Anhydrous Ammonia

Hydrogen - 3

Nitrogen - 1

Stable Chemical Compound

Naturally Occurring Chemical Compound

Most Widely Used Chemical

NH_3

Basic Properties: Anhydrous Ammonia

• Appearance in air is		White w/Blue Tint
• Content (average)		Water = 0.38% NH_3 = 99.6% Nitrogen = 81.9%
• Boiling Point		minus 28° F
• Freezing Point		minus 108° F
• Vapor Pressure:	-28° F	0 psig
	0° F	16 psig
	32° F	48 psig
	60° F	93 psig
	100° F	197 psig

Basic Properties: Anhydrous Ammonia

- Vapor Density (atmos) .59 ~ Air = 1

  NH_3 is lighter (less dense) than our atmosphere

  – release phase dependant

- Molecular Weight 17.03
- Liquid to Vapor Volume (atmos) 1 to 850

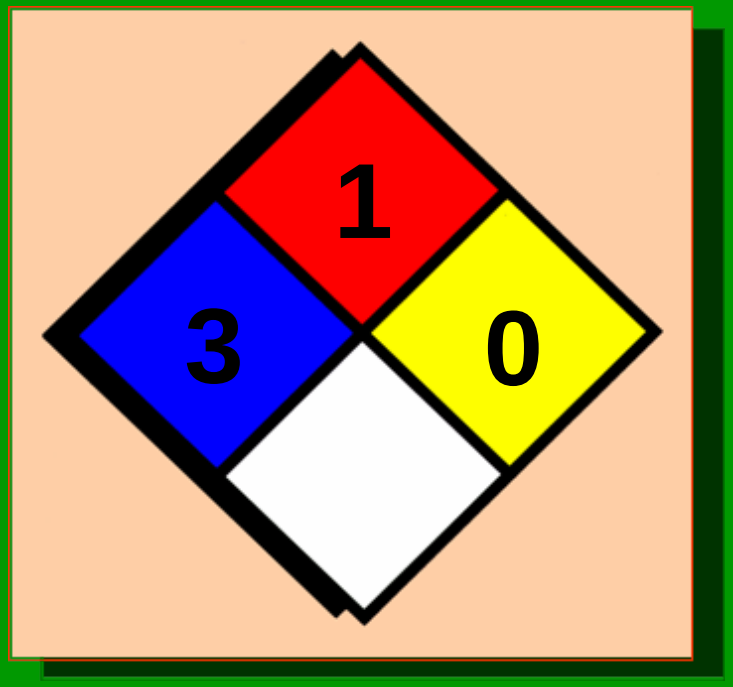
  Imagine 1 gal. (liquid) Expanding to 113 cubic feet of vapor

- Specific Gravity (68^o F) 0.68 ~ H_2O = 1
- Pounds per Gallon (68^o F) 5.1
- Gallons per Ton 388.0

Ammonia . . . Hazards

CAS # 7664-41-7
DOT # UN1005

NFR & HMIS Labels



All Labels are Not Standardized!

Ammonia . . . Health Effects

- 0.1 ppm plus — Concentration in human breath
- 1-4 ppm — Odor and taste detected
- 25 ppm — ACGIH TLV TWA Nasal dryness
- 35 ppm — STEL (15 min)
- 50 ppm — OSHA PEL - Irritation of eyes, nose & throat in sensitive individuals

PPE Threshold PPE Threshold PPE Threshold

- 70 ppm — Moderate irritation of eyes, nose, throat & possible chest irritation

Ammonia . . . Health Effects

PPE THRESHOLD	THRESHOLD	THRESHOLD
• 300 ppm	OSHA's revised IDLH	
• 700 ppm	Permanent eye damage possible	
• 2500 ppm	Severe eye, nose & throat irritation. Pulmonary edema	
• 5000 ppm	Few min. exposure leads to death from edema / asphyxia	
• 10,000 ppm	Instant Respiratory & Skin Damage/Death	

NH_3 Key Characteristics

1. NH_3 density is 59% of air -
   so it is lighter than air

2. NH_3 Cloud first rises - Cold Aerosol
   sinks to the ground - Absorbs H2O

3. NH_3 releases can be “re-liquefied”
   -108^o F

4. Dilution / Absorption is approximately
   1 part NH_3 to 2 parts H_20

5. NH_3 releases can Explode/Burn


150 # NH3 Container Orientation
Valve Outlet Up
Liquid Phase
Valve Outlet Down
Vapor Phase

1700 # NH3 Container

1700 # NH3 Container Orientation

1700 # NH3 Container Orientation

NH3 Refrigeration
Fish Processors – Food Storage

NH_3 Release Formations

Four Release Formations to Remember:

1. Trace Gas
2. Dense Cloud
3. Aerosol Cloud
4. Pooled Liquid

Trace Gas:

- Concentration - 0 to 2,000 ppm
- Visible indication -Not visible to slightly visible
- Don’t Let This One Fool You! It is a Risk!


Trace Gas

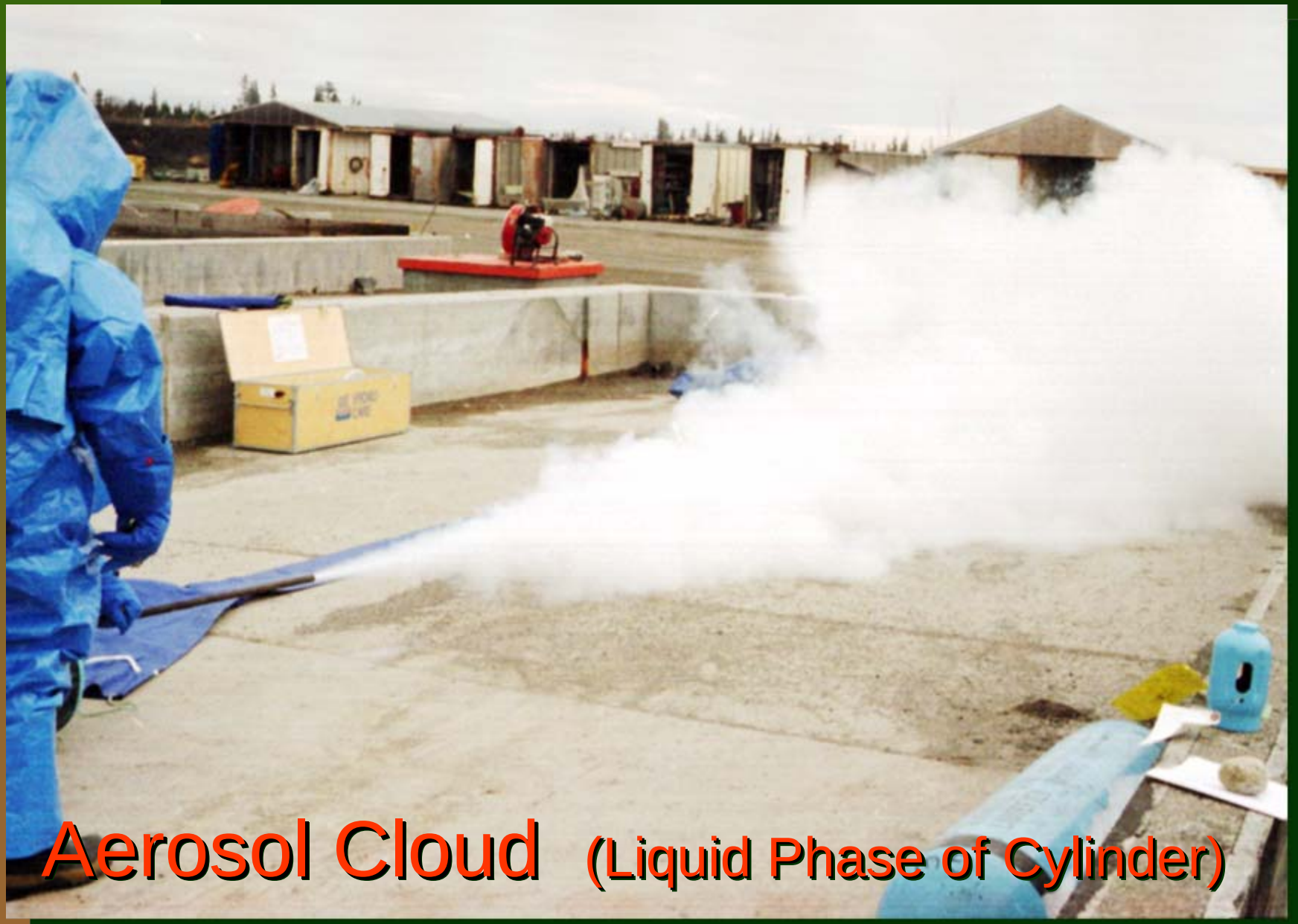
Dense Cloud:

- Concentration - 2,000 to 40,000 ppm
  NH_3 visible as a cloud - 1% to 4% =
  10,000 to 40,000 ppm
- Visible indication - Fully visible to fully engulfing
- Use PPVF (Positive Pressure Ventilation Fan)
  to clear a room/effected area
  before entering
- Flammability range is 16% to 25% in air
- Nose/Throat Pain - Severe Eye, Lung Damage


Dense Cloud

Aerosol Cloud:

- Concentration - 40,000 ppm to real stinkin' high
- Visible indication - Fully engulfing
- Made up of NH_3 droplets in center dissipating to dense cloud
- Core plume temperature -minus 82 - 102 deg. F
- Permanent Tissue Damage – Death


Aerosol Cloud (Liquid Phase of Cylinder)

Pooled Liquid:

- Concentration - 100% NH_3 to 40,000 ppm just above the surface vapor
- Visible indication - Clear liquid / vaporizing to trace gas
- DON'T ADD H_2O
  - Protect Downwind Populations
  - Beware of potential Ignition Sources
  - Freezes Human Tissue on Contact
    - Vapor Damages Eyes, Nose and Lungs

Evolution of an NH3 Release

Ammonia Spill/Release Actions

Defensive and Offensive Response Tactics

- Isolate from a Distance & 2nd Isolation
- Controlled Ventilation- Fixed or PPV
- Re-condense - Turn it to Liquid ~
  Trap & Cover with any old thing!
- Use H_20 on Clouds (?IF) with Caution!

Re-condensation Deployment

Where Did The Ammonia Cloud Go?