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# president's

BY DAVE RULE

# MESSAGE

Looking at the rich and exciting program for our association's 2020 annual conference in Orlando, I see an extraordinary palette of achievements by IIAR members over the past several years. While this will be my last conference as IIAR president, I am proud of our members' accomplishments, which form a strong foundation for further growth and continuing efforts that will broaden the applications of natural refrigerants both in the familiar industrial setting and in the expanding retail/commercial sector.

Looking back at IIAR's many accomplishments during my tenure as president, three stand out to define this organization and set the course for our vision and mission for many years to come.

First is ANSI approval of the current IIAR-2 Standard in 2014. Completion of this comprehensive standard for Safe Design set in motion countless design elements to improve the safety of our industry and protect personnel operating the systems and the surrounding community. IIAR-2 defined our advocacy programs with the regulatory community, offered a comprehensive document that building, fire and electric codes could reference around the country and is now a template internationally.

IIAR's second major accomplishment was the Academy of Natural Refrigerants certificate program. Education is one of the primary goals of our mission and the ANR program enables people working in all sectors of our industry to document their proficiency, expand their knowledge and build their professional credentials.

The third most notable change is IIAR's move to include all natural refrigerants. Actions we have taken

to advocate for ammonia, CO<sub>2</sub> and hydrocarbon refrigerants are critical to the growth of our organization, the safety of our industry and protecting our environment.

Also critical to growth and safety is the hard work of our volunteer member committees, the cornerstone of this organization.

Members' volunteer commitment to the all-important work of our committees have driven the adoption of standards that are having a positive impact both domestically and, increasingly, on an international stage.

The Standards Committee has led IIAR to offer a full suite of ANSI-approved standards, having a significant impact on design and safety guidance, regulatory advocacy and building codes in the U.S. Chairman Bob Czarnecki and the many individuals who contribute their time deserve hearty thanks and congratulations.

Next, the Compliance committee has also made significant advances this year, including a new PSM/RMP Guidelines book that is now available and has updated the soon to be published Ammonia Data Book.

Education has a major focus on developing and managing the Academy of Natural Refrigerants certificate program, introducing four new certificate courses just this year. All of the courses, which may be taken online, offer an IIAR certificate and are accredited.

That's just scratching the surface. The Safety committee, among other things, has been working through the complicated questions of valve Lock-Out-Tag-Out and will soon seek bids to draft a new guideline intended to address current regulatory and safety issues. The Marketing committee has completed the 2019 State of The Industry Report

and is developing several new-member outreach programs. The Piping Handbook committee completed an extensive review and update of the Handbook with new selection criteria that enable more accurate pipe selection and includes software to assist engineers in both selection and cost analysis.

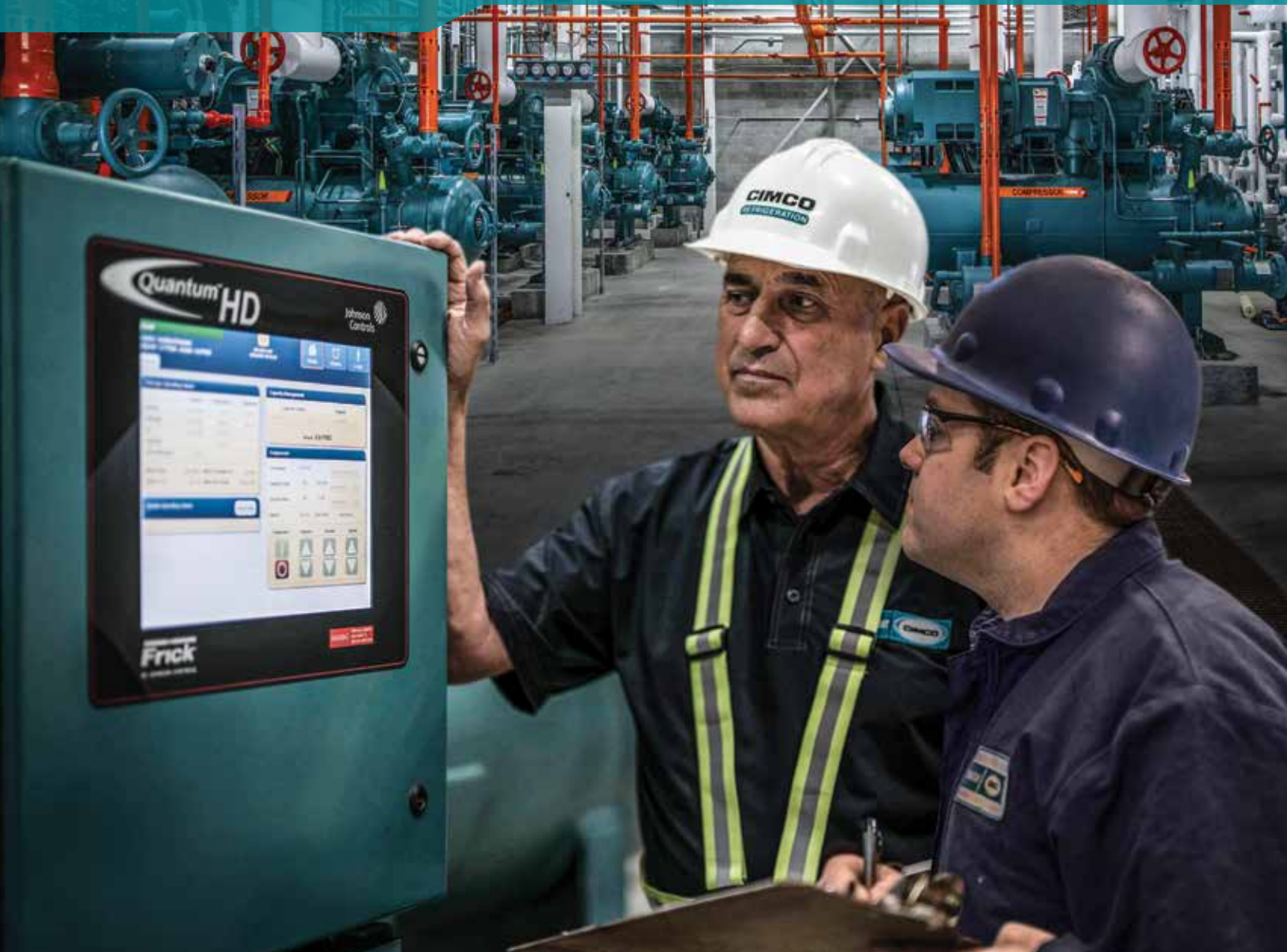
Meanwhile, Government Relations continued to provide input in our regulatory initiatives with NIOSH and OSHA, and assisting with the OSHA training program produced by the Industrial Refrigeration Consortium. Following reorganization recently, under the guidance of both the IIAR and ARF Board of Directors, the Finance committee is now structured to provide oversight for both organizations. The International committee has continued to move forward with an aggressive chapter program, and IIAR Standards now adopted or being considered for national safety standards in Chile, Costa Rica, Argentina and Columbia, while several new documents have been translated to Spanish.

Once again, I must congratulate the IIAR working committees and volunteer membership for all of these important accomplishments during my tenure as your President. It has been my honor to serve the organization and I have immensely enjoyed the opportunity.

As we kick off 2020's annual conference, I'd like to welcome you all, whether you're a longtime IIAR member or just learning about the tremendous work this association does on behalf of our industry. We have an exciting program planned for you that will provide a broad educational experience touching on all of the themes I have referenced in this column. I look forward to seeing you in Orlando!



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## Hawaii and Energy Efficiency

**M**ark Twain once wrote that Hawaii was “The loveliest fleet of islands that lie anchored in any ocean.” I first visited Hawaii just a few years after the world had experienced its second “energy crisis”. In 1979 the Iranian Revolution had disrupted the world’s oil supply and overnight the price of oil doubled to \$39.50 per barrel. Long lines appeared at gas stations again as they had during the first energy crisis of 1974 and we collectively realized the urgency of reducing our dependence on fossil fuels, not because of their global warming effect but because of the realization that there is a finite amount of oil in the world which needs to be carefully conserved. I remember in the early 80’s standing in our booth at a trade show and noticing a suntanned fellow wearing an “Aloha” shirt approaching. He introduced himself and asked: “Can you build evaporators for my heat pump water heating systems in Hawaii?”. Not knowing any better or even what he was talking about, I said “Of course!”. The result of that meeting was an introduction to those beautiful islands and to the amazing and powerful application of heat pump technology to heating potable water for the many apartments, hotels, hospitals, and military bases there. I became well acquainted with a number of pioneers involved in the business of energy conservation in Hawaii. To this day heat pumps continue to be the dominant technology used for heating water in Hawaii, reducing carbon emissions while significantly reducing operating costs and producing very attractive returns on investment.

Because heat pumps ‘move’ heat from a low temperature heat source to a high temperature level with a relatively small power input, they can produce the same heating effect as a boiler burning fossil fuel or electricity with only 1/3 to 1/4 the energy input. Heat pumps use the same basic technology and components found in any refrigeration system; compressor, condenser, expansion device, and evaporator. As a refrigeration engineer this is a technology that is easy to get excited about!

To date our activities in IAR have focused primarily on refrigeration - making stuff cold. As we start to add more focus and emphasis on energy efficiency and sustainability issues through our newly formed committee of the same name, I believe the promotion of heat pumps for water and air heating will be the result. In many facilities that depend on refrigeration, i.e. food processing plants, breweries, etc., the heating loads are actually larger than the refrigeration load. Commercially available ammonia heat pumps can achieve heating temperatures greater than 90 deg C (194 deg C), while other work on the development of ammonia / butane cascade heat pumps have demonstrated the feasibility of reaching heating temperatures as high as 125 deg C (257 deg F)! These temperatures are high enough to replace boilers in most (if not all) of our food processing facilities.

Another interesting type of heat pump is often referred to as a mechanical dehumidifier. In the same facilities that require both refrigeration and heating, many times there are also dehumidification challenges (controlling condensation, drying processes, etc.) that could

be met using a mechanical dehumidifier. A mechanical dehumidifier places the evaporator coil in series with the condenser coil to first cool and dehumidify an airstream and then reheat it to a lower humidity level. The further addition of a wrap-around heat pipe with the cooling coil can reduce the compressor horsepower in many cases by half. Dehumidifying air in this way uses a fraction of the energy compared to desiccant dehumidifying which requires a large amount of natural gas or electric resistance heating to regenerate the desiccant media. Here is another technology that all of us as refrigeration engineers can easily grasp.

Electric power generation and heating activities contribute 25% of global greenhouse gas emissions as shown in the above figure published by the US EPA. In my view this represents both an obligation and an opportunity for all of us to apply what we know and do to improving the energy efficiency of our refrigeration systems and to expand our activities to include the application of heat pumps and mechanical dehumidification, thereby reducing greenhouse gas emissions. It is personally gratifying to see the interest and enthusiasm shown in the formation of our new Energy and Sustainability Committee and I want to thank all of those involved in its formation: Mike Lynch, Stefan Jensen, Pat Strine, and the IAR Board of Directors.

In closing I encourage you to get involved in IAR committee activities. I am certain it will place you in the forefront of the important work we share of making our world a better and safer place.



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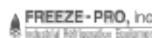
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# IIAR TECHNICAL PROGRAM UNITES INDUSTRY



One of the most interesting and important programs at the IIAR annual conference in Orlando is the presentation of technical papers. At this year's conference, industry experts from both the industrial and commercial sides of the business will present technical papers at the IIAR Technical Program.

The session will feature 17 papers covering a broad range of topics in the food retail and industrial space. "This year is unusual in that we have nearly double the amount of technical papers

due to member enthusiasm," said Eric Smith, vice president and technical director of IIAR. "You aren't going to get this breadth and depth in any other refrigeration specific conference."

The papers will cover several key areas, including food retail refrigeration applications, industrial use, energy efficiency, and safety and regulatory issues, Smith said.

An IIAR committee reviews paper submissions and identifies the topics that will appeal to the attendees and those that address a specific problem or quandry in the industry. "These get

priority," Smith said, adding that the association collects proposals and ideas continually. "After our annual call for papers, we will evaluate all of the abstracts submitted and determine which papers are most appropriate."

## COMMERCIAL REFRIGERATION

IIAR members are continuing to discuss commercial refrigeration applications, and the association is working to provide relevant technical content, Smith said.

Caleb Nelson of Azane Inc. will present his paper entitled "Methods for





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Saving Energy in Cold Storage Warehouses.” The paper provides guidance for end users, engineers, operators and manufacturers who endeavor to understand and improve the energy efficiency of a cold storage facility.

“Cold storage is most often considered an industrial application. But we

know that in many situations, packaged equipment, rather than field-erected systems, are being used for small warehouse applications, and this type of equipment borders on commercial applications,” Smith said.

Nelson said the title makes the paper sound like it will be a design checklist

noting the merits of things like floating head pressure, economizing, using variable frequency drives, etc., but that is not the case. “In hindsight, perhaps I should’ve titled the paper differently, implicating it to cover the ‘overlooked and misunderstood’ aspects of energy reduction instead,” Nelson said. He

## TECHNICAL PAPERS AND WORKSHOPS AT A GLANCE

Each of the 17 technical papers that will be presented at IIAR’s annual conference is full of specific, actionable information about the refrigeration industry. Each paper will be presented twice and there will be interpretation to ensure the sessions are available in Spanish and English. Here is a full list of the available papers as well as the presenters.

- CFD Simulation of NH<sub>3</sub> Release and Detection in Refrigerated Spaces (Results of the IIAR/ARF Research Project); by William Greulich, Kensington Consulting;
- Methods for Saving Energy in Cold Storage Warehouses; by Caleb Nelson, Azane Inc.
- Transcritical CO<sub>2</sub> and Ammonia: Energy Efficiency Comparison for Industrial Refrigeration Systems; by Giacomo Pisano, Dorin USA
- Proper Installation Practices for VFDs; by Paul Jasczynski, Logic Technologies
- Development of a Mechanical Insulation Installation Guideline for Refrigeration Applications (Results of the IIAR/ARF Research Project); by Gordon Hart, Artek Engineering LLC
- Review of Accidents in the Ammonia Refrigeration Industry; by Peter Jordan, MBD Risk Management Services Inc.
- Taking Your PSM Program to the Next Level - Establishing an Evaluation System; by Linda McDaniel, Americold
- Penthouse Evaporator Use with In-Rack Freezing Systems; by Dan Tippmann, Tippmann Innovation
- Hot Gas vs. Electric Defrost for Standard Commercial Refrigeration Systems: An Energy Comparison; by Danny Halel, Nthalp
- Reducing Capital and Energy Costs Through Refrigeration Energy Modeling; by Andy Campbell, Leo A Daly
- Compressor Lubricants for Natural Refrigeration Systems; by Glenn Short, BVA
- Permanent Refrigeration Plant Performance Optimization Using Continuous Real Time Analysis; by John Clark and David Blackhurst, Star Technical Solutions Ltd.
- Low Head Pressure Operation of Commercial Systems; by Dustin Lilya, DC Engineering
- Energy Study of Package Chiller Systems - Comparison of Natural (NH<sub>3</sub> and CO<sub>2</sub>) and HFC Refrigerants; by John Collins, Zero Zone

- Technical and Technological Barriers for Ammonia Refrigeration Thermal Districts in Colombia / Barreras técnicas y tecnológicas para los distritos térmicos de refrigeración con amoníaco en Colombia; by Bolivar Monroy, ACAIRE
- Operating Cost Comparison between Transcritical CO<sub>2</sub> and Ammonia Recirculation Systems in a Cold Storage Warehouse; by Chris Herzog and Peter Lepschat
- Comparación de costos operativos entre CO<sub>2</sub> transcrítico y sistemas de recirculación de amoníaco en un almacén de almacenamiento en frío; by Mario Mora Carli, FrigoConsult
- Application of IIAR 2 and IIAR 6 Standards and National Regulations for a Refrigeration System of a Bovine Slaughter Plant in Colombia / Aplicación de las normas IIAR 2 y IIAR 6 y regulaciones nacionales para un sistema de refrigeración de una planta de sacrificio; by Bolivar Monroy, ACAIRE

### Here is the full list of workshops with presenters:

- Lessons Learned in Ammonia Refrigeration: Making Our Industry Safer; by Bent Wiencke and Doug Reindl
- Management of Change as a Key PSM Element; by Ed Johnson, Dean Foods
- OSHA 1910.146: Keeping CSE Safe; by Mark Heuchert, Draeger Inc.
- Carrying out Critical Life Safety Plans for Ammonia Refrigeration; by Gary Smith ASTI
- Global Market Trends in Refrigeration; by Marc Chasserot, Shecco
- Pipe Size Program Tutorial Resulting from Recent ARF Research; by Bent Wiencke, Gordon Struder and Robert Sterling
- Transcritical CO<sub>2</sub> Applications in the Latin-American Industrial Refrigeration Market / Aplicaciones transcriticals de CO<sub>2</sub> en el mercado latinoamericano de refrigeración industrial; by Mauricio Baena, Hill Phoenix South America
- How to Perform a HAZOP PHA; by Jet Stiffler, JS Compliance LLC



added that the most basic parts of the paper seemed necessary because many of the errors he sees in system sizing and performance analysis come from a misunderstanding of the fundamentals. “Energy efficiency is not just affected by component selection and P&IDs, but it’s also affected by its resilience to real-world abuses and maintenance neglect.”

Danny Halel of Nthalp Engineering, will also focus on energy in his paper, “Hot Gas vs. Electric Defrost for Standard Commercial Refrigeration Systems: An Energy Comparison.” “That should be interesting because it provides a basic understanding and description of how defrost systems are often applied in food retail applications,” Smith said.

There are more than 38,000 grocery stores operating in the U.S., and the vast majority of them could significantly lower their energy use through implementation of the solutions that Dustin Lilya of DC Engineering outlines in his paper, “Low Head Pressure Operation of Commercial Systems.”

Commercial refrigeration compressors directly account for approximately one-third of the energy consumed in a grocery store. An effective way to lower overall compressor energy usage is to operate at the lowest head pressure possible when ambient conditions and system design will allow for it, Lilya said. The paper provides a technical description of specific components, methodologies and control theories, which can often limit commercial systems from operating at much lower head pressures.

Smith said he expects the paper by John Collins of Zero Zone – “Energy Study of Package Chiller Systems - Comparison of Natural (NH<sub>3</sub> and CO<sub>2</sub>) and HFC Refrigerants” -- to be particularly relevant to the industry at this point.

Collins’ paper evaluates criteria for selection of chiller systems in an ice-rink application using different refrigerants, including ammonia (NH<sub>3</sub>) R717, carbon dioxide (CO<sub>2</sub>) R744 and hydrofluorocarbon (HFC) R448a. Collins said facility owner and operators, systems designers and contractors could benefit from the session.

“I feel that ammonia and CO<sub>2</sub> cascade systems are excellent substitutes

for HFC and HFO refrigerants, particularly for warmer climates,” Smith said. “We would like to see commercial end users and other commercial system practitioners coming to the conference and learning about these types of systems. This is all in an effort to address current industry issues, build a larger commercial membership base and build on commercial system technical content.”

## INDUSTRIAL END USERS

Smith said IIAR remains committed to meeting the needs of industrial end-users and practitioners. “That has been our traditional core focus and will continue to be a focus,” he said. “Among several interesting papers related to industrial refrigeration, there are two papers that are being presented as a result of research funded by the Ammonia Refrigeration Foundation.”

The paper, “Computational Fluid Dynamics Simulation of NH<sub>3</sub> Release and Detection in Refrigerated Spaces” by William Greulich of Kensington Consulting, will depict how ammonia distributes in a cold room when a release occurs. “The results of this research are being considered by the IIAR Standards Committee,” Smith said. This will include some very interesting release simulations based on CFD analysis.

As part of the project, researchers completed simulations varying the location, ammonia leak rate and condition, and closed-room mechanical circulation. The three rooms, typical of ammonia refrigerated storage and processing spaces, incorporated equipment details for their operations, as well as specified heat loads and air flows to represent operating and maintenance conditions. Potential detector placement performance was evaluated by extracting data from the simulation results and application of a combinatorial examination of the total time over the experimental and set small groups of spatially distinct potential detection locations took to detect 25-parts-per-million-by-volume ammonia concentration in the model rooms. This data will be used to develop guidelines for sensor numbers and preferred location when designing a room.

Gordon Hart of Artek Engineering

LLC will present the paper “Development of a Mechanical Insulation Installation Guideline for Refrigeration Applications.”

“The researcher spent a couple of years traveling to various sites with various stages of insulation project construction,” Smith said. “He has developed a guideline for best practices for installation, and we think that is going to be an important guideline to ensure corrosion under insulation is mitigated and that end users get the best value for their money when they contract for an insulation or piping project.”

Hart said all refrigerated facility designers, owners and users can benefit from attending the presentation and reading the paper. “The takeaway is that the correct refrigeration insulation installation is critical to the long-term performance of that insulation system and that the performance is very important for energy efficiency, condensation control and reduction in corrosion of refrigerated pipe and equipment. Another major takeaway is that the opportunity to install the insulation system correctly presents itself only once. Once the protective jacket is installed over top of the insulation and vapor retarders, it is generally too late to make installation corrections.”

## ENERGY EFFICIENCY

Several of the papers presented, including some focusing on commercial applications, will provide insights into energy efficiency. “These papers discuss using pragmatic methods to analyze and adjust refrigeration systems to be as efficient as they can be,” Smith said.

Andy Campbell of Leo A Daly will present the paper “Reducing Capital and Energy Costs Through Refrigeration Energy Modeling.” He will discuss the validity and value of energy modeling as an integral part of the design process, along with highlighting the benefits of the energy modeling process in advance of capital equipment selection.

Campbell said the paper demonstrates how energy modeling will aid with the selection of capital equipment to deliver energy efficiency for the majority of the system’s operational time, rather than

efficiency for peak design conditions. These design principles, while being capable of delivering the required capacity during the maximum design day, reduce energy consumption and capital investment.

John Clark and David Blackhurst of Star Technical Solutions Ltd. will present their paper, "Permanent Refrigeration Plant Performance Optimization Using Continuous Real-Time Analysis." Clark and Blackhurst said studies indicate that efficiency improvements of 10 percent to 30 percent can be anticipated in systems that have not already been optimized.

Existing inefficiencies add significantly to the financial cost of operation and the environmental impact of these systems. Inefficiencies are generally associated with a lack of information, knowledge and incentive to improve the situation. However, these barriers can be overcome following advances in computer modeling software, the reduced cost of internet access and computing power and the ease of developing accessible user outputs, allowing the automated analysis results to be delivered continuously to specified personnel.

## **SAFETY AND REGULATORY ISSUES**

Peter Jordan of MBD Risk Management Services Inc. has been collecting data related to accidents that have occurred in the ammonia refrigeration industry for more than 10 years and will present his findings in his paper, "Case History: A Study of Incidents in the Ammonia Refrigeration Industry." "He will review what the causes are and speculate on the best way to prevent them," Smith said.

Jordan said IIAR members have struggled to answer some basic questions regarding the industry since the earliest days of the Process Safety Management standard and the Risk Management Plan rule. Questions include how many incidents are occurring in the ammonia refrigeration industry, what are the consequences of these incidents and what are the most common causes of the incidents?

Each day over the past 14 years, the data on incidents has been input into an

Excel spreadsheet. The information was analyzed and compared with historical incident data available from EPA's Risk Management Plan database and an IIAR survey that was conducted in 2008.

"It is hoped that the analysis of these incidents will focus attention on the industry policies and practices which can prevent and/or mitigate the consequences of future incidents in the ammonia refrigeration industry, thereby improving the overall safety of the industry," Jordan said.

There are two papers related to the execution of PSM programs, Smith said. Linda McDaniel of Americold will present "Taking Your PSM Program to the Next Level - Establishing an Evaluation System," and Jet Stiffler of JS Compliance LLC will present "How to Perform a HAZOP PHA."

McDaniel said anyone responsible for PSM compliance at a site or company level as well as contractors who help companies with their PSM compliance or have PSM compliance software could benefit from her session. She said attendees can learn different methods/ideas for scoring PSM items to better communicate accurate compliance progress to upper management. "You cannot improve what you cannot measure," she said.

## **AN INTERNATIONAL FOCUS**

Several technical papers and workshops will be presented in Spanish by international members. "We are integrating the international papers with the rest of the program," Smith said. "We hope that stimulates international networking and that our international members will attend more English-speaking sessions and vice versa." He said the technical paper presentations are interpreted in real time – utilizing the IIAR conference app – in both Spanish and English through the use of an interpreter and headsets.

## **CONFERENCE WORKSHOPS AND PANELS**

In addition to technical papers, the IIAR conference will present several industry workshops. "There are some very important topics in our workshops and panel discussions," Smith said, adding

that topics include global market trends in refrigeration, transcritical CO<sub>2</sub> applications in the Latin-American industrial refrigeration market and critical life-safety plans for ammonia refrigeration facilities. Another workshop will feature presenters discussing incident-specific accidents, what happened and what could have been done to prevent them.

The research panel will present proposed and in-progress cutting-edge research projects. The panel is presented by the IIAR Research Committee, which identifies and scopes projects that are necessary to gain additional understanding of the various technical challenges in the industry. "Several very important findings have resulted from recent research that have a practical effect on safety and efficiency," Smith said.

Smith noted that code and regulatory advocacy is one of the most important functions of IIAR. "Jeff Shapiro, IIAR's code consultant, and Lowell Randell, IIAR's director of government affairs will present their always-popular annual review of IIAR's efforts and progress in these arenas. Their work is ultra-critical for the use of ammonia refrigeration as it relates to government agency regulations," Smith said, adding that an update from OSHA, EPA and the Department of Homeland Security will also be provided.

The closing panel will discuss the use of manual hand valves as they are applied to Occupational Safety and Health Administration's mandated lockout-tagout programs. "We will discuss a survey that was conducted over the past year related to the topic, the results of that survey, the relevance of the OSHA standard, and what IIAR is considering to address for industry guidance," Smith said. "We hope people come and ask questions and provide their perspectives."

Smith said ammonia refrigeration and other natural refrigerants are positioned well to address refrigeration needs in the future. "Natural refrigerants have a lot of advantages including positive environmental effects, reliability and energy efficiency that cannot be overlooked," Smith said. "Of course, there are also intangible benefits like the ability to advertise sustainable practices."





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# India Eyes IAR Standards, Other International Efforts See Success

While much of the efforts of IAR's International Committee in the past few years have been focused on Latin America, the committee recently began activities to develop contacts and influence in India.

Several countries will be represented at this year's IAR conference, including Costa Rica, Mexico, Peru, Ecuador, Colombia, Chile, Argentina, Brazil, Malaysia, Spain, Australia, Nicaragua and Germany, and Yesenia Rivera Rector, IAR International Director, recently returned

professionals and government leaders to discuss this prospect and establish relationships. Her trip is another step in a process that she said is expected to be methodical and slow-moving. "The trip to India was successful," Rector said.

Like most countries, Indian officials are wary of foreign influence. Building relationships with key leaders has been a critical part of the process and these, she said, are starting to yield results. Shah, who lives in India and who is a member of IAR's Board of Directors, has been working with establishing key partnerships with several organizations

ing practices – practices that have been proven to work in the United States and other countries."

While that would be a tremendous step forward for India's industry, Rector said she believes that it will also be beneficial for the global refrigeration industry as a whole. Economies are so globalized, and trade so interconnected that when something happens – good or bad – in any particular country, reverberations are felt through global supply chains. By helping developing industries to standardize their practices, Rector said IAR is helping secure the industry for everyone.

Additionally, by adopting IAR standards, India can significantly reduce its carbon footprint. According to research conducted by the Global Carbon Project, in 2018 India was the world's third-leading producer of greenhouse gas emissions. Rector said by taking steps to make its refrigeration industry more sustainable with natural refrigerants, India can begin to move in the right direction.

During the visit, Shah and Rector also met with the PHD Chamber, which is primarily an educational association. "They are going to do several educational sessions during 2020 and want IAR to partner," she said. "I think there is a not only a need for education but also a thirst for it throughout the industry."

Also during her visit, Shah and Rector met with Rajendra Mittal, President of All India Air Conditioning and Refrigeration Association (AIACRA) in order to reaffirm the partnership with IAR in working towards a safer and prosperous industry. IAR will have a dedicated column in AIACRA's quarterly newsletter.

Safety is the primary goal – both globally and locally. For the first time, India will have a proven set of guidelines by which to operate that will ensure systems are installed and maintained using best practices. These guidelines have proven to be effective, she said, and she's confident they will help India's refrigeration industry thrive.

Rector said one of the main challenges and opportunities in India is the language. "India has different languages depending on the region, but overall the majority is Hindi. There may be a reason to explore IAR to start putting

**"As of now, there aren't established standards and regulations for [India] to ensure safety. The idea is that as they become more acquainted with IAR and our work, they'll adopt safer working practices – practices that have been proven to work in the United States and other countries."**

**-Yesenia Rivera Rector, IAR International Director**

from a trip to India, where she met with officials and industry representatives.

The Regional Vice-Chair of the International Committee, Mr. Samir Shah, has been working for some time with several organizations within the country in order to increase awareness of IAR's vision and mission.

Shah has met several times with the Bureau of Indian Standards (BIS), the country's across-the-board regulatory body that sets standards for the country, to assist and advise India's refrigeration industry and regulators. Through him, IAR is working to get India to adopt IAR standards as their basis for setting the country's refrigeration standards, Rector said.

Rector visited India in late January to meet with BIS representatives, industry

in the country, including BIS.

The BIS is creating the Indian standard applicable for the industry. "Right now, it is under review. This Indian standard for the refrigeration industry is based on IAR's Standard for Safe Design of Ammonia Refrigeration Systems, ANSI / IAR 2," she said. "The idea is more standards will come from this process and they will start looking at other IAR standards to improve safety in their refrigeration systems."

This is a very important step for India's refrigeration industry, Rector said. "As of now, there aren't established standards and regulations for the country to ensure safety. The idea is that as they become more acquainted with IAR and our work, they'll adopt safer work-

some communication and translations into Hindi to reach the target audience,” she said, adding that while design engineers and company owners communicate capably in English, operators and the people working the day-to-day systems are more fluent in Hindi.

Going forward, Rector said it is important to increase IAR’s visibility and availability in the Indian market. “They are looking for American companies that are members of IAR to invest and grow the industry. I think it is a great opportunity overall if we have the same practices and safety standards that American companies currently use

2019, IAR had several International Seminars of which the main ones were in Buenos Aires, Argentina and Guadalajara, Mexico,” she said.

Costa Rica has adopted ANSI IAR Standards, specifically 2, 4 and 8, as voluntary national standards. “Also, we started working with the Argentinian government and in Colombia, via our MOU Partner ACAIRE, to develop the national standards for the industry, based on IAR standards,” she added.

In 2020, there will be three international seminars in Latin America: Medellín, Colombia, July 9-10; Lima, Peru, Aug. 4-5; and Guayaquil, Ecuador

**“By providing advocacy, education and standards, the global community benefits from having safe, reliable and efficient refrigeration systems,” she said. “This, in turn, benefits the industry by promoting sustainable processes, commerce and a unified language to ensure that the industry not only grows, but thrives, benefiting all.”**

**-Yesenia Rivera Rector, IAR International Director**

and understand to ensure a sustainable industry,” she said.

Through Shah, IAR has been an active participant in several Cold Chain shows in India in order to promote IAR memberships and increase IAR’s visibility. To help increase visibility, IAR needs to focus on grassroots communications and participate in local and regional training events to awareness of IAR as an educational leader for the industry, Rector said. “At the same time, we will concentrate working with BIS on the design and safety standards, so the designers are held to a higher standard,” she said.

Meanwhile, on another continent, IAR is working closely with its members in Latin America to increase awareness and education of IAR standards and safe work practices. “Last year, in

Nov. 18-19. “The purpose of these seminars is to provide education on the IAR standards and safe work practices,” Rector said. “Finally, in Costa Rica, we will host, along with our MOU Partner CIEMI, the first Academy of Natural Refrigerants Certificate Course in Spanish on April 20-21.”

IAR’s mission is to create a better world through the safe and sustainable use of natural refrigerants. “By providing advocacy, education and standards, the global community benefits from having safe, reliable and efficient refrigeration systems,” she said. “This, in turn, benefits the industry by promoting sustainable processes, commerce and a unified language to ensure that the industry not only grows, but thrives, benefiting all.”



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# IIAR Says Goodbye to Longterm President Dave Rule

**This summer IIAR will say goodbye to David L. Rule as President of IIAR. A strong organization begins with strong leadership and Dave has been a great influencer of change and growth. He will be missed.**

*"Through Dave's leadership and forward thinking, he has been able to guide IIAR to a completely new level that many of us never dreamed of reaching in such a short period of time.*

*His leadership has brought about great working relationships not only with other organizations within our industry, but also with the regulatory agencies that govern our industry.*

*His proactive management of the budget and investments have allowed IIAR to branch into new areas that have and continue to provide the IIAR membership with the services that we need to be successful.*

*The voluntary member involvement in the Committees is higher than I have ever seen in my time with the organization, and this can be attributed to the leadership of IIAR in development of the standards, training, research, and many other tools that are beneficial to the IIAR membership." - Eric Johnston, American Foods Group*

**D**ave Rule began his long and esteemed career in the industrial refrigeration industry by way of obtaining his first job in none other than the truck manufacturing industry. His first job gave him a quick education and a good understanding of steel fabrication and working in manufacturing. All skills he would soon apply to his next challenge. Dave quickly transitioned from the truck manufacturing industry to the industrial refrigeration industry as an employee with Baltimore Aircoil (BAC). He came in as a material controls assistant and quickly grew to a lead position in sales and technical support.

After BAC, Dave joined Bohn Heat Transfer as a marketing product manager responsible for introducing a new product line of refrigeration products. Dave was then recruited by Bill Kahlert, one of the founding members of EVAPCO, Inc., a worldwide manufacturer

of refrigeration, air conditioning and process cooling equipment, to join the company as a marketing manager.

As EVAPCO, Inc. grew, Dave was

**As EVAPCO, Inc. grew, Dave was promoted to Vice President of International Operations where Dave and his team were charged with opening the first EVAPCO manufacturing plant in Shanghai, China followed by a second plant in Beijing. Facilities in Italy, South Africa and Belgium quickly followed.**

promoted to Vice President of International Operations where Dave and his team were charged with opening the first EVAPCO manufacturing plant in Shanghai, China followed by a second plant in Beijing. Facilities in Italy, South Africa and Belgium quickly followed.

Dave ended his career with EVAPCO, Inc. as Vice President of Refrigeration Sales in North America during which time he participated in many IIAR proj-

ects and roles including the Government Relations committee and Chair of both the International Committee and the Marketing Committee.

He was encouraged to come out of retirement in order to advance the goals of the IIAR and improve mem-

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# IIAR Says Goodbye to Longterm President Dave Rule

ber services through his network of professional relationships and years of Industry knowledge.

Dave is the third President in IIAR's history since its founding in 1971.

Dave Schaefer, PE, LEED, AP, Bassett Mechanical describes Rule's contribution to the industry,

*"Dave's impact and legacy on our industry has been tremendous. I have had the good fortune of being able to work with Dave and appreciate his advice that comes from having spent over 40 years in the refrigeration field. Our IIAR standards, Academy of Natural Refrigerants and financial stability have all greatly benefited under Dave's leadership."*

Dave has been IIAR president since 2013 and since that time has overseen the organization's development of industry-safety and design standards, the expansion of its international role and initiation of a broad educational program designed to deepen the professional knowledge of industry employees and increase the flow of new professionals into industrial refrigeration. Emphasizing the importance of IIAR's members in the organization's accomplishments during his tenure as president, Dave said, "our organization has achieved many significant accomplishments over the past several years thanks to the active participation of our members and working committees and I have been so pleased to be a part of this work."

During Dave's tenure, IIAR greatly expanded and deepened its leadership position in the natural refrigerants industry with the promulgation of industry standards and their adoption into building codes both around the country and internationally. In addi-

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tion, IIAR has broadened its focus to include commercial and retail refrigeration, along with industrial applications, as the industry has increasingly come to see the advantages of natural refrigerants, which include ammonia, carbon dioxide and hydrocarbons.

"It has been an honor to serve as President of this organization, and I am

especially thankful to its members who have done so much during my time here to advocate the application of natural refrigerants, develop new education opportunities for our membership and improve the safety of our industry. This is truly a volunteer organization and I'm proud of everything we've accomplished," Rule said.

*"During Dave's tenure as President, IIAR has developed new educational/training programs, extended its global outreach and has reached record membership levels. Dave has played an integral role in these, and other accomplishments, by effectively managing headquarters staff personnel, working closely with each Executive Committee to achieve its goals and objectives and travelling around the world to represent IIAR at meetings, conferences and seminars.*

*Today, as never before, IIAR is recognized around the world as the preeminent technical authority for the safe and efficient use of ammonia and other natural refrigerants."*

- Joseph A. Mandato, EVAPCO Inc. (ret)

*"Dave, I want to thank you for your tireless dedication as President of the IIAR. During your tenure, as President, you grew the IIAR membership to unprecedented levels, expanded its outreach and was instrumental in the development of the Academy of Natural Refrigerants.*

*Your leadership, insight and guidance, while at the helm of this great organization, should be an example to us all. I wish you and your wife health and happiness in the years ahead."*

- Michael Lynch, US Cold Storage

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# IIAR Membership Advances Industry with Committee Work

The past year was a productive one for IIAR's numerous committees. From in-depth technical research to international outreach, IIAR's membership has been busy advancing the industry. Here's a detailed catalog of each committee's activities, and what they hope to address in the next year and beyond.

## CO<sub>2</sub>:

Just before the IIAR conference last year, IIAR's CO<sub>2</sub> standard went up for public review. Since that time, the CO<sub>2</sub> Committee has updated its standard based on the comments it received.

"We received approximately 140 comments," said John Collins, chair of the CO<sub>2</sub> Committee. "Over the last many months, the task group who is putting together the document has gone through each and every comment, come up with a response and drafted an update to the standards document in sync with the responses received."

While that sounds straightforward, it was anything but. "It's quite an involved process," Collins said. "We were meeting on a weekly basis as a task group from the time that we received the public comments in April of last year up until [late January.]"

While the comments were distributed across the entire document – 22 chapters in all, Collins said a significant amount centered on certain key sections. Many of the comments had to do with system design, piping as well as maintenance, and inspection of installed systems. Significant changes were made based on these comments.

The comments from the community demonstrates the need for such a standard. "This is an area that other standards in the industry haven't really covered effectively," he said. "The committee and board directed us to address it in drafting this document – we need a comprehensive document, something that covers not just system design but also installation and testing. Something that covers inspection and maintenance requirements."

CO<sub>2</sub> differs from ammonia in many significant ways Collins said. It's a fundamentally different chemical and as such needs to be regarded differently, specifically in the hazards it poses. It doesn't make sense to regulate both substances in the same way. "In writing this standard, we needed to be really conscious of that," Collins said. "We had to ask ourselves what the baseline necessity was for a safe system. Everyone has an opinion, which is fine, but the objective is to come to a baseline requirement for making these systems safe."

As for the next steps, Collins said the committee has just completed the formal response process to all the comments. From here, the fully updated standard will be released for a second round of public review right before the 2020 Conference.

## COMPLIANCE:

In October, the IIAR Board voted to publish a Process Safety Management and Risk Management Plan (PSM RMP) guideline. This document will be an update to the committee's last revision that was done about 8 years ago, Jeanna Emmons, compliance committee chair said. This updated document will reflect changes in the Environmental Protection Agency's RMP regulations.

The committee is also working on a "how-to" document on implementing the new updates to the regulation. This will be a completely new document that IIAR members haven't seen yet, and at the time of publication is approximately 80 percent complete, Emmons said. The how-to will present readers with best practices from industry professionals on how to best implement each section of the regulatory requirements.

Additionally, Emmons said the committee has set a goal of June to have the Ammonia Data Book fully revised and off to the IIAR Board for review and publication. This will be the document's first update in approximately a decade.

"In the last 10 years there have been a lot of changes – regulatory and application-wise – in the industry," Emmons

says. "what we've done is gone through each chapter and updated everything to make it current. It's come a long way since the last publishing."

Finally, at last year's conference, the Compliance Committee got approval to work in conjunction with the Safety Committee to work on a guidance document on emergency planning and response. This was meant to assist dealing with the California regulatory body's reinterpretation of several code requirements related to emergency action plans. "This document will assist the rest of the country with bridging a gap that CAL-OSHA [the California Occupational Safety and Health Administration] has found," Emmons said.

## EDUCATION:

Each year, said Mark Stencil, chair of the Education Committee, the group works to produce certificate programs, helping the Academy of Natural Refrigerants with its content and curriculum. These are open-module programs that have quizzes throughout, leading up to a final comprehensive test that determines the learner's skills and knowledge. Passing these tests entitles the learner to a certificate demonstrating their aptitude.

"In meetings with regulatory agencies, it's been stressed that a means to certify credentials and the gathering of demonstrated knowledge and specific expertise in refrigeration was needed. The program itself has evolved such that there are areas of specialization," Stencil said.

Currently, the Education Committee is working on certificate programs related to IIAR 6, basic ammonia design, PSM engineering calculations, the piping handbook, mechanical integrity and the CO<sub>2</sub> handbook, Stencil said. These programs are designed for industry professionals to demonstrate their abilities in a formal way, and IIAR's members have access to the programs at a discounted rate.

Additionally, through its Scholarship subcommittee, the Education Com-

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# IIAR Membership Advances Industry with Committee Work

mittee has supported the Ammonia Refrigeration Foundation's Founders Scholarship and this past year helped to grow the program significantly since its inception in 2016, Stencil said. In that initial year, the program received three applications. This year, it received 26.

## GOVERNMENT RELATIONS:

Lowell Randell, IIAR Director of Government Relations, says the first thing that comes to his mind when he thinks of industry/government relations is the world of regulations. In that regard, the Government Relations Committee has been very active over the past year.

"The committee has been working on items ranging from regulatory reform to engaging with agencies to train inspectors," Randell said. "We've been providing compliance assistance materials and resources to the membership, as well."

In the area of regulatory reform, the committee is working with the National Institute of Occupational Safety and Health regarding its upcoming review of the Immediately Dangerous to Life and Health (IDLH) level that's been assigned to anhydrous ammonia, Randall said. The committee is providing resources and information to the agency with the hope that it can demonstrate that the current level is too low, and that policy moving forward should enable facilities to use air-purifying respirators at higher levels to enhance the safety of facilities.

The committee has also worked very closely with the Environmental Protection Agency to advance proposals that would correct issues with the Final Reconsideration Rule – the culmination of quite a few years of rulemaking that go back to the Obama administration's changes to the RMP rules and added overly restrictive provisions, Randell said. The result of this effort was a revised reconsideration rule that was finalized in late 2019 that rescinded problematic regulations while preserving beneficial requirements.

The committee has also worked in the past year to build ongoing relationships with agencies. "We have a formal alliance between the Global Cold Chain Alliance, IIAR, RETA and OSHA," Randell said. "This was renewed in August of 2019, and under this alliance we do a number

of different things. The highest-profile item is training OSHA inspectors on IIAR standards and in industrial refrigeration." This is important because many times these inspectors might enter a member facility and not be very familiar with an industrial refrigeration system. They might apply knowledge of – say – a petroleum refinery. This is not a one-to-one comparison and will likely lead to inappropriate citations and other issues.

"We supported the training of OSHA inspectors through a web-based program last year, and we'll be conducting another round in February," Randell said. "It's been very successful – the agency is very supportive of the effort."

## MARKETING:

This year, the Marketing Committee's main focus has been on developing different types of content to inform and inspire current IIAR members, to influence the overall perception of the ammonia refrigeration industry, and to potentially recruit other industry professionals as members.

Beth Fox, Chair of the Marketing Committee, said the committee's third annual State of the Industry report, to be available at the IIAR's Orlando conference, addresses all those goals.

This year, the report will include more historic data so readers can better understand industry trends, Fox said. By being attentive to members' needs, she thinks this year's report will provide actionable information as well as educational materials with a human element to help readers connect with, contextualize and interpret the data.

A broader goal of the Marketing team, Fox said, is influencing the overall perception of the ammonia refrigeration industry. "This is actually a much broader effort," she said. This will involve numerous different outreach efforts as well as several types of content across different types of media channels to discuss these systems and their commercial applications.

One specific part of this effort will be outreach regarding IIAR itself, directed at end users. "Who are we? Why are we important?" Fox asked rhetorically. "Ammonia is everywhere, and people just don't realize it." Dovetailing from

this effort will be a portal that will break down local regulatory resources by state and where end-users can interact with IIAR materials to learn more about the industry.

Finally, the Marketing Committee will continue its efforts with the internal IIAR Connect, including tech tips for members – non-commercial, pertinent information that is important for industry leaders to know and internalize.

## PIPING:

Gordon Struder, Chair of IIAR's Piping Committee, said the group's major accomplishment last year was publication of the latest edition of IIAR's Piping Handbook. This extensive reference manual has over nine chapters related to piping in refrigeration systems breaking these systems down into each component.

"The largest update was a rewrite of Chapter One where we included two-phase flow of ammonia piping, also known as wet vertical suction risers," Struder said. "It's very complicated, but that was the largest addition to this particular handbook."

The June 2019 revision was the culmination of input from committee membership – all experts on this particular topic – as well as research done by separate committees, published through ASHRE and ARF, which was integrated into the handbook.

Looking forward, the Piping Committee is hoping to take the numerous diagrams contained in the handbook and make them more detailed. Each schematic is what Struder called a "stick figure," meaning that they are line drawings that approximate the information the diagram is trying to convey rather than being true-to-life drawings. "There's an effort to change all of these diagrams to a 3D format which will enhance the details significantly providing readers a better depth of understanding," adding this effort is quite an undertaking – one of the handbook's chapters has over 40 such schematics.

Struder added that there are efforts underway to translate the handbook into languages other than English, using resources from the International committee. "This will help us service a much broader base of IIAR members," he said.



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# IIAR Membership Advances Industry with Committee Work

## RESEARCH:

Last year, two papers were presented at the IIAR conference, one of which was used to update IIAR's piping handbook, said Wayne Wehber, Chair of the Research Committee. The other, on ammonia dispersion in refrigerated spaces, was so popular that it will be presented again at this year's conference.

This momentum has continued throughout the year, Wehber said. This year, a new paper will be presented at the conference that codifies guidelines for mechanical installations of refrigeration applications.

"The goal of the research committee is to have two research projects going on at all times," Wehber said. "This keeps us busy and moving forward." So far, one project has been approved, funded, and appointed a principal investigator: a study of machinery room ventilation and ammonia release computational fluid dynamics.

This is related to the previous study of refrigerated spaces, but the project specifically looks at machinery rooms. A primary focus of this research, Wehber said, is to look at the ventilation rate requirements in IIAR 2. In addition to using modeling to determine what the minimum ventilation rates should be, the project will be determining the best placement of ammonia leak detectors in these particular spaces.

The second project, an IIAR relief valve and pipe sizing program, will research the proper sizing of relief valve piping. This project is in the works – the Committee is currently in the process of writing the work statement, Wehber said.

"[These projects] are filling the pipeline," Wehber said. "We try to keep projects going while others phase out, so we have a few additional projects that are in queue. We're putting the information together and prioritizing the new research projects. Hopefully, we'll keep project ideas coming from the committees, from the IIAR community and from the industry."

## SAFETY:

This past year, the Safety Committee's biggest project had to do with manual hand-valve lock-out/tag-out issues. Joe

Fazzari, the committee's chair, said that IIAR wants to publish an informational guideline document that addresses how manual valves are treated in the industry.

This is necessary, Fazzari said, because current guidance from the Occupational Safety and Health Administration is unclear when it comes to ammonia refrigeration industry applications. OSHA approached IIAR to ask for the organization's input.

"It's a little bit gray when it comes to our industry... Is it a lock-out/tag-out program or is it an energy-control program?" he asked. "How can we give IIAR members the best information on how to handle this issue? This is us responding back to OSHA and to our members and applying the experience and expertise of our volunteer members and affiliate associations."

This project was the priority of the Safety Committee in the past year. "There was lots of discussion," Fazzari said. "We did a couple of surveys, and we're getting close to publishing the analysis of the results."

The responses to the surveys, Fazzari said, were significantly varied, indicating a need for IIAR's standardization. He said he believes the published analysis will do exactly that. As far as timelines go, Fazzari expects it to be completed within the coming year. "We're going out to bid right now for contractors to help us write the document... I'd say it [will be ready] within the next year or less."

Also worth noting, Fazzari said, will be a workshop during the conference's closing session on this topic. IIAR members are encouraged to attend to learn more and to share their experiences.

## STANDARDS

The Standards Committee will soon release an update to IIAR 2 for its first public review, Eric Smith, vice president and technical director at IIAR, said. This review covers the five-year periodic maintenance practices and piggybacks off of last year's addendum A revisions.

"[We] have collected comments and feedback from IIAR 2-2014 over the past several years, and we have been discussing those comments and changing the standard as necessary to address

them," Smith said. "Further, this edition will address a number of ambiguities stemming from the last publication and further refine the standard."

Smith pointed out that this revision is a major one with over 200 items analyzed for the update. He said several significant changes have been made to the standard including ammonia detection reliability requirements, to name one. "It's something people should tune into."

Work has also begun on revisions to IIAR 4, IIAR 5 has recently been updated and re-published and the long-awaited IIAR 6 – the standard on inspection, testing and maintenance – was published last summer.

Looking farther ahead, the Standards Committee is anticipating completion of IIAR 2's five-year review process. Smith said once this process is concluded, there's a possibility the International Fire Code will adopt the standard in its entirety rather than writing their own codes for ammonia refrigeration. The committee is also looking into the possibility of drafting a hydrocarbon standard in the near future which would apply to non-listed systems.

Additionally, much of the work of the Codes Committee has been absorbed by Standards this year. Of this work, Jeff Shapiro, IIAR's code consultant, said the International Mechanical Code, the Uniform Mechanical Code, the NFPA 1 Fire Code and ASHRAE 15 no longer specifically regulate ammonia refrigeration and are instead deferring to IIAR standards, and particularly IIAR-2.

"Our next advocacy effort in the model codes will be attempting to get the International Fire Code to defer to IIAR 2, like [the codes listed above], Shapiro said. "That effort will be developed in 2020 and advocated in the 2021 code cycle. If successful, the changes would appear in the next edition of the IFC in 2024."

The quality and superiority of IIAR's consensus documents is the organization's "calling card" to encourage international adoptions of IIAR standards. Shapiro added. The consensus process contributes a lot more brain power to IIAR documents than can be achieved by government-run processes.





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# CONFERENCE WELCOME

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## Welcome to the 2020 IIAR Natural Refrigeration Conference & Exhibition!

**I**t is my pleasure to welcome all of you to the 2020 IIAR Natural Refrigeration Conference and EXPO here in Orlando. Your IIAR Staff and Executive Committee have worked very hard to provide you with the largest technical program ever offered at an IIAR conference along with many opportunities to network with all of your IIAR friends and colleagues.

The program this year has been expanded to include Seventeen (17) technical papers, Eight (8) workshops and Three (3) panels. The technical program offers a broad range of information that addresses many important environmental and refrigeration issues currently facing the industry. I can assure you that whether you are from the industrial or food retail sectors of refrigeration, the regulatory community or others, we have

something here for you over the next several days.

I would also like to assure you that the safety and comfort of our conference guests is a fundamental concern of IIAR. We have worked closely with our conference partners, including the Rosen Shingle Creek Hotel and Convention Center to implement appropriate safety measures to safeguard your health while attending the conference. Hotel rooms and public areas are thoroughly disinfected on a routine basis and hand sanitizer stations will be located in all public spaces and lobbies. We understand that many of you have significant concerns regarding the novel coronavirus (COVID-19) and we have taken all known precautions to ensure your safety during the conference.

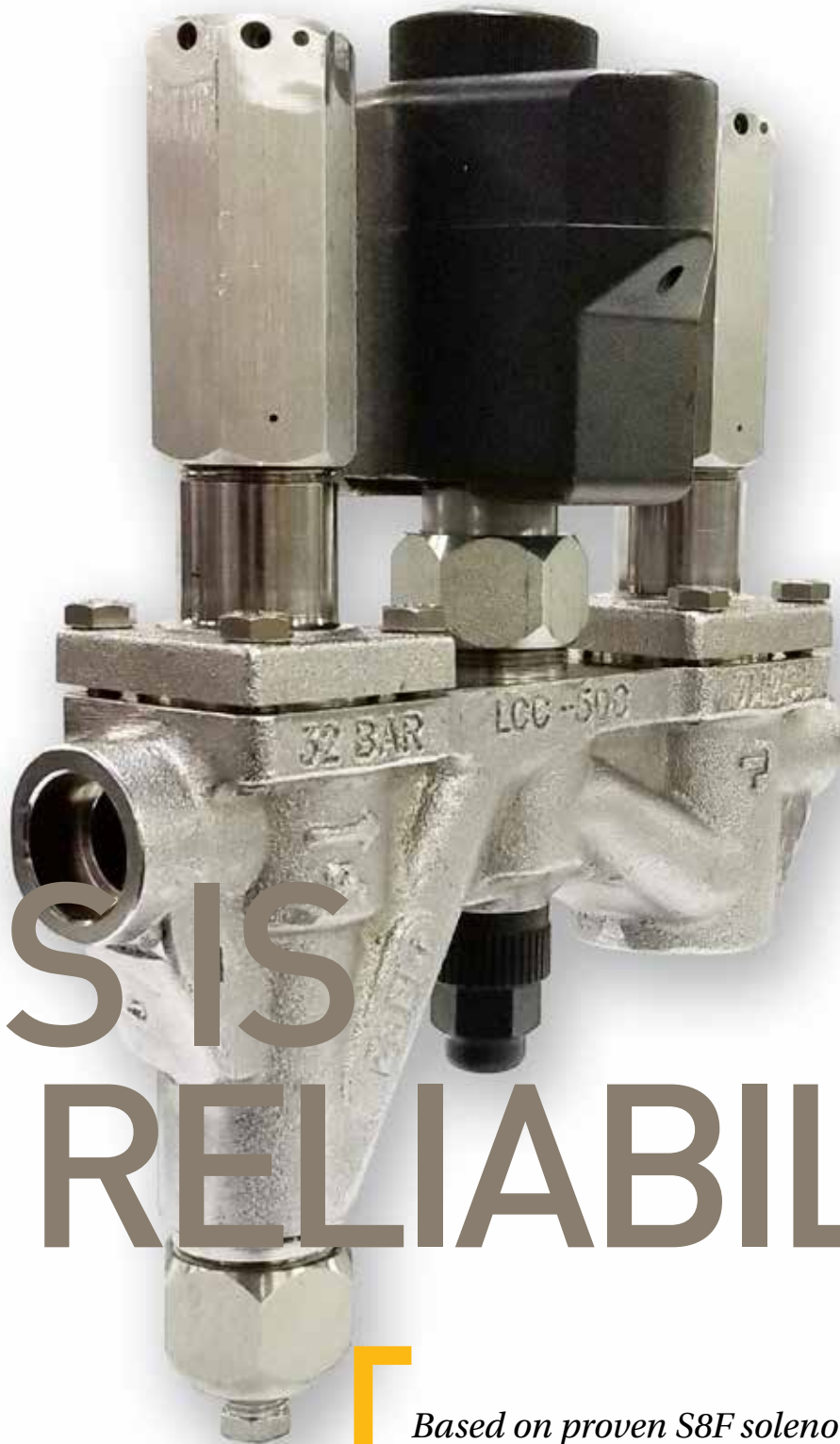
Most of you may be aware that I have announced my

retirement from IIAR, effective June 30, 2020. I would like to take this opportunity to thank the IIAR Staff members, the Executive Committee and Board of Directors, and most of all, the IIAR membership for all of your support and encouragement during my tenure as your President. It has been my honor to serve you and the IIAR organization over the past several years and I wish you all the best as you move forward to complete the mission of IIAR.

So, once again, welcome to the IIAR Orlando Conference. I look forward to seeing you around the meeting and hope you all have a productive and enjoyable conference.

Regards,

David L. Rule  
President, IIAR



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# IIAR Unveils New Energy and Sustainability Committee

**A**mid a high level of interest from members, IIAR's newly established Energy and Sustainability Committee will have its inaugural meeting at this year's annual conference in Orlando.

At last year's IIAR Annual Conference, after much discussion and deliberation, the IIAR chairman appointed a task force to investigate the needs of the industry's end-user community with regards to energy and sustainability in their facilities, said Bruce Nelson, speaking on behalf of the committee.

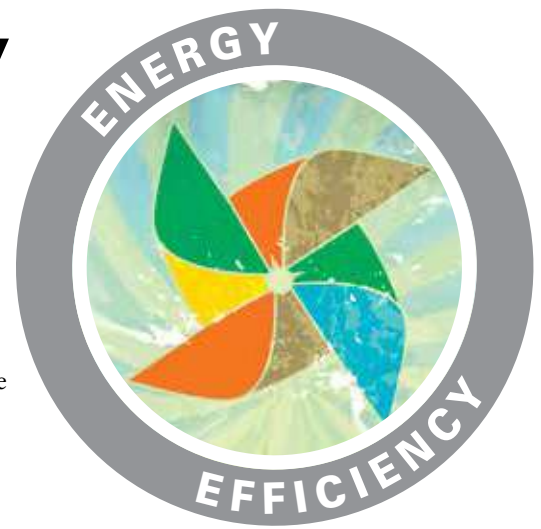
The Energy and Sustainability Committee will be tasked with delivering educational materials including best practices, influencing energy codes and standards, advocating with governments and power utilities to better support sustainability and energy-efficient practices as well as researching various related topics, Nelson said.

According to Nelson, there is potential for tremendous growth in the industry as it pertains to energy efficiency and sustain-

ability, particularly in the form of education to create better competencies at the design and plant-operations level. This can also take the form of the addition of an Energy and Sustainability Specialist role to the Academy of Natural Refrigerants curriculum, as well as the development of more energy- and sustainability-specific ANR course content. Prioritizing this type of education would be a boon for the industry, he said.

"I am convinced that energy efficiency is good business, both on an economic and environmental basis," Nelson said. "Not only are natural refrigerants environmentally friendly, but they are also highly energy efficient. This new committee seems to have struck a chord with our end-user members judging from the tremendous response and commitment to participation."

Illustrating the high level of IIAR's commitment and interest to these topics, Nelson said more than 48 IIAR members have expressed interest in attending the committee's first meeting at the Orlando conference, where the exact scope and



purpose of the committee will be discussed and agreed to. It's also expected that its initial objectives will be defined, and subcommittees will be set up.

Nelson also noted it is particularly interesting that the level of interest from IIAR's international members has been "significant."

"The response to our invitation to the inaugural meeting has been tremendous and encouraging," Nelson said. "Strong leadership has been identified and growth in participation and activity is expected going forward."

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# Foundation Founders Scholarship Program Sees Continued Growth

Since its introduction in 2016, the Ammonia Refrigeration Foundation's Founders Scholarship has helped connect talented young people to the world of natural refrigerants by awarding students who exhibit exceptional character, academic prowess and a healthy interest in pursuing an engineering or related technical degree with financial and professional assistance.

"The scholarship program is one of the main missions of the Foundation itself," Joe Mandato, chairman of the Foundation's Board of Trustees said. It helps sustain the industry and introduce new talent to veteran industry leaders.

When the scholarship was initiated, it was limited to a small number of recipients due to limits on funding and interest. The IAR Scholarship Subcommittee Chair Bob Port, said it has grown significantly over the years, culminating with the most recent cohort of nine new and returning students.

"The big success [last year] was the numbers," Port said. This year, a field of 26 total applicants competed – the largest number of applicants ever received. Additionally, the Foundation voted to double the number of scholarships awarded, expanding the program significantly. This year three new juniors received scholarships as well as three seniors. Three more returning seniors continued their scholarships as well.

In 2019 the foundation awarded a record level of funding – \$53,000 in total – Mandato said. The hope is to grow the program even more this year through continued fundraising efforts; the goal for 2020, he said, is \$500,000. These funds will grow the scholarship program as well as sustain the Foundation and its research efforts.

Mandato said he hopes that in the future, the program can expand beyond United States borders. Already the Foundation has received applications from Canada, Latin America and African countries, and Mandato said

it's his hope this international pull will continue to grow. Port agreed, saying he hopes that outreach efforts to colleges and universities nationally and internationally will be strengthened.

While the ARF scholarships benefit recipients tremendously, they are also

critical for the overall health of the industry, Mandato said. Recipients are given the opportunity to visit the IAR annual conference and to meet directly with industry leaders, many of whom are looking to fill positions with bright, talented young people.



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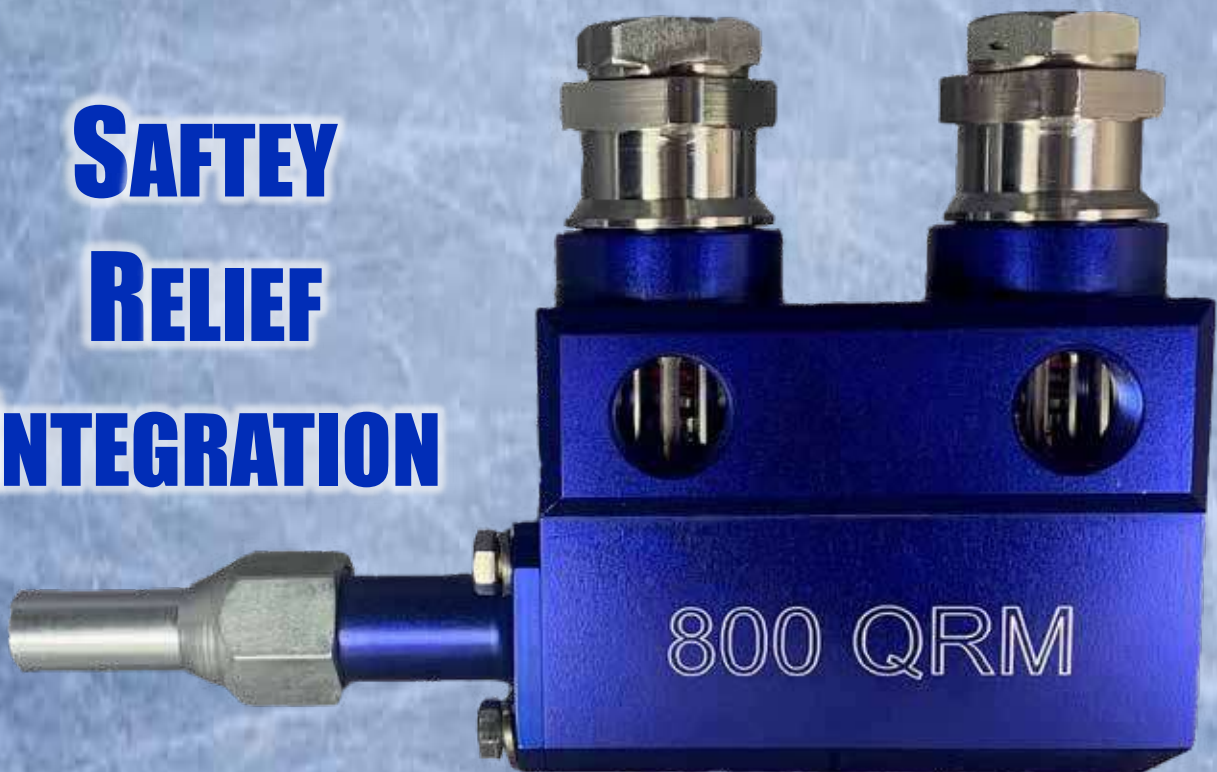




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As Port sees it, the conference invitation is one of the biggest benefits of the scholarship program. Students have a direct connection to the industry they

Ultimately, the scholarship program keeps momentum going in the industry. “The long-term benefit,” Mandato said, “as the scholarship program expands...

ous universities will be more likely to introduce the industry to them.”

The students who receive these scholarships are impacted positively, and their gratitude is apparent. “The IIAR Founders Scholarship has made an incredible impact in my career as an engineering student. By receiving this award, I am under less pressure to work extensive hours on top of my studies, and have avoided taking out student loans,” Samuel Koske, a junior at the University of Missouri who received a scholarship this year, said in a statement.

“This scholarship has also given me an incredible opportunity to connect with companies and learn more about the natural refrigeration industry,” Koske added. “After I graduate, my hopes are to eventually make cheaper and safer ways to make ammonia/natural refrigeration a more widespread technology throughout the world.”



**“I tell everyone to bring a stack of resumes with them. I haven’t met a kid yet that wasn’t blown away.”**

**Bob Port, IIAR Scholarship Subcommittee Chair**



are studying and to meet with industry professionals one-on-one. “I tell everyone to bring a stack of resumes with them” Port laughed. “I haven’t met a kid yet that wasn’t blown away.”

as the list [of recipients] grows and there’s greater awareness within academia about the industry, those people who are responsible for the placement of graduating students from their vari-

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- Hermosillo, Mexico | Nov 5 | IIAR seminar

# What? I didn't know that

BY KEM RUSSELL

I recently read an article about a man that spent a considerable amount of time tromping through the wilderness back in the early 1900s. In his journal he made a statement that I found interesting. He wrote, "I don't know where I am, but it doesn't matter." I am concerned when someone doesn't know where they are or what is going on, and they think it "doesn't matter." I think it can matter a lot where you are, and what you know when you are there. On this man's last trip in the wilderness it certainly did matter to him. He was found some weeks later after drowning in a river. This man's statement got me thinking about something I have run into numerous times, where people don't know something and they also don't realize it really does matter.

If you are in the design and construction field of industrial ammonia refrigeration, you have probably experienced this. You design most, if not all, of the ammonia refrigeration system. You properly size equipment for the intended load(s), properly size and configure piping, correctly select control valves as well as hand valves, properly size vessels, etc. You do everything needed for the ammonia system to function correctly. However, there are some items and work associated with the ammonia system that you may not do, but you are aware of what is required. Those items and that work may be done by a General Contractor, or some other contractor or sub-contractor. If the items are not done correctly the facility owner, who is relying on more knowledgeable people to do the right thing, may have serious challenges. The "Authority having Jurisdiction" may not agree with what was or wasn't done, and require corrective action. Or at a later date, OSHA and/or EPA may site the missing items for corrective action, along with a fine.

The issues involve the ammonia machine room, and what should be part of the machine room design. I have run into this many times over several decades of design and construction, and I experienced this same issue again just recently when a knowledgeable refrigeration operator asked me what should be included in the machine room design.

For industrial ammonia refrigeration the standard for safe design is ANSI/IIAR 2-2014 Addendum A (2019). I have been surprised time and again at how many people do not know about some of the key safe design standards in this document. Here are some of those key safety items that we should all know and understand:

- Ammonia detection and alarming. Almost everyone, but not all, realize there should be ammonia detection in the machine room. Beyond that, understanding of what should be in place gets fuzzy. ANSI/IIAR 2 2014 Addendum A, paragraph 6.13.1 states:

6.13.1 **General.** Machinery rooms shall be provided with ammonia detection and alarm in accordance with Sections 17.2–17.6 and the following features:

1. At least one ammonia detector shall be provided in the room or area.
2. The detector shall activate an alarm that reports to a monitored location so that corrective action can be taken at an indicated concentration of 25 ppm or higher.
3. Audible and visual alarms shall be provided inside the room to warn that access to the room is restricted to authorized personnel and emergency responders when the alarm has activated. Additional audible and visual alarms shall be located outside of each entrance to the machinery room.

I am guessing that many do not read, or have access to the information stated in 6.13.1.3, which states that "... audible and visual alarms shall be located outside of each entrance to the machinery room."

- Next, I think that most of the people involved in the design and construction of ammonia refrigeration machine rooms understand that there should be a ventilation system in that room, and that an ammonia detector should activate the emergency

# LESSON

## LEARNED?

ventilation system. Beyond this, it seems knowledge and understanding are lacking, and it is not generally understood that there is more to be done. Paragraph 6.13.4 states:

"Detection of ammonia concentrations that exceed a detector's upper detection limit or 40,000 ppm (25% LFL), whichever is lower, shall activate visual indicators and an audible alarm and shall activate emergency ventilation, where required, in accordance with Section 6.14.7. Once activated, emergency ventilation shall continue to operate until being manually reset by a switch located in the machinery room. In addition, the following equipment in the machinery room shall be automatically de-energized:

1. Refrigerant compressors
2. Refrigerant pumps, and
3. Normally closed automatic refrigerant valves that are not part of an emergency control system."

Many ammonia machine rooms may have this high-level detection. Some may shut compressors down on activation of the high-level PPM. More rare are systems that shutdown other equipment and controls in the machine room.

- Most machine room designs include "Emergency Control Switches", but what that switch does can vary considerably from one facility to another. It is common that the switch shuts down the compressors, but often that's all. As stated in paragraph 6.12.1 that switch should do the following:



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## LESSON learned

“The switch shall provide off-only control of refrigerant compressors, refrigerant pumps, and normally closed automatic refrigerant valves that are not part of an emergency control system, located in the machinery room. The function of the switch shall be clearly marked by signage near the controls.”

- Construction of ammonia machine rooms sometimes lacks what is stated in Chapter 6. The following are a few key paragraphs:

### 6.2.1 Separation and Fire Protection.

The machinery room shall be separated from the remainder of the building by tight-fitting construction having a one-hour fire-resistance rating. Doors shall comply with Section 6.10.

6.10.2 **Door Features.** Machinery room doors shall be self-closing and tight fitting. Doors that are part of the means of egress shall be equipped with panic hardware and shall be side hinged to swing in the direction of egress for occupants leaving the machinery room. Where the machinery room is not provided with fire

sprinklers, doors communicating with the building interior shall be one-hour fire-rated. Doors to the outdoors shall be fire rated where required by the Building Code based on the fire rating required for exterior wall openings.

To help in understanding of what constitutes a tight-fitting door there is a definition in ANSI/IIAR 1-2017 Definitions and Terminology Used in IIAR Standards.

“**tight-fitting door:** A tightly constructed door with seals to minimize gap clearances between the entire door perimeter and its fixed door frame that is intended to control the transfer of liquid, moisture, air, and vapor.”

A large percentage of machine rooms do not have tight-fitting doors. Many could easily accommodate a mouse, and I am sure ammonia molecules would have no problem escaping.

Similar to the doors, numerous machine rooms do not properly address the penetrations through the machine room envelope, as they should as stated in the following paragraph:

6.6.2 **Pipe Penetrations.** Pipes penetrating the machinery room separation shall be sealed to the walls, ceiling, or floor through which they pass in accordance with Section 6.2.1. Where Section 6.2.1 requires that the separation have a fire rating, pipe penetrations shall be fire stopped in accordance with the Building Code.

There are several other key features that should be part of a properly constructed ammonia refrigeration machine room in Chapter 6 of ANSI/IIAR 2 2014 Addendum A. As an ammonia refrigeration designer, engineer, contractor, operator, etc. each should study and understand what is included in this ANSI/IIAR Standard. And, you should pass your understanding along to those who may not know.

If you don't know does it matter? Yes it does.

The IIAR-2 Academy of Natural Refrigerants certificate course provides a comprehensive review of the standard. The course is offered online to provide easy access to match anyone's schedule.

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# CSB Establishes New Chemical Incident Reporting Rule

**iiar** government

## RELATIONS

BY LOWELL RANDEL, IIAR GOVERNMENT RELATIONS DIRECTOR

**O**n February 5, 2020, the Chemical Safety and Hazard Investigation Board (CSB) released its Final Rule on accidental chemical release reporting. The rule creates a new reporting requirement for facilities that experience a chemical release. The enabling legislation that established the CSB included a require-

In December 2019, the CSB published a Proposed Rule that would comply with the court order and establish a new reporting requirement. IIAR, along with many others in industry, responded to the Proposed Rule commenting on the proposed provisions in an effort to minimize duplication and reporting burden for regulated facilities. The Final Rule released in February 2020 incorporates some of the recommendations made by IIAR and others, but fundamentally

Substantial property damage is defined as estimated property damage at or outside the stationary source equal to or greater than \$1,000,000.

Given the definitions of “serious injury” and “substantial property damage”, it is likely that many releases IIAR members must report to the NRC may not fall under the requirements for CSB reporting. The current reportable quantity threshold for NRC reporting is 100 pounds over a 24-hour period. Many accidental ammonia releases that are stopped small and well-contained do not result in “serious injury” or “substantial property damage”. However, it is critical that IIAR members understand the new requirements and report to the CSB when applicable.

The Final Rule specifies that facilities will have 8 hours to report a covered incident to the CSB. This is an improvement over the Proposed Rule, which suggested a deadline of only 4 hours to make the report. In its comments to the CSB, IIAR expressed concerns that 4 hours was insufficient, as facilities are focused on emergency response in the first hours of an incident. Thankfully, the CSB acknowledged the need for additional time for reporting and extended the timeframe to 8 hours in the Final Rule.

**In December 2019, the CSB published a Proposed Rule that would comply with the court order and establish a new reporting requirement. IIAR, along with many others in industry, responded to the Proposed Rule commenting on the proposed provisions in an effort to minimize duplication and reporting burden for regulated facilities.**

ment that the agency develop a reporting mechanism to help identify incidents that warrant CSB investigation. While the legislation was enacted in 1990, and the CSB began operating in 1998, the agency had never finalized the reporting requirement included in the authorizing legislation.

Because the CSB receives reports of chemical releases from multiple sources, including the National Response Center (NRC), finalizing the reporting rule was not previously determined to be a priority. However, a legal challenge was brought against the CSB to compel them to finalize a reporting rule and the U.S. District Court for the District of Columbia ordered the CSB to complete a rulemaking by February 2020.

moves forward with the creation of an additional reporting requirement that IIAR members must recognize.

### KEY PROVISIONS OF THE FINAL RULE

The owner or operator of a facility must report any accidental chemical release resulting in a fatality, serious injury or substantial property damage. Serious injury is defined as any injury or illness that results in death or inpatient hospitalization. This definition was refined between the Proposed Rule and the Final Rule in response to comments made by IIAR and others that expressed concerns that the original definition was too broad and would capture minor incidents outside the interest of the CSB.

### CONTENTS OF THE REPORT

The report required under the Final Rule must include the following information regarding

an accidental release as applicable:

- (a) The name of, and contact information for, the owner/operator
- (b) The name of, and contact information for, the person making the report
- (c) The location information and facility identifier
- (d) The approximate time of the accidental release

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## GOVERNMENT relations

- (e) A brief description of the accidental release
- (f) An indication whether one or more of the following has occurred:
  - (1) fire
  - (2) explosion
  - (3) death
  - (4) serious injury
  - (5) property damage
- (g) The name of the material(s) involved in the accidental release, the Chemical Abstract Service (CAS) number(s), or other appropriate identifiers
- (h) If known, the amount of the release
- (i) If known, the number of fatalities
- (j) If known, the number of serious injuries
- (k) Estimated property damage at or outside the stationary source
- (l) Whether the accidental release has resulted in an evacuation order impacting members of the general public and others, and, if known:
  - (1) the number of persons evacuated
  - (2) approximate radius of the evacuation zone
  - (3) the type of person subject to the evacuation order (i.e., employees, members of the general public, or both)

Reports may be made by email to: [report@csb.gov](mailto:report@csb.gov), or by telephone at 202-261-7600.

### WHAT IF YOU ALREADY REPORTED TO THE NRC?

The Final Rule recognizes that in some cases a facility is already required to make a report to the NRC within a specified timeframe. In order to minimize duplication, the Final Rule states that if the owner or operator has submitted a report to the NRC the CSB reporting requirement may be satisfied by submitting the NRC identification number to the CSB within 30 minutes of submitting a report to the NRC. This is the most likely scenario for IIAR members, as the industrial refrigeration industry is already accustomed to

making reports to the NRC “immediately” after knowledge of a reportable incident.

If the owner or operator has not submitted a report to the NRC and notified the CSB

the owner/operator must submit a report directly to the CSB within eight hours of the accidental release.

### ENFORCEMENT

The Final Rule states that the CSB’s focus will be on education and compliance, not on “creating traps for the unwary”. However, the rule does make it unlawful for any person to fail to make reports required under the regulation. Suspected violations of the regulation will be forwarded to the EPA for possible enforcement action, which could include administrative penalties, civil

actions, or criminal actions. To allow adequate time for compliance education, CSB will provide a one-year grace period. The CSB has indicated that it looks forward to working with owner/operators and other stakeholders to help ensure compliance.

Moving forward, it is important for IIAR members to understand that they are now responsible for notifying the CSB of reportable incidents. In most cases, this will likely take the form of providing the CSB the NRC identification number within 30 minutes of contacting the NRC. However, there may be cases where facilities need to make a full report directly to the CSB. Members are encouraged to familiarize themselves with the regulation and be prepared to meet the new requirements.



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# Is an Ammonia Refrigeration Evaporative Condenser a Permit-Required Confined Space (PRCS)?

BRYAN HAYWOOD

**T**his article will explore the questions so many have regarding their evaporative condensers and OSHA's Permit-Required Confined Space standard(s) (29 CFR 1910.146 and 29 CFR 1926.1201 - .1213).

We will look at the two most common models/designs:

- 1) Forced Draft (fans are vertical and on the bottom section)
- 2) Induced Draft (fans are horizontal and on the top section)

Although both condenser designs will share an atmosphere between the top and bottom sections, depending on the model at your facility, the top and bottom sections most likely will need separate evaluations done because the physical hazards in these sections and the results may be different. For example, the lower section of an induced draft condenser may only be a "confined space", where the upper fan maintenance section is without a doubt a "permit-required confined space", because of the proximity to fan blades and power transmission devices. This is important to point out, because most condensers will in fact have two (2) spaces within the unit; each one needing its own evaluation and possibly its own labeling based on the outcome of the evaluation(s).

First things first, what makes an evaporative condenser a "confined space" (CS)?

In the USA, we use OSHA's criteria that any space that meets ALL THREE (3) of the following is defined as a Confined Space:

- 1) Is large enough and so configured that an employee can bodily enter and perform assigned work; AND
- 2) Has limited or restricted means for entry or exit; AND
- 3) Is not designed for continuous employee occupancy.

So, let's ask ourselves:

*Are condenser's "large enough and so configured that an employee can bodily enter and perform assigned work"?*

**YES.** Workers "bodily enter" (i.e. fully enter) this equipment for maintenance activities and once inside, have no problems moving around to do their assigned tasks.

In fact, many manufacturers are making their units easier to bodily enter and perform assigned work by making their entry portals larger. (More on these "larger openings" later)

Most forced-draft models have entry portals on both ends of the lower fan section, but once through the entry portal (i.e. manway) these models are quite "roomy" regarding confined space size standards.

In induced draft models that have top fans, the fan access area can be a tight squeeze to work in, but the space is actually provided by the manufacturer to bodily enter and perform assigned work on the fan and its power transmission devices. So clearly these spaces are large enough and so configured that an employee can bodily enter and perform assigned work.

*Do condensers have "limited or restricted means for entry or exit"?*

**YES.** Even with the two (or more) openings, ALL the entry/exit portals on all models I have ever seen pose a LIMITED OR RESTRICTED means of entry or exit! I like to say...

"Any opening that we have to slide/slither/crawl/climb/contort through is a "limited means of entry or egress" REGARDLESS of how many of these types of openings there are to enter or exit the space".

We can literally have dozens of openings of which we can slide/slither/crawl/climb/contort through and the number of openings means absolutely nothing – it is the size of those openings that matters.

Since this "limited or restricted means for entry or exit" characteristic seems

to be causing a lot of confusion due to some marketing/sales literature from some manufacturers, I thought it would be prudent to share OSHA's official position (since 1995) on how the phrase "limited or restricted means for entry or exit" is defined within the agency's OSHA Instruction CPL 2.100:

A space has limited or restricted means of entry or exit if **an entrant's ability to escape in an emergency would be hindered.** The dimensions of a door and its location are factors in determining whether an entrant can easily escape; however, the presence of a door does not in and of itself mean that the space is not a confined space. For example, a space such as a bag house or crawl space that has a door leading into it, but also has pipes, conduits, ducts, or equipment or materials that an employee would be required to crawl over or under or squeeze around in order to escape, has limited or restricted means of exit. A piece of equipment with an access door, such as a conveyor feed, a drying oven, or a paint spray enclosure, will also be considered to have restricted means of entry or exit if an employee has to crawl to gain access to his or her intended work location. **Similarly, an access door or portal which is too small to allow an employee to walk upright and unimpeded through it will be considered to restrict an employee's ability to escape.**

OSHA published a technical amendment to the preamble in Federal Register / Vol. 59, No. 213 / Friday, November 4, 1994, page 55208. (emphasis by me – NOT by OSHA)

Basically, for an entry/exit portal to NOT limit or restrict the means for entry or exit, the portal would need to be a FULL-SIZE door so the entrant could literally walk into the space as if he/she were walking into an office. And even



with this full size door, the space may still pose “limited or restricted means for entry or exit” due to the configuration of the space and equipment, such as piping, conveyors, and baffles, within the space.

So, with all that said, most evaporative condensers will have limited or restricted means for entry or exit.

*Are condensers “designed for continuous employee occupancy”?*

**NO.** Evaporative Condensers are designed to have water cascading down over refrigerant coils and have fan blades moving large volumes of air thru the unit. There is NO WAY any rational person can argue this space was “designed for continuous employee occupancy”. Offices, lunchrooms, training rooms, process production rooms and etc. are “designed for continuous employee occupancy” - NOT evaporative condensers.

We cannot confuse “maintenance access portals” provided by a manufacturer with the phrase “designed for continuous employee occupancy “. Just because a manufacturer provides a means to enter their condenser (as they all do), this in no way alluding that the space is “designed for continuous employee occupancy”. This debate regarding condensers is quite easy, because most manufacturers have placed DANGER signs at their entry portals telling the entrant that hazards are present behind the entry portal cover. If the space behind the cover was in fact “designed for continuous employee occupancy” there would be no hazards within the space and no need to place DANGER/CAUTION/WARNING signs at the portal(s).

So, we have a space, an evaporative condenser, that:

- 1) is NOT designed for continuous employee occupancy, AND
- 2) has limited or restricted means for entry or exit, AND
- 3) is large enough and so configured that an employee can bodily enter and perform assigned work

The results of our assessment tell us our evaporative condenser is a CONFINED SPACE.

But strictly in the terms of OSHA compliance, 29 CFR 1910.146 and



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## IS AN AMMONIA REFRIGERATION EVAPORATIVE CONDENSER A PERMIT-REQUIRED CONFINED SPACE (PRCS)?

1926.1201-.1213 do NOT apply to spaces that are determined to be merely a “confined space”. For these OSHA standards to apply to the space, the space must have a permit-required confined space (PRCS) hazard.

OSHA defines a PRCS as a “confined space” that has at least one (1) or more of the following hazard(s):

- 1) Contains or has a potential to contain a hazardous atmosphere; OR
- 2) Contains a material that has the potential for engulfing an entrant; OR

**I have yet to find anyone who has claimed their “treated water” is hazardous and has taken any of these steps mentioned above to properly manage their “treated water” as a hazardous chemical/material as spelled out in 29 CFR 1910.1200.**

- 3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; OR
- 4) Contains any other recognized serious safety or health hazard.

For the sake of time and space, I will not break down each of these four (4) categories of PRCS hazards because OSHA has done a nice job within both standards AND because we really only need to discuss two (2) of the hazard categories. Leaving out, for now, the discussion regarding the ammonia in the coils during entry, I do NOT believe condensers have:

- 1) a material that has the potential for engulfing an entrant, NOR do they have
- 2) an internal configuration such that an entrant could be trapped or asphyxi-

ated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section

Please understand that I have never managed treated or untreated condenser water cascading down into a basin that is knee-deep as an “engulfment hazard”. I keep hearing arguments put forth that the condenser water is “treated” with some hazardous chemicals and therefore “treated water” should be considered a “hazard”. Folks, I will never tell anyone who feels like something is a hazard to

not respect their feelings; however, if we truly believe our “treated water” is indeed a “hazardous chemical/material” we will need to take the following steps just to meet OSHA minimum safety standards regarding hazardous materials:

- 1) obtain or develop a SDS for this “treated water”,
- 2) ensure our condenser basins and feed tanks are properly labeled with appropriate hazard labels to reflect the hazard(s) of the “treated water”, and
- 3) label our “treated water” lines/piping per ASME A13.1, Scheme for the Identification of Piping Systems

I have yet to find anyone who has claimed their “treated water” is hazardous and has taken any of these steps mentioned above to properly manage their “treated water” as a hazardous chemical/material as spelled out in 29 CFR 1910.1200. But I digress – feel free to manage your “treated water” as

a “hazard” but it will NOT be an “engulfment hazard” in the vast majority of condensers due to the design, size, and configuration of most condenser basins.

HOWEVER, condensers do contain a “recognized serious safety or health hazard” because once we have entered, either the upper fan section on the induced draft models or the lower fan section on the forced draft models, we are exposed to UNGUARDED FAN BLADES and POWER TRANSMISSION DEVICE(S). These mechanical hazards make these spaces within the condenser a PRCS.

Now it’s time to discuss the 800-pound gorilla in the room and that is ammonia in the coils during entry. The main question is:

*Do we have to evacuate the NH<sub>3</sub> from the condenser coils before our entry?*

Well it looks like we have run out of time and space, so tune into the next “Condenser” edition for the answer. But I can give you a hint...

It depends on which entry method we want to use in our entry:

1910.146(c)(5) or 1926.1203(e) - Alternative Entry

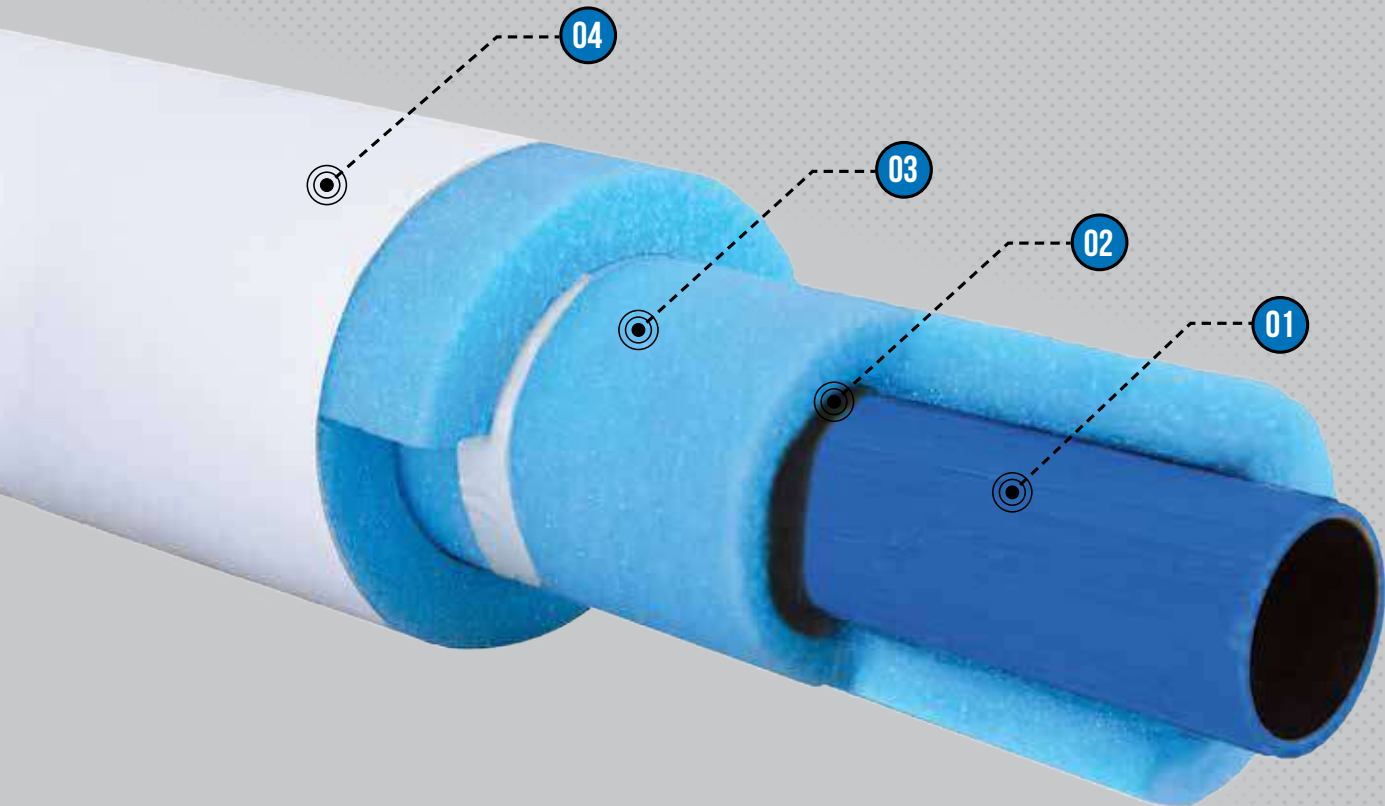
1910.146(c)(7) or 1926.1203(g) - Reclassification

1910.146(d)-(k) or 1926.1204 - 1926.1211 – FULL “permitted-entry”

It is also worth noting that if the work taking place within the permit-required confined space is installation work (i.e. construction work), then the facility AND the contractor will need to follow Subpart AA (Confined Spaces in Construction) 1926.1201 - .1213 rather than 1910.146 requirements.

The entry method will dictate entry requirements (e.g. rescue available vs. not having to have rescue available). But until then, I would suggest evacuating the NH<sub>3</sub>, properly isolating the NH<sub>3</sub> using one of the three (3) acceptable isolation means, and reclassifying your condenser to a NON-PRCS- unless, of course, the facility has mastered sections 1910.146(d) - (k) or 1926.1204 - .1213 and can meet at least the OSHA minimums related to “permitted-entries”.

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