Process Hazard Analysis (Emphasizing Ammonia Refrigeration Systems)
September 23–25, 2015
Madison, Wisconsin

- Gain an overview of PHA methodologies identified by OSHA in the PSM standard
- Focus on the most commonly applied PHA methodology for ammonia refrigeration systems
- Get hands-on experience applying PHA methodologies
- Review requirements for conducting and revalidating PHAs
Focus on Best Practices

This results-oriented course is your opportunity to learn how you can achieve a high-quality process hazard analysis for your ammonia refrigeration systems. Our focus on best practices is especially relevant to industrial refrigeration systems that utilize anhydrous ammonia as a refrigerant. Each facility with quantities of ammonia in excess of 10,000 pounds must comply with OSHA’s Process Safety Management (PSM) Standard (29 CFR 1910.119) and EPA’s Risk Management Plan (RMP: 40 CFR 68).

Both PSM and RMP require end-users to conduct process hazard analyses on processes covered by these standards.

At this course, you will learn:

- Why process hazard analysis (PHA) is one of the most important aspects of achieving successful and safe designs that lead to cost-effective ammonia refrigeration system operations
- How a sound PHA process allows you to identify weaknesses in both the design and operation that, potentially, could lead to accidental releases in your ammonia refrigeration systems
- How to eliminate or mitigate hazards to reduce the impact to personnel and property

Who Will Benefit

- PSM coordinators
- Refrigeration design engineers
- Refrigeration operators who will participate in PHA sessions
- Others responsible for developing and implementing process safety management programs

Your Instructors

Frederick T. Elder, PhD, PE
Adjunct Professor
University of Wisconsin–Madison
President, Frederick T. Elder and Associates

Douglas T. Reindl, PhD, PE
Professor, Department of Engineering Professional Development
Director, Industrial Refrigeration Consortium (IRC)
University of Wisconsin–Madison

Learn How to Conduct High-Performance PHAs

Achieving high-quality process hazard analyses depends on a team that can systematically identify and evaluate the significance of potential hazards in and around ammonia refrigeration systems. This course will help you understand the factors that will improve your ability to conduct high-performance PHAs. You will:

- Receive an overview of the PHA methodologies identified by OSHA in the PSM standard
- Focus on the most commonly applied PHA methodology for ammonia refrigeration systems
- Gain hands-on experience applying the PHA methodologies presented
- Review the requirements for conducting and revalidating PHAs

Take Home Techniques You Can Apply at Once

During the presentations and workshop sessions, we will emphasize techniques that you can apply immediately to improve your ability to identify, evaluate, and control hazards. We will also discuss common pitfalls in the PHA process.

At the conclusion of this course, you will be positioned to effectively lead or participate in PHA teams. If you are already familiar with conducting PHAs, this course is your opportunity to take your PHAs to the next level.

Site Visit Included

The workshop includes a planned field trip to a local facility with an ammonia refrigeration system. You will have a hands-on opportunity to identify hazards and consider human factors and facility siting as part of the PHA process.

PSM Best Practices Series

Process Hazard Analysis is one of three UW–Madison in-depth process safety management courses offered to help you ensure safe operation and compliant industrial refrigeration systems.

Other PSM Best Practices courses include:

- Principles and Practices of Mechanical Integrity for Industrial Refrigeration Systems
- Process Safety Management Audits for Compliance and Continuous Safety Improvement
- Integrity for Industrial Refrigeration Systems


Industrial Refrigeration Consortium (IRC)

The IRC, a collaborative effort between the University of Wisconsin–Madison and industry, offers its members practical refrigeration information and application-oriented research, a telephone hotline, Internet-based information resources, on-site technical assistance, and specialized publications. To learn more, check the IRC website at irc.wisc.edu, email IRC director Douglas Reindl, dreindl@wisc.edu, or phone toll free 866-635-4721.

Past Participants Say…

“Your courses are well thought out and planned to provide everything I expected. All speakers were very helpful and professional. Thank you.”

“I came in clueless and I feel comfortable with the knowledge gained.”

“Good class. I learned all I expected to.”

“Great enlightening experience on PHAs, HAZOP, etc. Very informative material and an excellent, resourceful staff. Thanks.”

“Excellent program!”
Course Outline

Day 1

Welcome
Douglas T. Reindl, PhD, PE
Professor, Department of Engineering
Professional Development
Director, Industrial Refrigeration Consortium (IRC)
University of Wisconsin–Madison

Introduction to Process Hazard Analysis
- Definitions
- Nature of hazards
- Why conduct hazard evaluations/analyses?
- When should I conduct hazard evaluations?
- How PHAs during design phase differ from PHAs during operation
- Review of 1910.119(e)
- OSHA interpretations on PHAs

Doug Reindl

Preparing for a PHA
- Staffing
- Defining PHA objectives and scope
- Information requirements
- Timeline
- Strategies for achieving more effective engagement for all PHA participants

Frederick T. Elder, PhD, PE
Adjunct Professor
University of Wisconsin–Madison
President
Frederick T. Elder and Associates

Critical Factors to Include in PHAs
- Humans
  - types of human error
  - errors people make
  - human factors considerations
  - operational staffing
- Facility siting
- Engineering and administrative controls (safeguards)—assessing and documenting
- Accounting for all operating scenarios

Doug Reindl

Workshop (Human Factors-Related)

P&IDs—Their Role in the PHA Process
- Purpose of a P&ID
- Elements of a good P&ID
- Role of P&IDs in the PHA process

Fred Elder

Management of Change
- “Change” vs. “replacement in-kind”
- What should trigger a PHA?
- Establishing scope
- Conducting the PHA for an MOC
- Importance of PHA recommendation closeout
- OSHA interpretations on MOCs that lead to PHAs

Doug Reindl

Day 2

Overview of PHA Methodologies
- What-if
- Checklist
- What-if/Checklist
- Hazard and Operability Study/Analysis (HAZOP)
- Failure Mode and Effects Analysis (FMEA)
- Fault tree analysis
- Advantages, disadvantages, and limitations
- Matching the PHA methodology to the complexity of the process

Doug Reindl

Conducting a PHA Using the What-if/Checklist Methodology
- Study organization: Identifying PHA objectives, scope, and subsystems
- Gathering required information as input to the process
- Developing and modifying the What-if/Checklist
  - typical What-if categories
  - developing and utilizing Checklists
  - techniques for using HAZOP principles to expand what-if questions
- Characterizing risk
- Documenting the PHA process and findings
- Pitfalls
- Preview of What-if/Checklist workshop
- Software to facilitate conducting

PHAs (demonstration)

Doug Reindl

What-if/Checklist Workshop
Given appropriate preliminary documentation (P&IDs, photos, etc.), participants will work in groups to define PHA objectives and subsystem, review given information, modify their What-if/Checklist, and complete a first-cut at their checklist. Representatives from each group will present their PHA objective(s) and What-if/Checklist modifications.

Site Visit—Engine Room Walk-thru

Day 3

What-if/Checklist Workshop
Each group conducts a mock PHA using their What-if/Checklist.

What-if/Checklist Workshop Closeout
Roundtable discussion of site visit and PHA using the What-if/Checklist methodology

PHA Revalidation
- Redo, update, revise, and revalidate—what’s the difference?
- Revalidation requirements

Doug Reindl

Day 2

Action Required Following a PHA
- Planning for revalidation
  - reviewing MOCs since last revalidation
  - verifying PSI is current, complete, and accurate
  - reviewing past incident investigation
  - reviewing completion/closeout of past PHA recommendations
- Conducting the revalidation
- Documenting revalidation

Doug Reindl

PHA Process Quality Improvement
- Post-mortem evaluation of a PHA session
- Strategies to achieve PHA process improvement

Doug Reindl

Course Schedule
Registration and course will be held at:
The Pyle Center
702 Langdon Street
Madison, WI

Day 1
8:00 a.m. to 8:30 a.m. Registration/Continental Breakfast
8:30 a.m. to 5:00 p.m. Class

Day 2
8:00 a.m. to 8:15 a.m. Coffee and Conversation
8:15 a.m. to 2:00 p.m. Class
2:00 p.m. to 5:00 p.m. Local Ammonia Refrigeration System Site Visit

Day 3
8:00 a.m. to 8:15 a.m. Coffee and Conversation
8:15 a.m. to 2:00 p.m. Class
Midmorning and midafternoon refreshments and noon lunch will be provided all three days.
Four Easy Ways to Enroll

Internet:
epd.engr.wisc.edu/webP518

Phone: 800-462-0876 or 608-262-1299 (TDD 265-2370)

Mail to:
The Pyle Center
Attn: Engineering Registration
702 Langdon Street
Madison, Wisconsin 53706

Fax: 800-442-4214 or 608-265-3448

Course Information

Please enroll me in Process Hazard Analysis (Emphasizing Ammonia Refrigeration Systems)
☐ Course #P518 September 23–25, 2015 in Madison, Wisconsin Fee: $1395
☐ Course #P518 September 23–25, 2015 in Madison, Wisconsin Industrial Refrigeration Consortium Member Fee: $1195
☐ I cannot attend at this time. Please send me brochures on future courses.

Personal Information (Please print clearly.)

Name __________________________
Title __________________________
Company __________________________
Address __________________________
City/State/Zip __________________________
Phone ( _______ ) Fax ( _______ )
E-mail __________________________

Additional Enrollees

Name __________________________
Title __________________________
E-mail __________________________

Billing Information

☐ Bill my company ☐ P.O. or check enclosed (Payable in U.S. funds to UW–Madison)

Cardholder's Name __________________________ Expire __________________________

Phone: 800-462-0876 or 608-262-1299 (TDD 265-2370)

Fax: 800-442-4214 or 608-265-3448

Related Courses from UW–Madison

Look for the following courses in the University of Wisconsin’s ammonia refrigeration series, including:
Design of Ammonia Refrigeration Systems for Peak Performance and Efficiency September 14–18, 2015, Course #P517
Introduction to Ammonia Refrigeration Systems October 14–16, 2015, Course #P519
March 2–4, 2016, Course #P950
Principles and Practices of Mechanical Integrity for Industrial Refrigeration Systems November 4–6, 2015, Course #P520
Intermediate Ammonia Refrigeration Systems December 2–4, 2015, Course #P521
Process Safety Management Audits for Compliance and Continuous Safety Improvement January 13–15, 2016, Course #P949
Ammonia Refrigeration System Safety April 13–15, 2016, Course #P521
To receive a brochure for any of these courses, please call 800-462-0876 or send an email message to custserv@epd.engr.wisc.edu. You can also check out these courses on our website: epd.engr.wisc.edu/ammoniarefrigeration

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Need to Know More?

Call toll free 800-462-0876 and ask for
Program Director: Douglas T. Reindl dreindl@wisc.edu
Program Associate: Mary Danielson or email custserv@epd.engr.wisc.edu

General Information

Fee Covers Notebook, course materials, break refreshments, lunches, and certificate.
Cancellation If you cannot attend please notify us at least seven days prior to the course start, and we will refund your fee. Cancellations received after this date and no-shows are subject to a $150 administrative fee per course. You may enroll a substitute at any time before the course starts.
Location This course will be held at The Pyle Center, 702 Langdon Street, Madison, WI. Phone messages: 608-262-1122.
Accommodations We have reserved a block of guest rooms (rates starting at $59, including continental breakfast) at Lowell Center, 610 Langdon Street, Madison, WI. Reserve a room online at epd.engr.wisc.edu/lodgingP518 or call 866-301-1753 or 608-256-2621 and indicate that you will be attending this course under group code P518EPD. Room requests after August 22 will be subject to availability. Other fees and restrictions may apply.
We have reserved a second block of guest rooms (rates starting at $99, including private airport taxi and parking) at Graduate Madison, 601 Langdon Street, Madison, WI. Reserve a room online at epd.engr.wisc.edu/lodgingP518 or call 800-589-6285 or 608-257-4391 and indicate that you will be attending this course under group code 150214. Room requests after September 1 will be subject to availability. Other fees and restrictions may apply.
Earn Continuing Education Credits By participating in this course, you will earn 20 Professional Development Hours (PDH) or 2.0 Continuing Education Units (CEU).