, wagon frame, hitches, breakaway coupler, frame bolts, and safety chains. Be sure to inspect the hoses and gauges as well.

1. Make sure the hitch bolts are in good condition and tight. Inspect hitch welds for stress cracks.
2. Ensure that the drawbar tongue is in good shape and that the hitch pin hole is in good condition
3. Check for the presence and the condition of the chains.
4. Inspect the hose routing and securement.
5. Check mounting pedestal bolts for securing tank to the wagon. They need to be tight and in good condition.
6. Check springs to ensure there are no broken leaves in the spring pack.
7. Inspect welds holding spindles to the frame for cracking.
8. Inspect nurse wagon tires for wear and ensure lug nuts are present and tight.
9. Inspect nurse wagon for stress cracks in the frame.

Remember: Chaining the tank instead of using the approved hitch pin and assembly is unacceptable and dangerous.

Yearly maintenance includes all of the aforementioned verifications plus other items such as:

- Paint, decal, and marking maintenance or replacement
- Valve inspection or replacement
- Hose testing
- Tank inspection and periodic testing

Your agri retailer is also required to comply with requirements in the Ammonia Code of Practice. Under the Code, a complete tear down of the nurse wagon every five (5) years in order to properly inspect all components that contribute to the safe operation of the ammonia application process. It is strongly recommended that farmer owned nurse tanks are subject to the same requirements.

Contact your agri-retailer for assistance or information on this critically important maintenance.

Emergency Response and Incident Reporting

Incident Prevention

Our commitment is to protect you, your family, our employees and the general public from the hazards of an accidental spill or leak. Agri-retailers will ensure the equipment used to transport anhydrous ammonia is in good working condition. However, situations may still occur on roadways and in the fields when handling anhydrous ammonia.

The leading cause of rollovers has been reported due to turning too sharp in the fields. To avoid this situation we recommend additional headlands to eliminate sharp turns.

The second leading cause of incidents is the use of cellphones while operating farm equipment. Do not use a cellphone while operating equipment to ensure your attention is fully focused on safe operation.

Other common causes of incidents occur when the operator:

- Accidentally knocked a hose end valve open
- Moved a nurse tank without disconnecting the filling hose
- Continued to use worn-out hoses, which eventually rupture without warning
- Didn't bleed hose couplings before disconnecting resulting in product discharge
- Was not upwind when bleeding off lines
- Reconnected breakaway coupler without properly bleeding the system
- Did not wear proper personal protective equipment (always wear the equipment when handling anhydrous ammonia).
- Did not release pressure in the line before cleaning a plugged shank
- Fails to properly maintain the nurse tank, fixtures and chassis.
- Was distracted from the task at hand

Anhydrous ammonia can cause serious injury to humans and the environment. **Ensure all ammonia releases to the atmosphere are minimized.**
Do your part to prevent ammonia accidents. Make sure you:

1. Are well-versed on the product and its characteristics.
2. Know your equipment and its limitations.
3. Seek proper training for you and your employees who handle or transport anhydrous ammonia
4. Ensure that your equipment is well-maintained
5. Always wear your personal protective equipment.
6. See, think, and act safely.

Emergency Response

Should an accident or incident occur involving anhydrous ammonia such as a leak, spill, or rollover, the first priority is the safety for yourself, your employees and your neighbours.

All incidents MUST be reported to ensure compliance with government regulations. Your agri-retailer can assist you in contacting the appropriate authorities, but it is ultimately the responsibility of the person in care and control of the product.

In the event of incident involving an uncontrolled leak, take the following steps:

1. Face the tractor upwind, proceed upwind and call for assistance.
2. Evacuate the area immediately – DO NOT WALK THROUGH THE VAPOUR CLOUD.
3. Neighbours should be notified immediately. Evacuation or Shelter in Place may be required.
4. Call 911. Inform them that anhydrous ammonia is involved. Paramedics must also be contacted if serious injuries are sustained.
5. Contact the emergency response line listed on the side of the tank or documents provided from your local agri-retail.
6. Contact your agri-retailer for response advice and assistance. Most agri-retails provide a 24 hour emergency response contact number.

CANUTEC is a service that Transport Canada offers to assist emergency response. They are knowledgeable of many dangerous goods and can provide information during an incident.

Some tanks carrying anhydrous ammonia may require a registered Emergency Response Assistance Plan (ERAP). To implement the ERAP, call the ERAP number. Talk with your agri retail about the resources available to you.

Incident Reporting

Everyone handling, transporting, or offering to transport ammonia must comply with the *Transportation of Dangerous Goods Regulations*. The federal *Transportation of Dangerous Goods Act and Regulations* places the legal responsibility on those who handle, transport or offer to transport anhydrous ammonia, including farm producers as the end user of anhydrous ammonia.

Emergency (Immediate) Report

An *Emergency Report* of any release or anticipated release is required to be filed with the local (provincial) authorities. This reporting includes a call to 911 to alert emergency programs. The TDG Regulations require an emergency report be submitted for any quantity of ammonia is released or that could be released.

Examples of releases or anticipated releases include but are not limited to:

- Damaged tank or vehicle
- Pinhole leak

- Nurse tank roll over/accident in roadway or in field
- Hose break
- Leaky valve

The information required in an *Emergency Report* and contact numbers can be found in the TDG Regulations Part 8.3 (Appendix B).

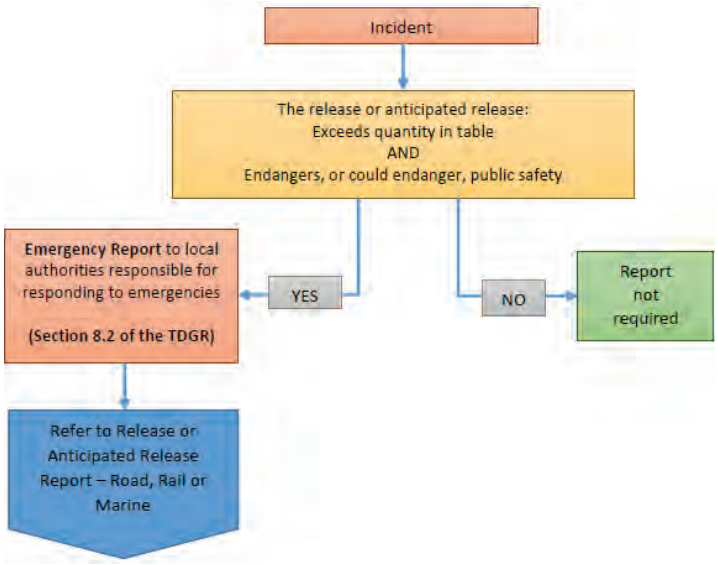


Figure 4: Transport Canada flowchart for Emergency Reports (Road, Rail, Marine) depicting emergency reporting requirements under Section 8.2 of the TDGR. For anhydrous ammonia (Class 2.3), the reporting threshold is any quantity of release. (Source: https://www.tc.gc.ca/eng/tdg/publications-guide-1300.html)

Release or Anticipated Release Report

A *Release or Anticipated Release Report* is required to be submitted as soon as possible to CANUTEC and the consignor of the anhydrous ammonia if the release or anticipated release resulted in the following:

- the death of a person;
- a person sustaining injuries that required immediate medical treatment by a health care provider;
- an evacuation of people or their shelter in place; or
- the closure of:
    - a facility used in the loading and unloading of anhydrous ammonia; or
    - a road, main railway line or main waterway.

A *Release or Anticipated Release Report* is also required if the tank has been damaged to the extent that the integrity is compromised.

The information required in a *Release or Anticipated Release Report* can be found in the TDG Regulations Part 8.5 (Appendix B).

30-Day Follow Up Report

If you have made a *Release or Anticipated Release Report*, a 30-Day F*ollow Up* report is required to be prepared and submitted to Transport Canada's Director General within 30 days of the day the release or anticipated release report was made.

The information required in the *30-Day Follow Up Report* is included in the TDG Regulations 8.7 (Appendix B).

The *Follow Up Report* must be kept by the person making the report for at least two (2) years after the day on which it was made. Following the submission of the report, you will also have 15 days to provide the report to a Transport Canada inspector from the time you receive a written request from the inspector.

Environmental Reporting

Releases of ammonia into the environment are normally required to be reported to your provincial ministry of environment. Visit your provincial ministry of environment's website for reporting requirements and contact information. Contact your agri-retail for assistance.

Emergency Response Assistance Program (ERAP)

Anhydrous Ammonia is one of the many dangerous goods that may require an ERAP intended to provide resources in event of an incident. There is currently an exemption for ammonia tanks that have a water capacity of 10,000 L or less.

For more information on ERAPs, please visit Transport Canada's website:
https://www.tc.gc.ca/eng/tdg/erap-menu-72.htm

Contact your agri-retailer, Fertilizer Canada, or CAAR for more information.

Keep a list of your important phone numbers near the tank:

Part 8 of the TDG Regulations list the authorities that must be contacted. Visit the website and fill in your local emergency contacts to ensure you are prepared in the event of an emergency.

Emergency Contacts	
911	
Emergency Response # or Agri-Retailer	
Ambulance	

Police	
Fire Department	
Other emergency contacts / personnel	
Other Resources: CANUTEC	1-888-226-8832 or 613-996-6666 Or *666 on a cellular phone

Notes

Notes

Appendix A

The Safety Data Sheet (SDS) identifies: product information; hazard ingredients; physical data; fire, explosive, and reactivity limits; toxicological properties; preventative measures; first aid procedures; and preparation information.

The Supplier Label must: identify the product and supplier; refer to the SDS; have a hazard symbol that identifies the product characteristics; detail the safety precautions; and provide first aid information.

Figure 5: Sample Globally Harmonized System (GHS) Supplier Label

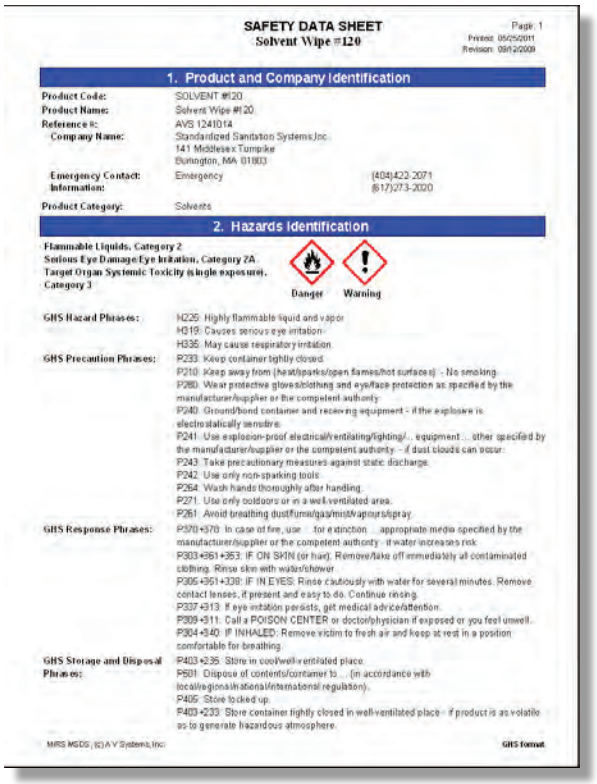


Figure 6: Sample Safety Data Sheet (SDS) in Globally Harmonized System (GHS) format

Appendix B

TDGR Part 8.3 Information to be Included in an Emergency Report – Road, Rail or Marine

An emergency report referred to in section 8.2 must include the following information:

- **(a)** the name and contact information of the person making the report;
- **(b)** in the case of a release of dangerous goods, the date, time and geographic location of the release;
- **(c)** in the case of an anticipated release of dangerous goods, the date, time and geographic location of the incident that led to the anticipated release;
- **(d)** the mode of transport used;
- **(e)** the shipping name or UN number of the dangerous goods;
- **(f)** the quantity of dangerous goods that was in the means of containment before the release or anticipated release;
- **(g)** in the case of a release of dangerous goods, the quantity of dangerous goods estimated to have been released; and
- **(h)** if applicable, the type of incident leading to the release or anticipated release, including a collision, roll-over, derailment, overfill, fire, explosion or load-shift.

TDGR Part 8.5 Information to be Included in a Release or Anticipated Release Report – Road, Rail or Marine

A release or anticipated release report referred to in section 8.4 must include the following information:

- **(a)** the name and contact information of the person making the report;
- **(b)** in the case of a release of dangerous goods, the date, time and geographic location of the release;
- **(c)** in the case of an anticipated release of dangerous goods, the date, time and geographic location of the incident that led to the anticipated release;
- **(d)** the mode of transport used;
- **(e)** the shipping name or UN number of the dangerous goods;
- **(f)** the quantity of dangerous goods that was in the means of containment before the release or anticipated release;
- **(g)** in the case of a release of dangerous goods, the quantity of dangerous goods estimated to have been released;
- **(h)** if applicable, the type of incident leading to the release or anticipated release, including a collision, rollover, derailment, overfill, fire, explosion or load-shift;
- **(i)** if applicable, the name and geographic location of any road, main railway line or main waterway that was closed;
- **(j)** a description of the means of containment containing the dangerous goods;
- **(k)** if applicable, an estimate of the number of people evacuated or sheltered in place; and
- **(l)** if applicable, the number of deaths and the number of persons who sustained injuries that required immediate medical treatment by a health care provider.

TDGR Part 8.7 Information to be Included in a 30-Day Follow Up Report

A follow-up report referred to in section 8.6 must include the following information:

- **(a)** the name and contact information of the person making the report;
- **(b)** the names and contact information of the consignor, consignee and carrier;
- **(c)** in the case of a release of dangerous goods, the date, time and geographic location of the release;
- **(d)** in the case of an anticipated release of dangerous goods, the date, time and geographic location of the incident that led to the anticipated release;
- **(e)** the mode of transport used;
- **(f)** the classification of the dangerous goods;
- **(g)** the quantity of dangerous goods that was in the means of containment before the release or anticipated release;
- **(h)** in the case of a release of dangerous goods, the quantity of dangerous goods estimated to have been released;
- **(i)** a description of the means of containment containing the dangerous goods;
- **(j)** if applicable, a description of any failure of or damage to the means of containment;
- **(k)** information about the events leading to the release or anticipated release of dangerous goods;
- **(l)** information as to whether there was an explosion or fire;
- **(m)** the name and geographic location of any facility used in the loading or unloading of the dangerous goods that was closed, and the duration of the closure;
- **(n)** the name and geographic location of any road, main railway line or main waterway that was closed, and the duration of the closure;
- **(o)** if applicable, an estimate of the number of people evacuated or sheltered in place and the duration of the evacuation or shelter in place;
- **(p)** if applicable, the number of deaths and the number of persons who sustained injuries that required immediate medical treatment by a health care provider;
- **(q)** if applicable, the ERAP reference number;
- **(r)** the date on which the report referred to in section 8.4 was made; and
- **(s)** an estimate of any financial loss incurred as a result of the release or anticipated release, and any emergency response cost or remediation costs related to it.

Any changes to the report relating to items: (f), (i), (j), (k), (l), (p), or (s) within one year after the day on which the follow up report was made must be brought to the attention of the Director General as soon as possible.

For the full text, please refer to the TDG Regulations Part 8:
https:www/tc/gc/ca/eng/tdg/clear-part8-379.htm