COMPLIANCE CONNECTION

July / August 2018 Vol 2 Issue 4

A bimonthly newsletter designed to help you navigate the ins and outs of compliance and the safe practice of industrial refrigeration.

Following an Ammonia Release ....

What was the cause and could it have been avoided?

By Mark Bennett

Within the last 10-15 years, there have been a number of ammonia releases that harmed human life, caused environmental damage and affected the adjacent community. The main causes have proven to be: human error, engineering/instrumentation failure and management system failures.

Performing a **root cause analysis** is important in determining how these accidents could have been prevented. Learning and understanding why these accidents occur can help us prevent them from happening in the future. Becoming RETA certified, following safe work practices and verifying SOPs will reflect the accurate operation of the system and go a long way towards preventing future releases.

Following and implementing these recommendations demonstrates that your company has a management philosophy devoted to protecting our most precious assets; our associates.

Corrosion Of Electrical Components Post Release

By Chris Harmon, RAI

One of the lessons we've learned over the years is how ammonia affects electric components (think copper in particular).

In 1995 there was a large liquid ammonia release inside the machinery room at a production facility in Texas which resulted in an explosion and fire. The machinery room was rebuilt with all of the affected/damaged components replaced. However, since not all of the components (motors, disconnects, etc) showed damage from the fire, some items were not replaced. The engineers and operators at the facility subsequently confirmed that all of the components that had not been replaced, failed over the next two years.

Fast forward fifteen years ... where there was a major release at a facility in their blast freezer. After clean up and incident investigation, the blast freezer was about to be started back up (approximately 2½ weeks after the release). We were called in to review the system. Concerned about the potential of damage to the copper components, we suggested all wiring be checked prior to putting the equipment back into operation. We randomly pulled one electrical wire and peeled back the insulation. The copper wire was corroded almost 14 inches. *(Once corrosion starts, it continues.)* Imagine what all the other components looked like. Based on this finding, everything that contained copper was removed (lights, motors, switches, wires, contactors, sensors, etc) and replaced. A massive undertaking yes .... but necessary to maintain the integrity of the system.

Bottom line: ammonia and copper are incompatible. So when there is a release of ammonia, all the copper containing components may be affected. *We don't usually consider the impact to electrical components is there is no apparent damage.* We, at Industrial Consultants, recommend you develop a procedure to check your copper containing components prior to restart if you've had an ammonia release.

Mark Your Calendar!

AUGUST 2018

ORLANDO, FL
Aug. 26-27
Refrigeration Review Course

SEPTEMBER 2018

CLIVE, IA
Sept. 18
8-Hour ERT Refresher
Sept. 19-21
24-Hour Emergency Response

PLYMOUTH, MN
Sept. 25-27
24-Hour Emergency Response
Sept. 27
8-Hour ERT Refresher
Sept. 28
8-Hour Incident Commander
Sept. 28
8-Hour ERT Refresher

OCTOBER 2018

YUMA, AZ
Oct. 2
8-Hour ERT Refresher
Oct. 3-5
24-Hour Emergency Response

MECHANICSBURG, PA
Oct. 1-3
24-Hour Emergency Response
Oct. 4 8-Hour ERT Refresher
Oct. 5 8-Hour ERT Refresher

For more information about available training and classes, visit www.ammonia.com

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Industrial Consultants

Your Compliance Connection™

2018 REFRIGERATION REVIEW COURSE

August 26-27, 2018
Orlando, FL

Instructor
Chris Harmon, RAI
Industrial Consultants

This special two-day course is held in conjunction with the Central Florida RETA Chapter Hosted Regional Conference:

Central Florida
Ammonia Refrigeration Regional Conference
August 26-27, 2018
Embassy Suites by Hilton Orlando Lake Buena Vista S.
Kissimmee, FL
Room Reservations: $119/night *(plus applicable tax)*

This course is designed as a review course addressing materials that may be included in the RETA certification exam(s). This course is ***not*** intended to walk the attendee through the exam(s).

See Next Page For Full Course Outline

Who Should Attend
Industrial refrigeration operators • technicians • consultants
end-users • plant managers • plant or process engineers

Registration Investment $395
Successful completion of the class provides attendees with 16 professional development hours (PDH)

Investment includes lecture materials (review textbook) and daily lunch. It is recommended for students to have reviewed and bring the following textbooks: *RETA Industrial Refrigeration One and Two (IR1 and IR2)* and *Basic Electricity 2 (BE2) - available at* ***http://www.reta.com****.*

Special for attendees — All review course attendees will be enrolled in the 2018 Central Florida Regional Conference. The Regional Conference enrollment provides for (but may not be limited to) receipt of Regional Conference attendees materials as well as participation in Exhibit Hall hours.

Enrollment is limited to 30 students.

REGISTER ONLINE TODAY!

Orlando, FL
August 26-27
Click Here

Contact Information
For questions regarding the Refrigeration Review Course, please contact:

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PO Box 833 • Owasso OK 74055
www.ammonia.com
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RETA CIRO or CARO Certification Exam
Course attendees may elect to sit for a RETA certification exam (CIRO or CARO) following the course. Test candidates must preregister *(submitting all paperwork and payment)* for the certification exam at least 2 weeks in advance of testing date. ***For details on how to register and arrange for your RETA certification exam, go to the RETA website at http://www.reta.com.*** If you have questions regarding the Certification Exam, please contact Dan Reisinger at RETA HQ (email dan@reta.com) or 541-497-2955.

Refrigeration Review Course Outline

Refrigeration Fundamentals Review

Basic Refrigeration Terms and Principles
- Units of measurement: area, volume, specific volume, rate (CFM, GPM), temperature, pressure (psia, psig) pressure/temperature chart
- Heat: conduction, convection, radiation, BTU, sensible heat, latent heat, specific heat, latent heat of vaporization/conduction, specific heat, subcooling, superheating, saturation, water heat curve
- Ton of refrigeration, heat calculations

Heat Flow in Refrigeration Systems
- Factors that affect conduction of heat: area, temperature difference, thermal conductivity, distance the heat passes through
- Conditions which increase/decrease effect of evaporator performance
- Pressure-enthalpy or Mollier Diagram

The Basic Refrigeration Cycle – Heat Flow
- The flow of heat through the four main components
- Basic P&ID for a system
- Heat of compression, compression ratio, pressure drop, noncondensable gases

Properties of Refrigerants
- Refrigerant selection factors
- Refrigerant operating characteristics: evaporator pressure, condensing pressure, theoretical discharge temperature, refrigerating effect (BTU/lb), Mass flow (lb/min/ton)
- Advantages/disadvantages of refrigerants
- Saturated refrigerant table: explanation of each column

Compressors
- Types of compressors:
  - Positive displacement, dynamic displacement
  - Open drive, hermetic
  - Reciprocating, rotary
- Reciprocating compressor: horizontal, VSA, V-W
- Rotary vane compressor
- Rotary screw compressor: compression cycle, oil
- Loading of a compressor
- Two stage compression and booster compressors
- Operation and maintenance: oil, oil heaters, slugging, log sheets

Lubrication
- Function in a refrigeration system, quality
- Types: splash, force-feed
- Oil and an ammonia system: draining oil and its dangers
- Oil pots, oil stills, oil scrubber
- Oil cooling

Evaporators/Cooling Units
- Function
- Fluid cooling, air cooling, forced convection, blast freezing, plate freezing
- Secondary coolant

Condensers
- Function and general types
- Shell and tube condenser
  - Causes of elevated head pressure
  - Cleaning, leaking, re-tubing
- Evaporative condenser
  - Basic design components and flow of refrigerant
  - Effect of humidity
  - Scale, corrosion
  - Head pressure control, fans, motors, dampers

Receivers
- Function
- Typical receiver connections and their functions
- King valve
- Overpressure protection

Purging
- Function
- Sources of noncondensables
- Types: manual, on-line, automatic
- Hansen purger

Refrigeration System Operations

Low Side Feed Valves and Controls (Evaporator Feed)
- Hand expansion valve (HEV)
- Thermostatic valve (TXV):
  - forces that drive the valve
  - nine basic points of operation
  - equalization
- Solenoid valve
- Float switch/level sensor
- Float valve

Direct Expansion System (DX)
- Basic design
- Slop-over/slugs
- Top feed/bottom feed
- Suction line accumulator

Flooded Systems
- Basic design
- Oil accumulation
- Resistance to heat transfer: product side/refrigerant side
- Causes of over-fill
- Consequences of slop-over (slugs)

Pumped Liquid Recirculation Systems (Liquid Overfeed)
- Basic design and recirculation ratio
- Pumps: mechanical and gas operated
- Basic rules for operation of centrifugal pumps
- Gas pumper systems: single, double, constant pressure
- Pump sizing, line sizing
- Refrigerant charge
- Start-up and basic operation, oil removal
- Advantages/disadvantages

Secondary Coolant Circulation System
- Direct vs. indirect
- Common secondary coolants
- 2 pipe/3 pipe system
- Defrost of secondary coils
- Pump types for secondary refrigerant
- Heat exchangers:
  - Open tank
  - Shell and tube
  - Plate and frame and its advantages

Two Stage System
- Basic design of operation
- Horsepower savings
- Compression cycle: booster compressor/high stage compressor
- Intercooler function: shell & coil, flash type
- Noncondensables
- Cascade System

Coil Defrost
- Moisture content, pump down, fan delay, pressure equalization
- Air defrost
- Electric defrost
- Water defrost
- Continuous defrost
- Hot gas defrost operation and guidelines
- Causes for excess of ice buildup

Measuring System Performance
- Measurements: horsepower, BTU, HP/ton, Kilowatt, Kw/ton, Kw demand
- Calculation: compression ratio, cost and efficiency

Electricity
- Fundamentals: Ladder Diagram
  - Rungs of the ladder
  - Symbols
  - Switches
  - Circuits

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VALVE WORKSHOP
Oct. 23-25, 2018
Naperville, IL

Industrial Consultants
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TRAINING SCHEDULE
AUGUST 2018 - APRIL 2019
CLICK HERE TO REGISTER
www.ammonia.com

Bring your Questions!
Tools will be provided.

The purpose of this *Hands-on Workshop* is to develop an understanding of the function, troubleshooting, maintenance and repair of all type of valves used in our industry. This three (3) day workshop will include the most common valves manufacturers:

HANSEN • PARKER/RS • DANFOSS

INSTRUCTOR
Chris Harmon, RAI

TOPICS COVERED:

- Overview of each valve and valve type
- Function
- Maintenance
- Troubleshooting
- Repair
- Problems
- Tips
- Hands on – actual valve repair
- Electronic controllers
  - Operation
  - Adjustments
  - Troubleshooting
  - Issues
- Latest development in valves

REGISTER TODAY!

WHO SHOULD ATTEND
End users • industrial refrigeration operators and technicians • plant managers • plant or process engineers

REGISTRATION INVESTMENT – $715
Successful completion of the class provides attendees with 24 professional development hours (PDH)

Investment includes materials and continental breakfast.

Due to hands-on portion of this workshop, the class size will be limited.

CONTACT & REGISTRATION INFORMATION

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AUGUST 2018

ORLANDO, FL
Held in conjunction with Central Florida Regional Conference
Aug. 26-27 — 16 Hr CARO/CIRO Refrigeration Review

SEPTEMBER 2018

CLIVE, IA
Sponsored by Industrial Refrigeration Services
Sept. 18 — 8 Hr ERT Refresher
Sept. 19-21 — 24 Hr Emergency Response

PLYMOUTH, MN
Sponsored by Gartner Refrigeration
*Sept. 25-27 — 24 Hr Emergency Response
*Sept. 27 — 8 Hr ERT Refresher
*Sept. 28 — 8 Hr Incident Commander
*Sept. 28 — 8 Hr ERT Refresher

OCTOBER 2018

YUMA, AZ
Oct. 2 — 8 Hr ERT Refresher
Oct. 3-5 — 24 Hr Emergency Response

MECHANICSBURG, PA
Sponsored by Colonial Industrial Refrigeration
Oct. 1-3 — 24 Hr Emergency Response
Oct. 4 — 8 Hr ERT Refresher
Oct. 5 — 8 Hr ERT Refresher

NAPERVILLE, IL
Sponsored by Dual Temp Companies
Oct. 23-25 — 24 Hr Valve Workshop
Oct. 23-25 — 24 Hr Emergency Response
Oct. 23-26 — 32 Hr Level I Refrigeration Operator
Oct. 25 — 8 Hr ERT Refresher
Oct. 26 — 8 Hr Incident Commander
Oct. 26 — 8 Hr ERT Refresher

NOVEMBER 2018

MIDDLE RIVER, MD
Sponsored by Industrial Refrigeration Services
Nov. 6-8 — 24 Hr Emergency Response
Nov. 7 — 8 Hr ERT Refresher
Nov. 8 — 8 Hr ERT Refresher

COLUMBUS, OH
Sponsored by Sutton & Associates
*Nov. 12-14 — 24 Hr Emergency Response
*Nov. 15 — 8 Hr ERT Refresher
*Nov. 16 — 8 Hr ERT Refresher

DECEMBER 2018

SANTA MARIA, CA
Sponsored by Bonita Packing
*Dec. 3-5 — 24 Hr Emergency Response
*Dec. 6 — 8 Hr ERT Refresher
*Dec. 7 — 8 Hr ERT Refresher

HARRINGTON, DE
Sponsored by Delmarva RETA Chapter
Dec. 11 — 8 Hr ERT Refresher

JANUARY 2019

NAPERVILLE, IL
Sponsored by Dual Temp Companies
Jan. 22-24 — 24 Hr Emergency Response
Jan. 22-25 — 32 Hr Level I Refrigeration Operator
Jan. 24 — 8 Hr ERT Refresher
Jan. 25 — 8 Hr Incident Commander Training
Jan. 25 — 8 Hr ERT Refresher

FEBRUARY 2019

FT. WAYNE, IN
Sponsored by Shambaugh & Son
Feb. 4-6 — 24 Hr Emergency Response
Feb. 7 — 8 Hr ERT Refresher
Feb. 8 — 8 Hr ERT Refresher

PLYMOUTH, MN
Sponsored by Gartner Refrigeration
*Feb. 12-14 — 24 Hr Emergency Response
*Feb. 14 — 8 Hr ERT Refresher
*Feb. 15 — 8 Hr ERT Refresher

MARCH 2019

KULPSVILLE, PA
Sponsored by Hatfield Quality Meats
Mar. 26-28 — 24 Hr Emergency Response
Mar. 27 — 8 Hr ERT Refresher
Mar. 28 — 8 Hr ERT Refresher

APRIL 2019

HARRINGTON, DE
Sponsored by Delmarva RETA Chapter
Apr. 8-10 — 24 Hr Emergency Response
Apr. 9 — 8 Hr ERT Refresher
Apr. 10 — 8 Hr ERT Refresher
Apr. 11 — 8 Hr Incident Commander

NAPERVILLE, IL
Sponsored by Dual Temp Companies
Apr. 22-26 — 40 Hr Level II Refrigeration Operator
Apr. 23-26 — 32 Hr SOP/MOP Workshop
Apr. 23-25 — 24 Hr Emergency Response
Apr. 25 — 8 Hr ERT Refresher
Apr. 26 — 8 Hr Incident Commander
Apr. 26 — 8 Hr ERT Refresher

**Special pricing applies to these classes*

FOR MORE INFORMATION OR TO REGISTER FOR ANY OF THE CLASSES LISTED ABOVE PLEASE CONTACT US:

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Schedule may be subject to change.