

Section III – Annex 9
Chemical Specific Preplans

Ammonia NH₃
(A.k.a. Anhydrous Ammonia)

Primary Hazard(s): Inhalation of concentrated fumes may be fatal; skin irritant; will react with strong oxidizers to form an explosive mixture; flammable at concentrations between 16-25% in air.

CAS Number: 7664-41-7

SAP Number: 11163

Average Inventory (lbs) 4000 **Max. Inventory (lbs)** 8000

Reportable if Spilled / Release = Yes **R.Q. = 100 lbs (~16 gallons)**

Storage: Farm service trailer –and- U-258 Frick chiller system

Location(s):

- Trailer - SW corner of U270B - 3000 gallon w/ 3800 pound maximum capacity
- Frick Ammonia Chiller - 1st floor, SE corner of U258 w/~2000 pound maximum capacity

Emergency Response Guidelines:

- (See *Cameo Response Information Data Sheet* data, attached)
- Attempt to shutoff main valve at nurse tank, if possible.
- Use water fog to suppress ammonia vapors.

Emergency Reporting Requirements

(See Annex II: Notifications)

Immediately Notify	When
National Response Center	CERCLA RQ = 100 pounds (~16 gallons) is exceeded within 24 hours –and- the material is released into the environment.
Illinois Emergency Management Agency (IEMA) a.k.a. SERC	CERCLA / SARA RQ = 100 pounds (~16 gallons) is exceeded within 24 hours –and- any of the released material has left the plant site boundary
St. Clair Emergency Services Disaster Agency	CERCLA / SARA RQ = 100 pounds (~16

Chemical Specific Preplans

(ESDA) a.k.a. LEPC	gallons) is exceeded within 24 hours – and - any of the released material has left the plant site boundary.
Neighbors / Surrounding Community	When material can be detected by persons off site
Wastewater Treatment Plant (P/Chem)	If 100 pound (~16 gallons) R.Q. is exceeded.
Illinois EPA – Collinsville Office (Air Releases Only)	Contact if chemical is emitted in quantities exceeding a permit limit or applicable EPA standard due to startup, shutdown, or malfunction of process equipment.

System DescriptionU270B Trailer

Anhydrous ammonia is used to make an ammonia hydroxide solution that is used as a catalyst in Unit 270. Flexible hose is used to connect the liquid valve of the trailer to a fixed piping system. This fixed pipe connects to tank 35-0471 located on the roof of Unit 270.

The liquid valve on the trailer is equipped with a dip pipe. The valve is opened only when a batch of ammonium hydroxide is made. This occurs 2-3 times per week for a period of 45 minutes. The liquid ammonia self vaporizes and is sparged into water in T-471 forming the ammonium hydroxide solution. The liquid valve has no excess flow check valve. The tank relief valve is set at 250 psig.

Vulnerability

Flex Hose: A vulnerable point in the system is the flexible hose used to connect the service trailer to the fixed piping system. The hose is approved for ammonia service and is rated for pressures in excess of 300 psig. The vapor pressure of ammonia at 25°C is 150 psig - well below the rating of the flexible hose. The hose is inspected on a regular basis by the ammonia supplier.

The trailer is located in an area where the likelihood of physical damage to the trailer or hose is low. The liquid valve on the trailer is open only 1-1/2 to 2-1/2 hours per week and the probability of the hose being physically at this time is extremely remote.

Trailer Overpressure: An ammonia release could occur if the service trailer was over-pressured. The service trailer is independent of any other material handling system in Unit 270. A fire causing external heat on the tank is the only way the trailer could over-pressurize. The trailer is located 30 feet from the main production area and has no flammable or combustible materials stored around it. The production area is protected by an automatic deluge sprinkler system that will minimize any fire exposure to the service trailers. The likelihood of an ammonia release due to fire is low.

Chemical Specific Preplans

History

There have been no major releases of ammonia from this system since the plant was purchased from Monsanto.

Other Sources of Ammonia Information:

- MSDS for Anhydrous Ammonia
- Chemical Hazards Response Information System (CHRIS) Manual
- Hawley's Condensed Chemical Dictionary

Chemical Database - Response Information Data Sheet

Preferred Name: ANHYDROUS AMMONIA, LIQUEFIED

Regulatory Name: AMMONIA
AMMONIA (ANHYDROUS)

Chemical Source: NOEPA **NOAA #:**4860

NFPA Codes **F:** 1 - Must be preheated to burn
 H: 3 - Extremely hazardous - use full protection
 R: 0 - Normally stable
 S:

General Description

Anhydrous ammonia is a clear colorless gas with a characteristic odor. Although it is a nonflammable gas, it will burn within certain vapor concentration limits, and the fire hazard will increase in the presence of oil or other combustible materials. It is shipped as a liquid under pressure. Contact with the liquid can cause frostbite. It is soluble in water forming a corrosive liquid. Although ammonia is lighter than air, the vapors from a leak initially hug the ground. It weighs 6 lbs./gallon. Prolonged exposure of the containers to fire or heat may result in their violent rupturing and rocketing. Long term exposure to low concentrations or short term exposure to high concentrations can result in adverse health effects from inhalation. It is used as a fertilizer, as a refrigerant, and in the manufacture of other chemicals. (© AAR, 1999)

Fire Hazard

Mixing of ammonia with several chemicals can cause severe fire hazards and/or explosions. Ammonia in container may explode in heat of fire. Incompatible with many materials including silver and gold salts, halogens, alkali metals, nitrogen trichloride, potassium chlorate, chromyl chloride, oxygen halides, acid vapors, azides, ethylene oxide, picric acid and many other chemicals. Mixing with other chemicals and water. Hazardous polymerization may not occur. (EPA, 1998)

Fire Fighting

Wear positive pressure breathing apparatus and full protective clothing.

Small fires: dry chemical or carbon dioxide. Large fires: water spray, fog or foam. Apply water gently to the surface. Do not get water inside container. Move container

Chemical Database - Response Information Data Sheet

Preferred Name: ANHYDROUS AMMONIA, LIQUEFIED

from fire area if you can do it without risk. Stay away from ends of tanks. Cool containers that are exposed to flames with water from the side until well after fire is out. Isolate area until gas has dispersed. (EPA, 1998)

Protective Clothing

Skin: Wear appropriate personal protective clothing to prevent skin contact.

Eyes: Wear appropriate eye protection to prevent eye contact.

Wash skin: If the chemical is in solution, the worker should immediately wash the skin when it becomes contaminated.

Remove: If chemical is in solution, work clothing that becomes wet or significantly contaminated should be removed and replaced.

Change: No recommendation is made specifying the need for the worker to change clothing after the work shift.

Provide: Eyewash fountains should be provided (when concentration is >10%) in areas where there is any possibility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. If concentration is >10% then facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] (NIOSH, 1997)

MATERIAL RATINGS

BARRICADE

FABRIC 1-3 hours

BUTYL

FABRIC > 3 hours

GLOVES > 3 hours

BUTYL/NEOP

FABRIC > 3 hours

Chemical Database - Response Information Data Sheet

Preferred Name: ANHYDROUS AMMONIA, LIQUEFIED

CHECKMATE

FABRIC > 3 hours

CHEMREL

FABRIC < 1 hour

CHEMREL MAX

FABRIC > 3 hours

CPE

FABRIC 1-3 hours

CPF III

FABRIC < 1 hour

FEP TEFLON

FACESHIELD > 3 hours

INTERCEPTOR

FABRIC > 3 hours

NAT RUB

FABRIC < 1 hour

NEOP

FABRIC 1-3 hours

GLOVES > 3 hours

BOOTS > 3 hours

NEOP/BUTYL

GLOVES > 3 hours

NIT+POLYURETHANE+PVC

BOOTS > 3 hours

NITRILE

Chemical Database - Response Information Data Sheet

Preferred Name: ANHYDROUS AMMONIA, LIQUEFIED

GLOVES > 3 hours

PE

FABRIC < 1 hour

POLYURETHANE

FABRIC < 1 hour

PTFE TEFLON

FABRIC < 1 hour

PVC

FABRIC < 1 hour

RESPONDER

FABRIC > 3 hours

SARANEX23P

FABRIC < 1 hour

VITON

FABRIC < 1 hour

VITON/NEOP

FABRIC > 3 hours

(NOAA, 1991)

Non-Fire Response

Keep material out of water sources and sewers. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. Vapor knockdown water is corrosive or toxic and should be diked for containment. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash or cement powder. Neutralize with vinegar or other dilute acid. Water spill: Neutralize with dilute acid. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (© AAR, 1999)

Health Hazard

Vapors cause irritation of eyes and respiratory tract. Liquid will burn skin and eyes. Poisonous; may be fatal if inhaled. Contact may cause burns to skin and eyes. Contact with liquid may cause frostbite. (EPA, 1998)

Properties

Lower Exp Limit: 16 % (EPA, 1998)

Chemical Database - Response Information Data Sheet

Preferred Name: ANHYDROUS AMMONIA, LIQUEFIED

Upper Exp Limit: 25 % (EPA, 1998)
Auto Igtn Temp: 1204° F (USCG, 1999)
Melting Point: -107.9° F (EPA, 1998)
Vapor Pressure: 400 mm at -49.72° F (EPA, 1998)
Vapor Density: 0.6 (EPA, 1998)
Specific Gravity: 0.72 (© AAR, 1999)
Boiling Point: -28.03° F at 760 mm (EPA, 1998)
Molecular Weight: 17.03 (EPA, 1998)
IDLH: 300 ppm (NIOSH, 1997)
TLV TWA: 25 ppm (©ACGIH, 1999)
TLV STEL: 35 ppm (©ACGIH, 1999)
ERPG-1: 25 ppm (AIHA, 1999)
ERPG-2: 200 ppm (AIHA, 1999)
ERPG-3: 1000 ppm (AIHA, 1999)
Water Solubility: 34% (NIOSH, 1997)

First Aid

Warning: Ammonia is extremely corrosive to the skin, eyes, and mucous membranes. Contact with the liquified gas may cause frostbite. Caution is advised.

Signs and Symptoms of Acute Ammonia Exposure: Inhalation of ammonia may cause irritation and burns of the respiratory tract, laryngitis, dyspnea (shortness of breath), stridor (high-pitched respirations), and chest pain. Pulmonary edema and pneumonia may also result from inhalation. A pink frothy sputum, convulsions, and coma are often seen following exposure to high concentrations. When ammonia is ingested, nausea and vomiting may result; oral, esophageal, and stomach burns are common. If ammonia has contacted the eyes, irritation, pain, conjunctivitis (red, inflamed eyes), lacrimation (tearing), and corneal erosion may occur. Loss of vision is possible. Dermal exposure may result in severe burns and pain.

Emergency Life-Support Procedures: Acute exposure to ammonia may require

Chemical Database - Response Information Data Sheet

Preferred Name: ANHYDROUS AMMONIA, LIQUEFIED

decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to ammonia.
2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.
3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.
4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to ammonia.
2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support. Warning: Do not attempt to neutralize with an acid wash; excessive liberation of heat may result.
3. If eye exposure has occurred, eyes must IMMEDIATELY be flushed with lukewarm water for at least 15 minutes.
4. Remove contaminated clothing as soon as possible.
5. Wash exposed skin areas THOROUGHLY with soap and water.
6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.
7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.
2. DO NOT induce vomiting or attempt to neutralize!
3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.
4. Activated charcoal does not strongly bind ammonia, and therefore is of little or no value.
5. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.
6. Transport to a health care facility. (EPA, 1998)

Reactivity:

CHEMICAL PROFILE: It is a strong base, in large quantity it will produce a violent reaction with acids. When exposed to intense source of ignition it will burn or explode. It readily combines with silver oxide or mercury to form compounds that

Chemical Database - Response Information Data Sheet

Preferred Name: ANHYDROUS AMMONIA, LIQUEFIED

explode on contact with halogens. When in contact with chlorates it forms explosive ammonium chlorate [Kirk-Othmer, 3rd ed., Vol 2, 1978, p. 470]. It react violently or produces explosive products with fluorine, chlorine, bromine and iodine and some of the interhalogen compounds (bromine pentafluoride, chlorine trifluoride). Potentially violent or explosive reactions on contact with 1,2-dichloroethane (with liquid ammonia), boron halides, ethylene oxide (polymerization), perchlorates or strong oxidants (chromyl chloride, chromium trioxide, chromic acid, nitric acid, hydrogen peroxide, chlorates, fluorine, nitrogen oxide, liquid oxygen). Reaction with silver chloride, silver oxide, silver nitrate or silver azide form the explosive silver nitride. It is capable of reacting with some heavy metal compounds (mercury, gold(III) chloride) to produce materials which may explode when dry. [Bretherics, 5th ed., 1995, p. 1553]. (REACTIVITY, 1999)