



Ammonia and Aqua Safety
&
Emergency Response

Co Authored By:
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CALAMCO
Fall Course 2022 (2.5 Hr.)



Intros and Evacuations

- Restrooms
- In Case of Emergency
- Rally Point
- Cell Phones – Stun / Silent

- Instructors Introductions

- Ammonia Safety Quiz
- Course Evaluation
- Certificate

Today's Topics & Agenda

- Ammonia & Aqua Safety
- TSA – First Observer
- CHP Commercial Roadway Hazards
- Recent Incident Review
- Round Table Q&A
- Lunch @ Noon

2022 Training Session Content

- All content for each session can be downloaded via this QR Code
- Alternate Method:
We will send it to you by end of the week. Please sign up on the mass email list with Francine or Lanie!!





- Who We Are.....
- Started on 1958 – Lathrop Ammonia Plant Started & Co – Op formed
- In 1978, Terminal at the Port of Stockton was approved by CALAMCO Board
- By the end of 1981, CALAMCO had expanded to two 20,000-ton storage tanks.
- Established as major terminal operation, importing ammonia from world-wide sources.
- In 2001, CALAMCO built a 40,000-ton capacity UAN32 storage facility at their Stockton terminal





Ammonia by Ship from Trinidad



Rail

- **Mainly Ship (Can Receive)**
- **Average 1-3 Cars week**
- **Up to 25 Cars Stagged @ Stockton Terminal**



- Average Trucks Shipped 10 per day
- In Season 80 -100 Trucks per day
- Season Middle March to June 1st (10 Weeks)
- > 80% of Volume occurs in Season

What's Your Why?



Here's Ours!!

Chemical Family in California...

**Goal Safe Handling,
Transportation, Delivery and Use**



Why are YOU here Today?

Boss told you to be here....

Personal Knowledge

Training Requirement

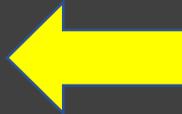
Company Requirement

Lunch



Law says...

- Owners & Operators have a general duty to:
 - Identify hazards associated with potential accidental release,
 - Design & maintain safe facility, **AND**
 - Minimize consequences of accidental releases.





Texas City, Tx – 1947

Bhopal, India - 1984



Love Canal – New York (1940 - 1950's)

- Worst environmental disaster involving chemical wastes in U.S. history.
- The Love Canal area was originally the site of an abandoned canal that became a dumping ground for nearly 22,000 tons of chemical waste
- Site was filled in and given by the company to the growing city of Niagara Falls, which allowed housing to be built on it.
- In 1978, however, state officials detected the leakage of [toxic](#) chemicals from underground into the basements of homes in the area.
- In 1994 Occidental agreed to pay \$98 million to New York latter an additional payment for \$129 million over three years.





West, Texas - 2013

Silver Lining – West Texas Disaster

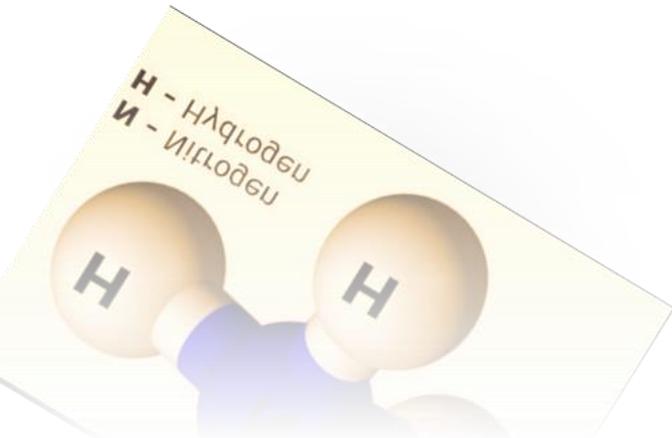
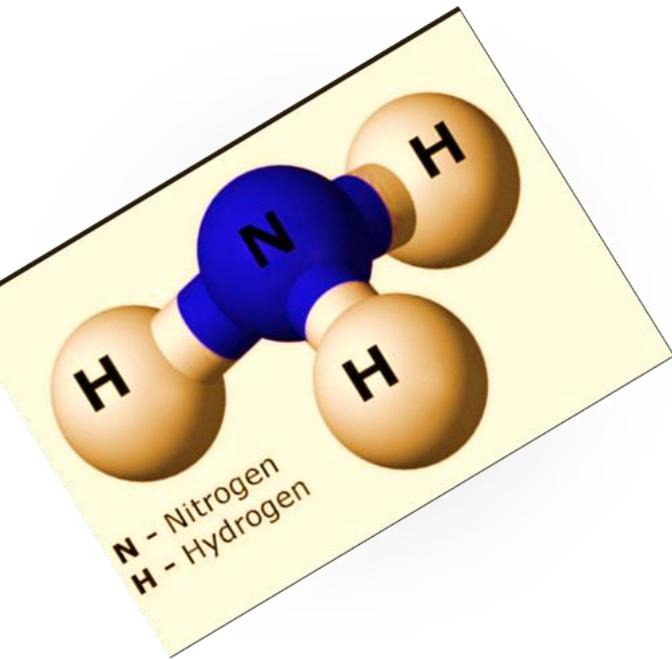


In the 209.... Just down the street (2016)

- **Official sentenced to 18 months in prison for illegal dumping**
- The former director of a Stockton biofuel company was sentenced to 18 months in federal prison Monday for unlawful discharge of industrial wastewater, tampering with monitoring equipment and conspiracy.

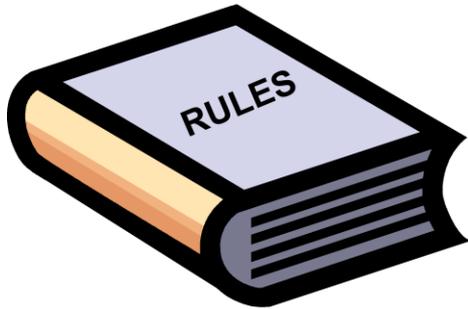


Legal Requirements & YOUR Safety Mandate



- Owner / Operators - Required Tier II Reporting and Planning - Federal EPA
- First Responder Awareness:
 - Haz Mat – Title 8 Section 5192
 - Medical – Title 8 Section 1512
- Employer and Employees
 - Right to Know & Duty to Disclose (SDS) OSHA 1983
- Where does YOUR Safety Mandate come from?

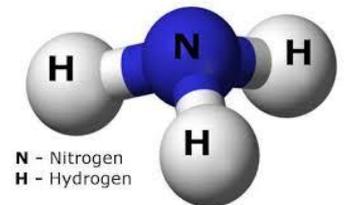
Your Safety Mandate Where does it come from?



NH₃ First Responder Awareness

Title 8 Section 5192

- Understand the **chemical and physical hazards** of ammonia and their impacts (risks)
- Understand the **potential outcomes (threats)** associated with an ammonia emergency
- Recognize ammonia in the work place and learn how to **escape** a release
- Understand the **emergency response plan** and the need for timely notification and engagement of resources





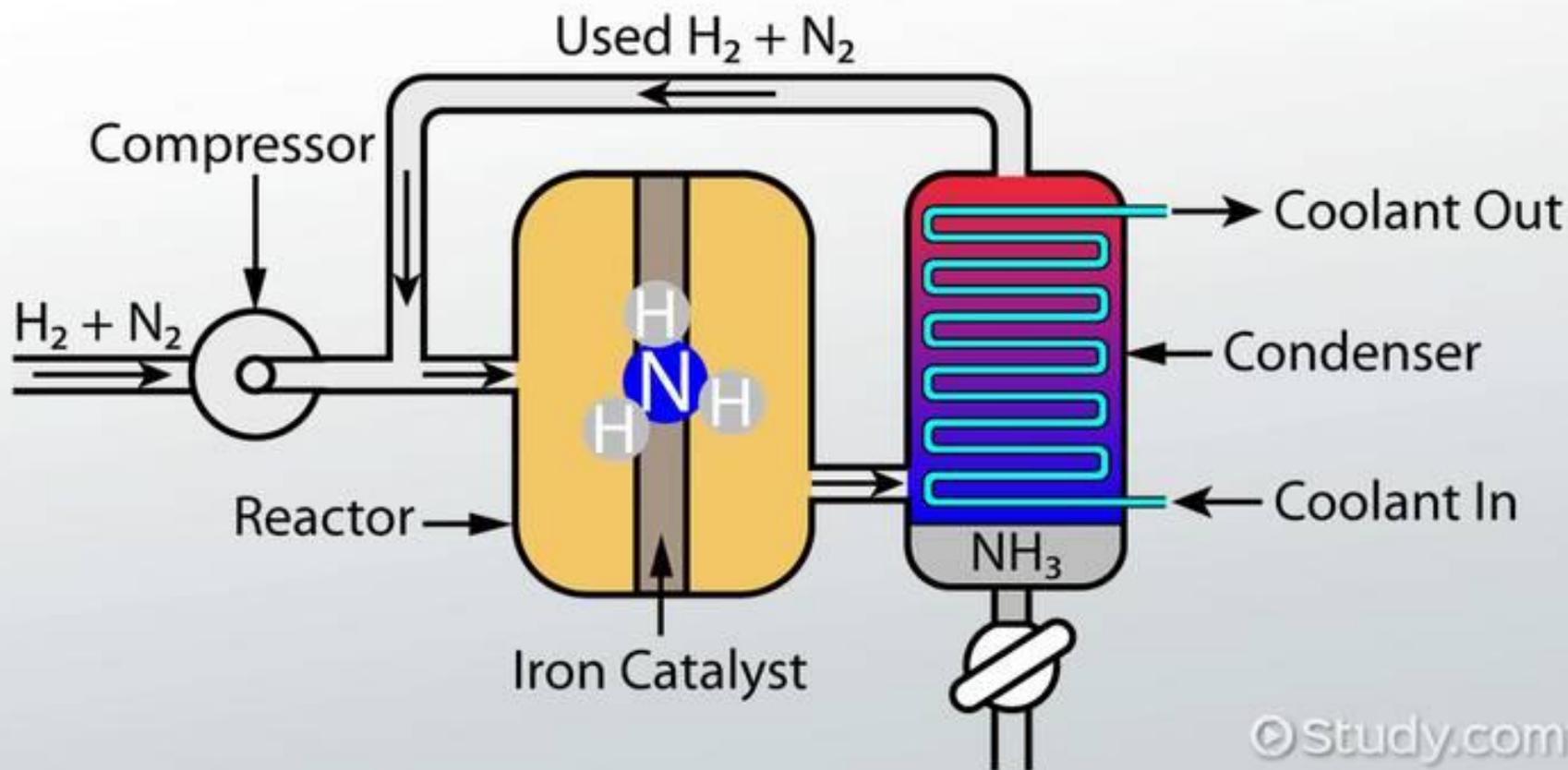
Anhydrous Ammonia

What is it used for:

- 83% of ammonia produced is used for food production
- Industrial Production and Emissions Control
- Alternative Fuels

How It's Made

OBTAINING NITROGEN



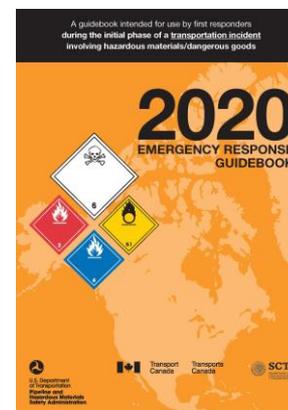
Ammonia Chemical Properties

SYNONYMS & TRADE NAMES:

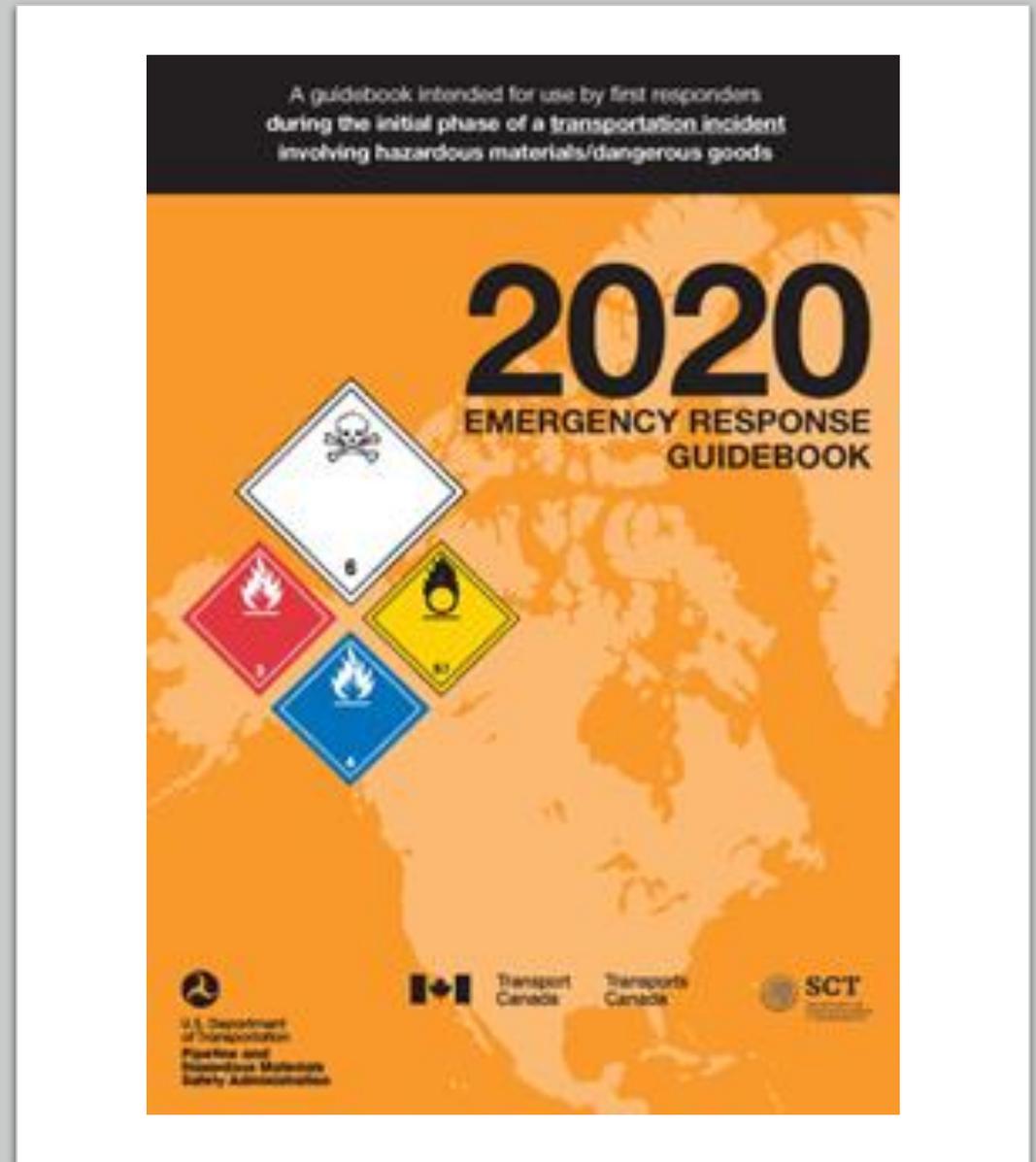
Anhydrous ammonia, Aqua ammonia,
Aqueous ammonia

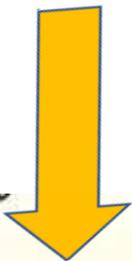
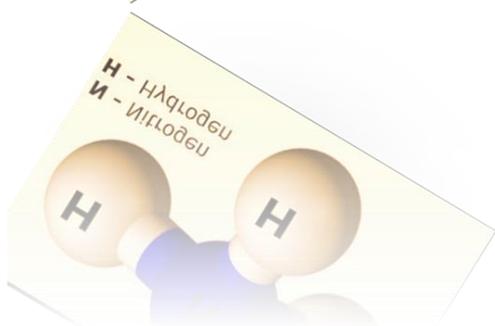
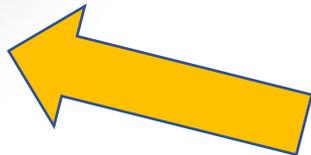
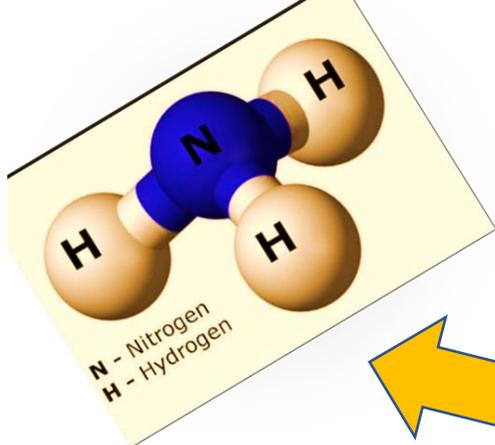
DOT ID & GUIDE

1005, 125(anhydrous)
2672 154(10-35% solution)
2073 125(>35-50% solution)
1005 125(>50% solution)



- <https://www.youtube.com/watch?v=PitdCqx7cU>





Chemical Properties

- FORMULA NH_3
- OSHA PEL 25 ppm (CA) 50 (Fed)
- STEL 35 ppm
- IDLH **300 ppm**
- Oder Threshold 5-50 ppm
- PHYSICAL DESCRIPTION
Colorless gas with a pungent, suffocating odor.



SOLUBILITY 34%

VERY

Chemical Properties

“Anhydrous” – means WITHOUT water

LOWER EXPLOSIVE LIMIT 15%

UPPER EXPLOSIVE LIMIT 28%

RELATIVE GAS DENSITY 0.60

PH (Caustic) 11.6

EXPANSION RATIO 1 to 850



[Note: Although NH₃ does not meet the DOT definition of a Flammable Gas (for labeling purposes), it should be treated as one.]

Does ANYONE know why it is shipped as a compressed gas?



Reactions with water



B
u
r
n
i
n
g



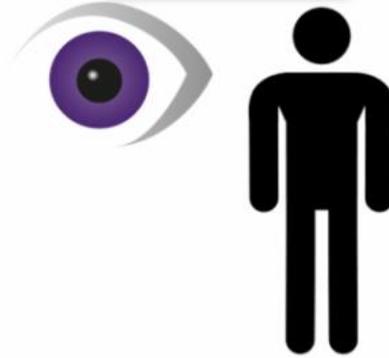
Inhalation



Ingestion



Absorption



Injection



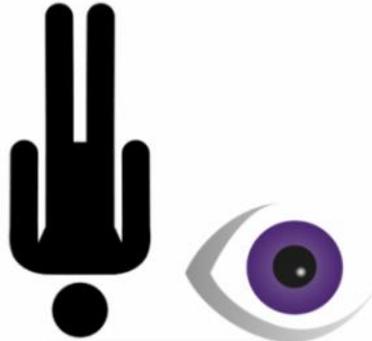
EXPOSURE ROUTES:

Chemical Properties

- Inhalation
- Ingestion
- skin and/or eye contact (solution/liquid)



Injection



Absorption



Ingestion



Inhalation

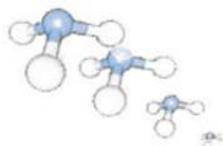
Chemical Properties

SYMPTOMS:

- Irritation eyes, nose, throat; dyspnea (breathing difficulty), wheezing, chest pain; pulmonary edema; pink frothy sputum; skin burns, vesiculation; liquid: frostbite

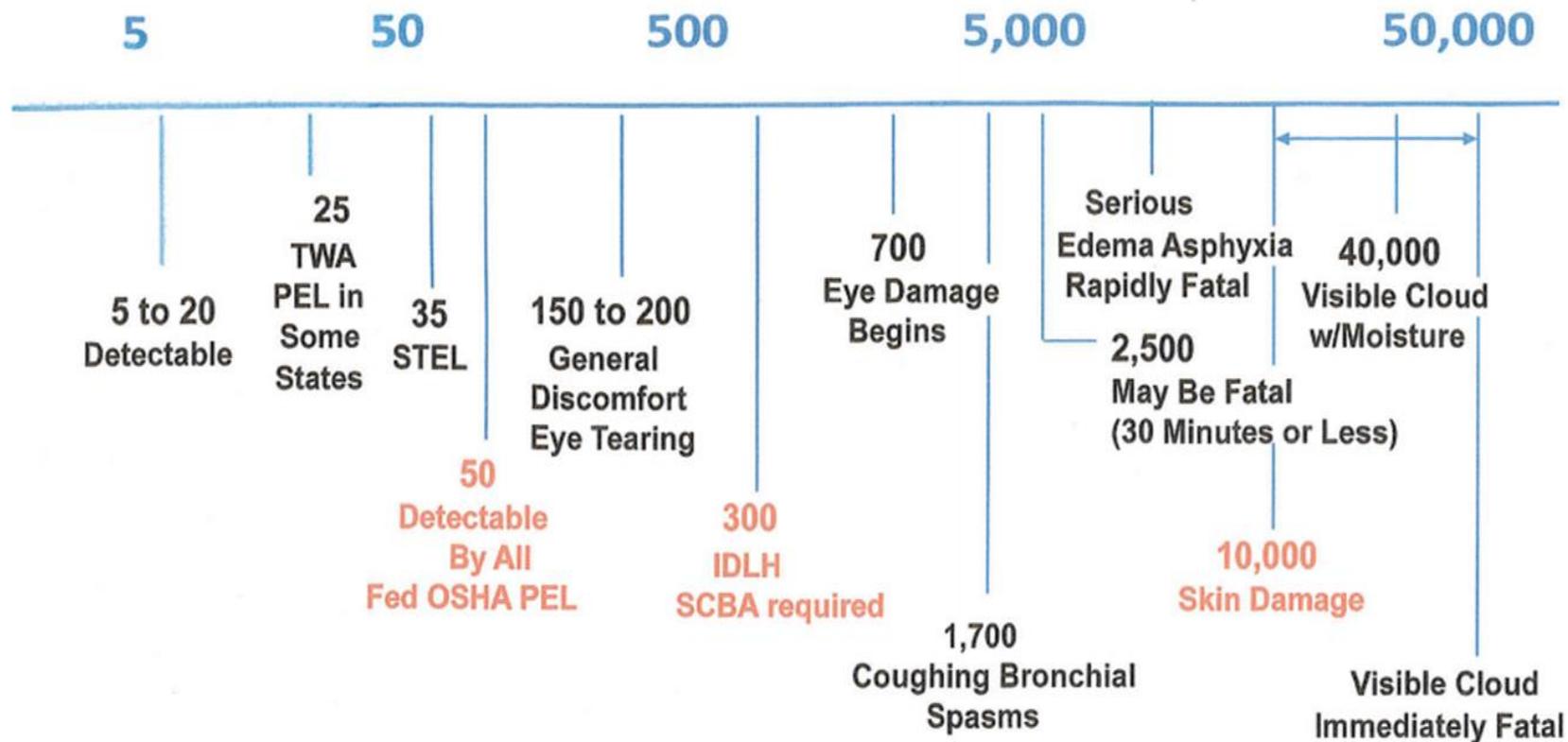
TARGET ORGANS:

- Eyes, skin, respiratory system



AMMONIA NH_3

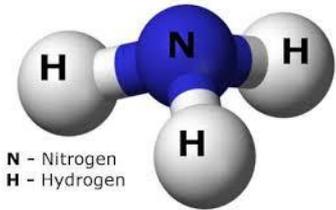
RULE OF FIVES



NOTE: ALL VALUES IN PART PER MILLION (PPM)

NH3 First Responder Awareness

Title 8 Section 5192



- Understand the _____ & _____ of ammonia and their impacts (risks)
- Understand the _____ associated with an ammonia emergency
- Recognize ammonia in the work place and learn how to _____ a release
- Understand the _____ and the need for timely notification and engagement of resources

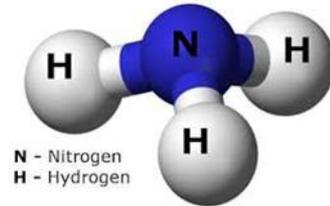
Ammonia
Emergencies



Where is your exposure potential?



Ammonia Major Event Frequency



High Risk Low Frequency Incidents



- Concerns
 - KSA's
 - Experience Base
 - Preparedness
 - Discretionary / Non Discretionary Time?
- How can **Complacency** creep in?

NDT High Risk Low Frequency DT	High Risk High Frequency
Low Risk Low Frequency	Low Risk High Frequency



Minot, ND - 2002

- LIQUID
- AEROSOL
- DENSE GAS
- TRACE GAS



Release Phases

097:13:59:50.32



097:13:59:50.32



Humid or Cold Day



Dry Warm Day









Fresno
COUNTY LINE

SPEED
CHECKED
BY
RADAR







2019 Navy Drive





Manning
Ave 2020

What
indirect
impact to
chemical
industry
occurred?

What can we learn from this?



You cannot make this up!!!
(I-5 NB @ March 2021)





Reclamation
Rd. 2021

What
indirect
impact to
CALAMCO
occurred?

2022 Near Miss Transportation

3:35:40



Training and Preparedness is Essential



Costco NH3 Release



- STOCKTON (CBS) - The Costco in Stockton has been evacuated because of a Freon leak.
- Around 9:40 a.m. Stockton Fire Department received the call of a chemical leak at the store in the 1600 block of east Hammer Lane. A department spokesperson says, so far, about 1,000 pounds of the chemical has leaked.
- It's unknown how long the store will remain closed.
- Freon is typically used as a refrigerant.



Cold Storage
NH₃ Release
2019



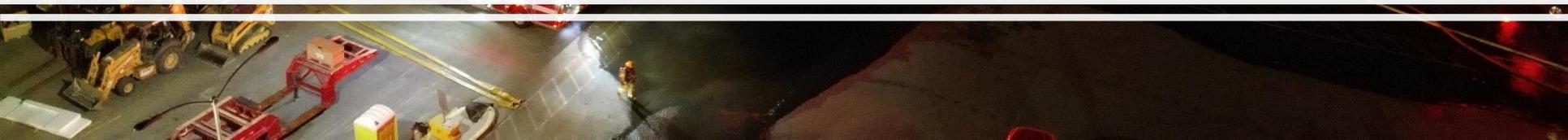
Resident dies following an ammonia leak at Packing Company (2019)

- An ammonia leak packing facility
- The California Division of Occupational Safety and Health was notified about the gas leak at 6:45 p.m. Tuesday
- 6 people exposed – 1 person died
- If CAL/OSHA emphasizes if the company violated any safety standards outlined in the CAL/OSHA emergency action plan, they can cite the company for general, regulatory or serious monetary penalties.



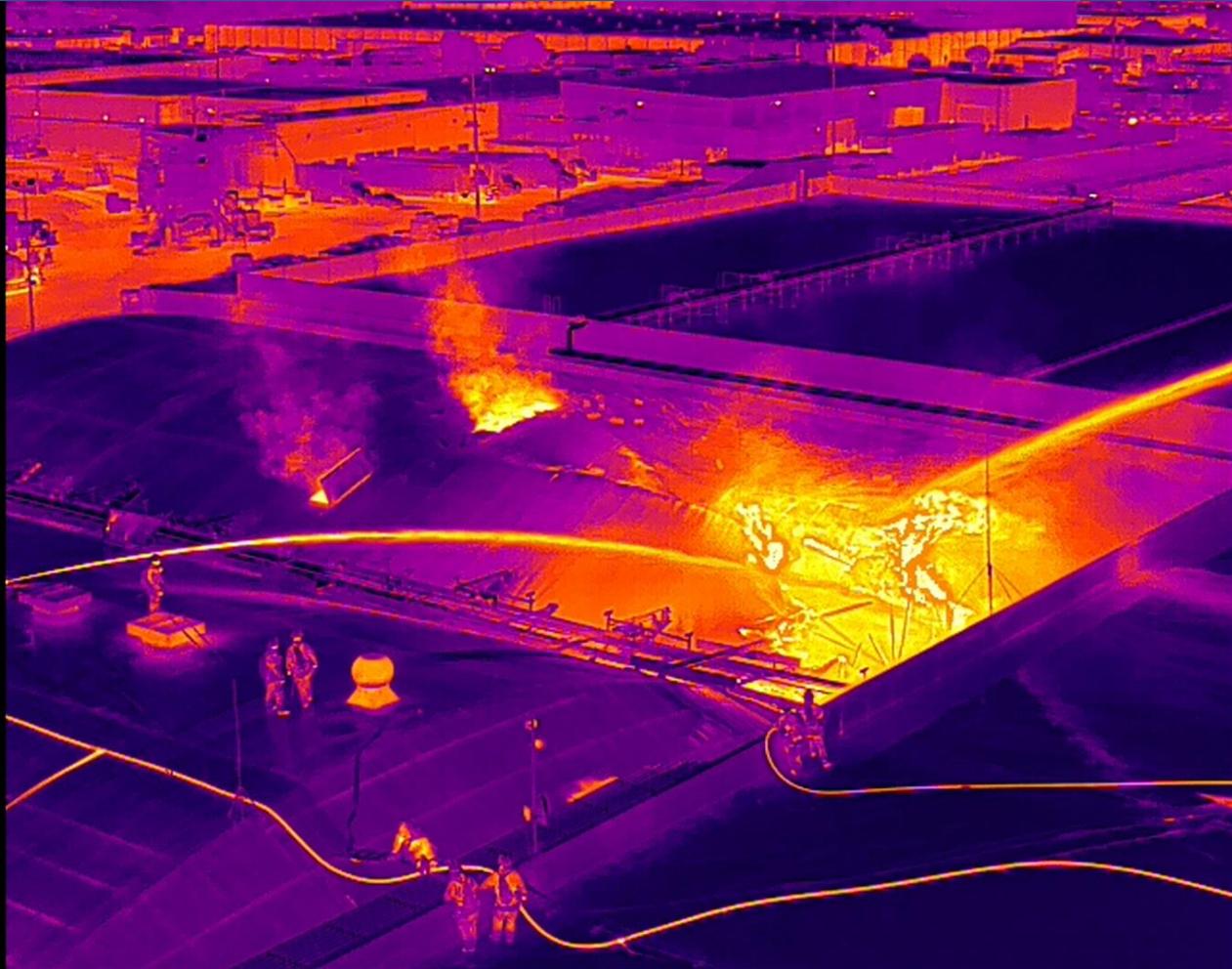


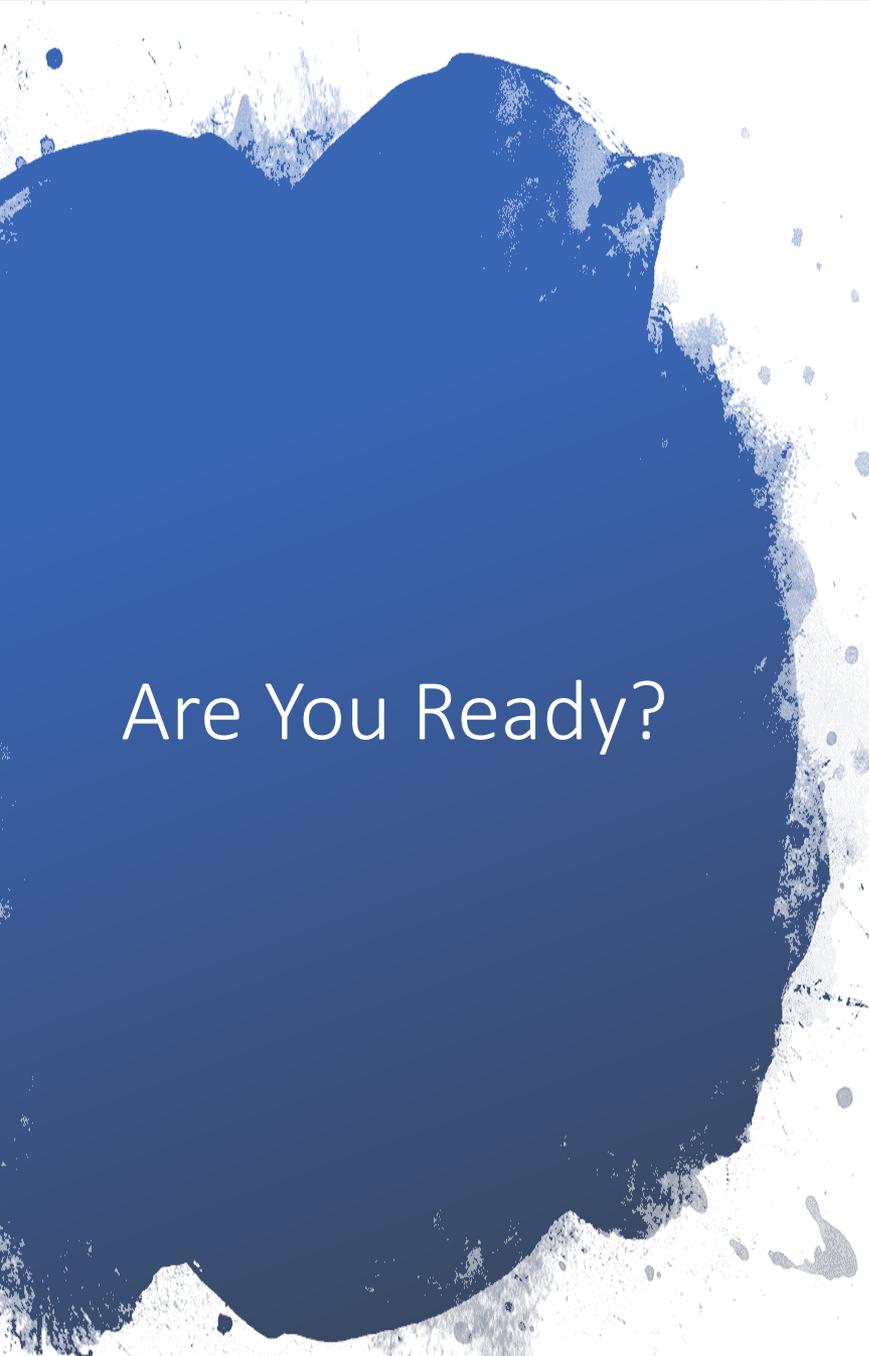
Salinas Food Processing Fire (2022)











Are You Ready?

- Do you have a Plan?
- Have you done...
 - Pre-planning and coordination
 - Identified personnel roles
 - Established lines of authority
 - Training and communication
 - Training on emergency recognition and prevention
 - Identified safe distances and refuge



Aqua Ammonia (NH_4OH)

Everything Aqua



HEALTH	3
FLAMMABILITY	1
REACTIVITY	0
PROTECTIVE EQUIPMENT	H

HMIS Classification



NFPA Classification

- What is it?
 - NH₄ OH
 - 3 Parts Water 1 Part Ammonia
 - Easy to Handle
 - 7 Lbs. Per Gallon
 - PH is 12 – Higher than Ammonia
 - Spill is worse than Ammonia
 - Sharp Irritating Odor
 - Vapors will linger

Everything Aqua

- Exposure
 - Tolerate 25 PPM – Smell
 - 25 PPM OSHA PEL
 - Skin Burns at 400 PPM
 - High Heat Decomposes = Nitrogen & Hydrogen
 - Nitrogen – Asphyxiation Danger
 - Hydrogen is Flammable
- Follow Procedures - Don't Take Short Cuts



1. IDENTIFICATION

Product name	Ammonium Hydroxide Solution 24.5%
Common name	Ammonium Hydroxide NH4OH
Chemical type	Strong base
Recommended restrictions	Use in accordance with supplier's recommendations
Company Name	CALAMCO 1776 W. March Lane Suite 420 Stockton, California 95207 Corporate Office (209) 982-1000 24 Hour / Emergency Contact (209) 466-9957
Emergency	Call CHEMTREC day or night 1-800-424-9300

2. HAZARD(S) IDENTIFICATION

GHS Classification:
Acute Toxicity Oral: 4
Acute Toxicity inhalation: 3
Skin Corrosion: 1
Eye Effects: 1

Pictogram(s):



Signal Word: DANGER

Hazard Statement: Harmful if swallowed. Causes severe skin burns and eye damage. Harmful if inhaled

Precautionary Statement(s): Do not breathe gas/mist/vapors/spray. Do not get in eyes, skin, or on clothing. Wash thoroughly after handling. Do not eat, drink, or smoke when using this product. Wear protective gloves, clothing, eye, and face protection. If swallowed or if inhaled call a poison center or doctor if you feel unwell. Rinse mouth. Remove person to fresh air and keep comfortable for breathing. If on skin rinse skin with water/shower. Take off immediately all contaminated clothing. Wash contaminated clothing before reuse. See first aid instructions and specific treatment on this label. If in eyes rinse cautiously with water for thirty minutes. Remove contact lenses, if present and easy to do so. Get medical attention.

Other Hazard(s): Not listed



Safety Data Sheet Tips!!

- Everyone Communicating about Chemicals – the SAME Way
 - GHS stands for the Globally Harmonized System Classification and Labelling.
- Clear Guidelines for safe production, transport, handling, use and disposal
- U.S. officially adopted GHS in 2012 OSHA refers HazCom 2012.
- Most noticeable changes to safety labels, safety data sheets, and chemical classification.
- GHS refers to safety data sheets as SDS (new) MSDS (old)
 - The GHS standardizes SDSs into 16 sections with a strict ordering.
- GHS is meant to be a logical and comprehensive approach to:
 - Defining health, physical and environmental hazards of chemicals
 - Creating classification processes that use available data on chemicals and defined hazard criteria

Where is your exposure potential?





Product Handling

Atmospheric Pressure Storage

Ambient temp and pressure

Generates it own pressure

Vapors can overwhelm

Pressure build up can launch

Thin skin tanks rupture

Follow Company Procedures

USE your PPE!!!

Ponder
This...

- “What we anticipate seldom occurs; what we least expect generally happens.”

Benjamin Disraeli (1804-1881)

Prime Minister 1868, 1874-1880



“What we anticipate seldom occurs; what we least expect generally happens.”



So.....

How Can We
Prepare?

➤ Prevention

Maintenance and service

➤ Mitigation

Stop it from spreading or
increasing in intensity

➤ Preparation

What we do up front

➤ Response

➤ Recovery

V I E W E R

DISCRETION

A D V I S E D

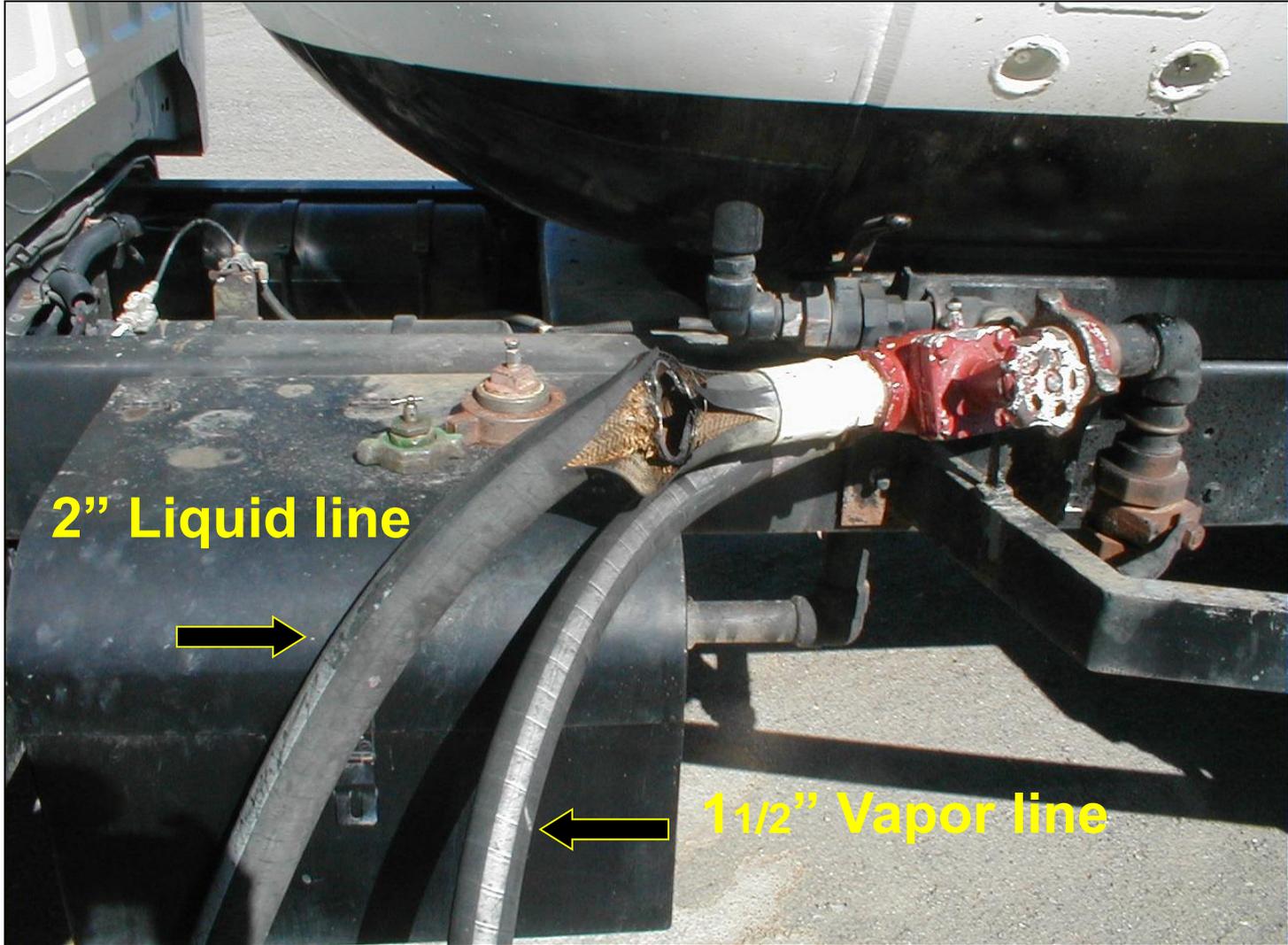
Personal Protection is Pro-Active



Personal Protective Equipment (PPE)

- **Helmet**
- **Chemical Goggles**
- **Long Sleeve Shirt**
- **Long /Pants**
- **Gloves**
- **Leather Boots**
- **Respirator**





2" Liquid line



1 1/2" Vapor line



Chemical Burns – Eyes



Only PPE can protect you from the
UNEXPECTED



Properly specified PPE can protect you from the HAZARD

SELLSTROM® Odyssey® II OTG (over-the-glass) goggles feature an ultra comfortable, soft goggle body with a snug seal.

Indirect vents on top and bottom provide protection against liquids and dust while allowing indirect ventilation.

Wide panoramic vision. An adjustable headband assures a proper fit. Fits over most prescription glasses.



Properly specified PPE can protect you from the HAZARD



Neoprene gloves are flexible, have a high tensile strength, and are resistant to a broad range of oils, acids, alcohols, fats, ketones, caustics, solvents, greases, and petrochemicals. The supported cotton liner is incorporated into the glove material to increase durability and absorb moisture and perspiration to keep hands dry.





New Trailer Fleet!!

COUNTRYSIDE
TANK COMPANY

COUNTRYSIDE
TANK COMPANY





AMMONIA ANHYDROUS
SAFETY DATA SHEET
1. IDENTIFICATION
2. HAZARD IDENTIFICATION
3. COMPOSITION AND INFORMATION ON MIXTURES
4. FIRST AID MEASURES
5. FIRE FIGHTING MEASURES
6. ACCIDENT AND LEAK RESPONSE MEASURES
7. HANDLING AND STORAGE
8. EXPOSURE CONTROLS AND PERSONAL PROTECTION
9. PHYSICAL AND CHEMICAL PROPERTIES
10. STABILITY AND REACTIVITY
11. TOXICOLOGICAL INFORMATION
12. ECOLOGICAL INFORMATION
13. DISPOSAL INFORMATION
14. TRANSPORT INFORMATION
15. REGULATORY INFORMATION
16. OTHER INFORMATION

**EMERGENCY SHUT-DOWN
PROCEDURES FOR ANHYDROUS
AMMONIA TRANSPORTATION TRAILERS**

EMERGENCY PROCEDURES FOR SHUT-DOWN

1. Evacuate Cabin
2. Locate & Engage Pull Emergency Shut-Off Switches
Right Hand Shut-Off - Labeled "Emergency Shut-Off"
Driver Side Front Shut-Off - Labeled "Emergency Shut-Off"
3. Turn off Truck Ignition

**EMERGENCY
SHUT OFF**



California Permit Trailer
4DH9828

VAPOR

LIQUID

SPRAY

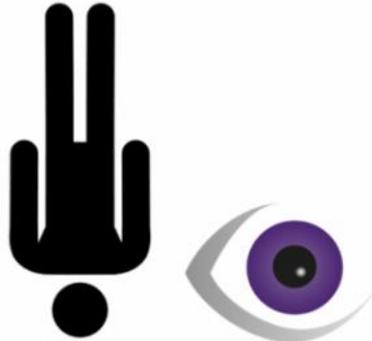
VAPOR

LIQUID





Injection



Absorption



Ingestion



Inhalation

Chemical Properties

SYMPTOMS:

- Irritation eyes, nose, throat; dyspnea (breathing difficulty), wheezing, chest pain; pulmonary edema; pink frothy sputum; skin burns, vesiculation; liquid: frostbite

TARGET ORGANS:

- Eyes, skin, respiratory system

Everything Aqua



HEALTH	3
FLAMMABILITY	1
REACTIVITY	0
PROTECTIVE EQUIPMENT	H

HMIS Classification



NFPA Classification

- What is it?
 - NH₄ OH
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Aqua Ammonia Burn

Chemical Degradation of PPE





Proximity of Emergency Showers





Alternate and Supportive Systems

Our Workplaces

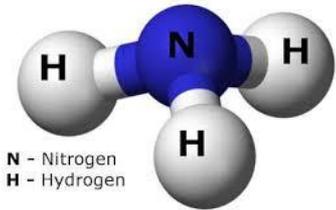
“We don’t work in a dangerous environment.

We work in a hazardous environment that we make dangerous by not following safe work procedures and not wearing our personal protective equipment.”

Brad Miles

NH3 First Responder Awareness

Title 8 Section 5192



- Understand the _____ & _____ of ammonia and their impacts (risks)
- Understand the _____ associated with an ammonia emergency
- Recognize ammonia in the work place and learn how to _____ a release
- Understand the _____ and the need for timely notification and engagement of resources



What Wrong Here?

- 5 Year Service Life
- Or
- Satisfactory Pop Test

- Rain Dust Cap

- 265 PSI Rated



Ammonia Hoses

- For “Ammonia Use”
- End of Service Date
- Manufacture Document Succeeds
- Annual Hydro Test Required (“Freckles”)



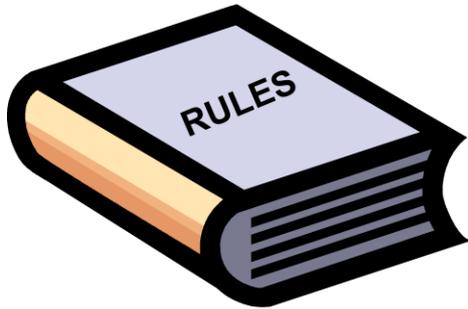
Special Security Notice

Originated @
CALAMCO



WPH recommends that facilities do not engage with this individual should they encounter him. Please close your facility gates and alert your local authorities if needed.

Your Safety Mandate Where does it come from?





Your SAFETY Mandate is issued by:

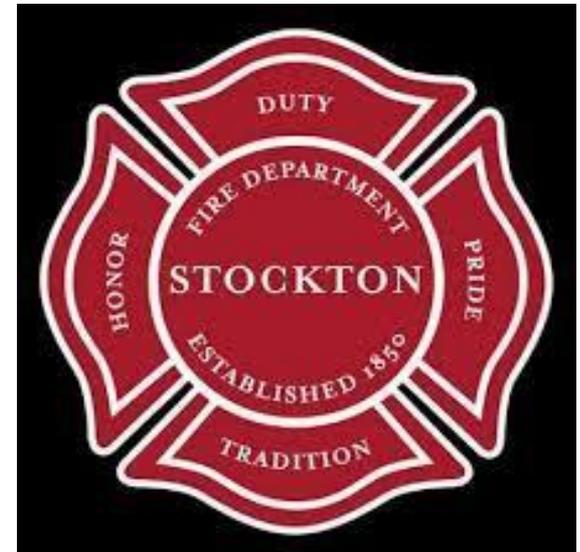
The People who care about YOU!!!

2022 Training Session Content

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Sincere Thank You!!



Transportation
Security
Administration

Notifications and Resources:

- National Response Center:
Reportable quantity (RQ) 100 lbs./18 gal released within a 24-hour period
(800-424-8802)
- CALAMCO – www.calamco.com
- Ammonia Safety Training Institute
(ASTI) www.ammonia-safety.com
- Must also notify state and local
environmental regulators – often have
more restrictive levels



Matt Duaine

EHS Manager

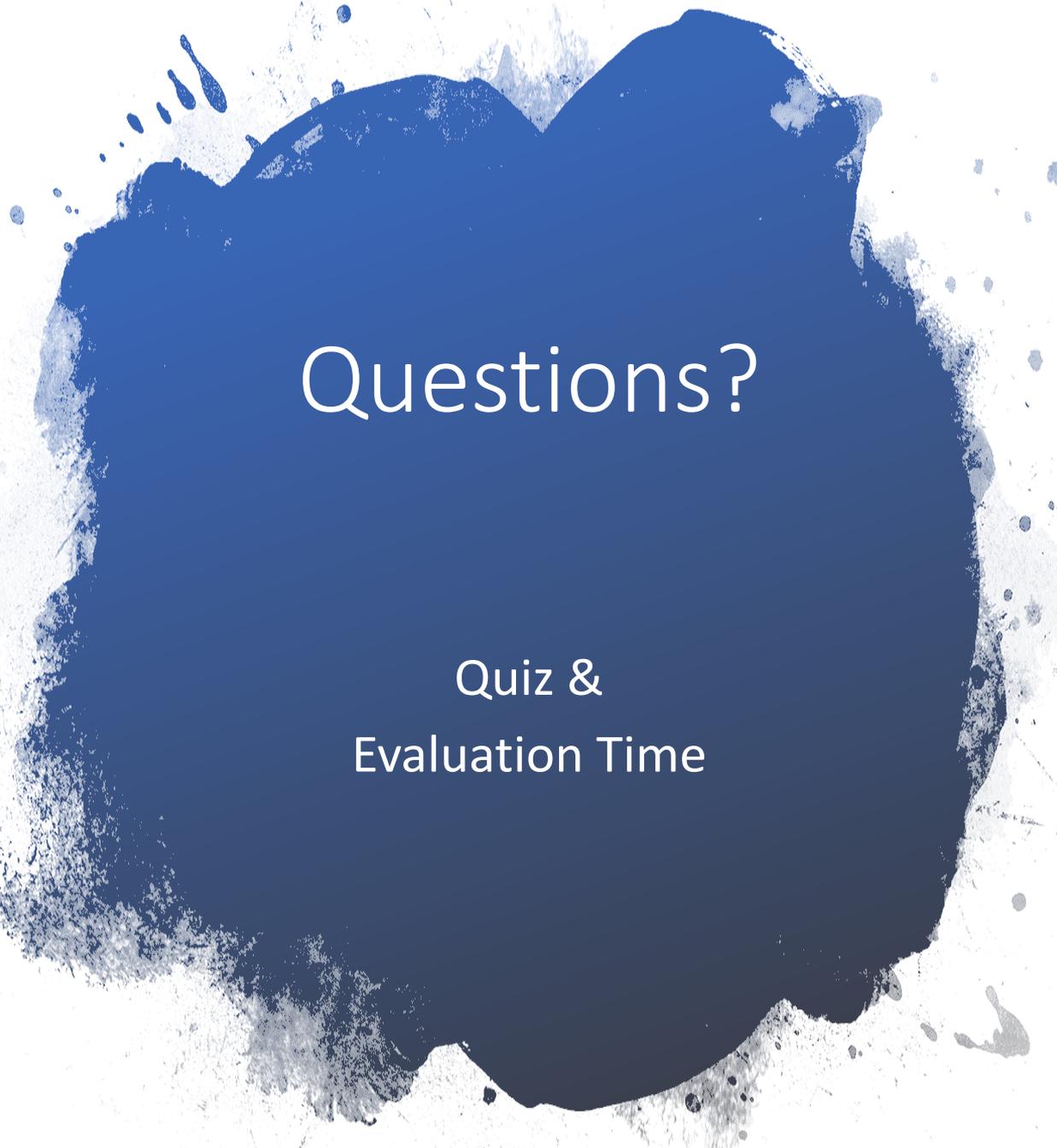
209.986.0751

Matt.Duaine@calamco.com



- CALAMCO Staff
 - Francine
 - Lanie

- Dan Stone – CEO / President
- Martin Jeppeson – Director
- Dale Thigpin – Director
- Allen Cupples – Terminal Manager



Questions?

Quiz &
Evaluation Time

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