Equipment Considerations for Anhydrous Ammonia Application

Mark Hanna

John E. Sawyer
Iowa State University, jsawyer@iastate.edu

Follow this and additional works at: https://lib.dr.iastate.edu/cropnews
Part of the Agricultural Science Commons, and the Agriculture Commons

Recommended Citation
https://lib.dr.iastate.edu/cropnews/2525

The Iowa State University Digital Repository provides access to Integrated Crop Management News for historical purposes only. Users are hereby notified that the content may be inaccurate, out of date, incomplete and/or may not meet the needs and requirements of the user. Users should make their own assessment of the information and whether it is suitable for their intended purpose. For current information on integrated crop management from Iowa State University Extension and Outreach, please visit https://crops.extension.iastate.edu/.
Equipment Considerations for Anhydrous Ammonia Application

Abstract
Because of limited fall 2018 anhydrous ammonia fertilizer application, fertilizer infrastructure including transportation, distribution, and application may be stressed this spring. A review of application equipment considerations can help ensure that your nitrogen fertilizer is properly and safely applied. This article focuses on anhydrous ammonia equipment.

Disciplines
Agricultural Science | Agriculture
Equipment Considerations for Anhydrous Ammonia Application

March 19, 2019

Because of limited fall 2018 anhydrous ammonia fertilizer application, fertilizer infrastructure including transportation, distribution, and application may be stressed this spring. A review of application equipment considerations can help ensure that your nitrogen fertilizer is properly and safely applied. This article focuses on anhydrous ammonia equipment.

Anhydrous ammonia contained in a field application tank is a high-pressure liquid that converts to a liquid-gas mixture as pressure drops while traveling to the knife outlet. Safety when using anhydrous ammonia is a primary consideration. Direct skin exposure can cause caustic burns because ammonia rapidly dissolves in water. Long sleeves and pants, lined rubber gloves, and unvented goggles are standard personal protective gear. Exposure of eyes to anhydrous ammonia can result in blindness, and inhalation can be fatal. A properly fitted respirator with ammonia-approved cartridges is recommended for operators who frequently work with valves and other connections. Because ammonia is
under pressure inside hoses, fittings, and knives it is important to regularly inspect equipment and keep it in good repair. A 5-gallon water supply should be readily available and a 6-ounce plastic squeeze bottle should be carried on the operator for immediate treatment of an accidental exposure.

Know wind direction and stay upwind when operating valves. When working with hoses, minimize handling hoses filled with ammonia. When connecting hoses, follow this order: first connect all hoses, then tighten bleeder valves, and lastly open valves beginning with the furthest downstream and work upstream. The last valve opened should be the one releasing ammonia into the hose. When disconnecting a hose, first close the valve supplying ammonia to the line and then successive valves downstream to the disconnect. This approach should help avoid trapping a large amount of ammonia in the line. Next open bleeder valves in the same order valves were closed before finally disconnecting the line. Small amounts of chilled, liquid ammonia frequently remain in ammonia plumbing even after bleeding the system until all ammonia is warmed enough to volatilize. Respect ammonia plumbing and use appropriate personal protective equipment.

Ammonia should be injected into soil deeply enough to avoid surface vapor losses, and below or away from the crop seed zone to reduce the potential of seedling injury. Telltale ammonia odor or the white vapor trail of water condensing in air that is cooled by escaping ammonia gas indicates deeper placement or more aggressive sealing with covering discs or "beaver-tail" tabs is required. Hoses from the distribution manifold to injection knives should be of equal length to ensure even distribution. Hoses that need to be coiled, such as those stretching a short distance from the manifold to a nearby knife, should be coiled in a horizontal plane.

Research at Iowa State University indicates improved distributor/manifold styles beyond an older open-chamber style manifold improve distribution uniformity. If using a conventional open-chamber manifold, hoses from adjacent applicator shanks should be connected to different regions around the outlet ring to improve distribution rate across the swath. A heat-exchanger flow controller is typically used instead of a regulator to improve rate control of total flow through the applicator. If using a variable-orifice regulator, plan to adjust the regulator setting as tank pressure varies with temperature throughout the day.

Two field application tanks are often used on a single running gear in high-capacity systems. Unless plumbing is constructed with attention to limiting excess-flow valve capacity and effects of a plumbing cross-over, hazardous release of ammonia can continue from the tanks for a lengthy period of time if a line breaks. Excess-flow valves should be
properly sized (45 gal/min flow rate maximum or less for most cases) to help avoid creating a dangerous release situation.

Category: Crop Production  Equipment and Machinery

Links to this article are strongly encouraged, and this article may be republished without further permission if published as written and if credit is given to the author, Integrated Crop Management News, and Iowa State University Extension and Outreach. If this article is to be used in any other manner, permission from the author is required. This article was originally published on March 19, 2019. The information contained within may not be the most current and accurate depending on when it is accessed.

Crop:

Corn

Tags: anhydrous ammonia  anhydrous ammonia tanks  ammonia safety  farm safety  application of nitrogen  nitrogen application  nitrogen  nitrogen fertilizer

Authors:

Mark Hanna

John Sawyer Professor

Dr. John Sawyer is a professor of agronomy and extension specialist in soil fertility and nutrient management at Iowa State University. His extension program involves soil fertility management, efficient crop nutrient utilization, and environmentally sound fertilizer and manure systems. Dr. Sawye...