



## Forum on Fire Protection Engineering: Challenges in Storage September 8 - 9, 2022

### Program Schedule

DAY 1 – Thursday, September 8	
7:30 a.m. Onsite Check-In	
8:00 – 8:15 a.m.	<b>Welcome and Introductions</b> ( <i>William Koffel</i> )
8:15 – 9:00 a.m.	<b>Wes Baker: Automatic Storage</b>  <b>Description:</b> Storage within warehouses has been changing over the past decade to allow for material handling of products via the use of robots while at the same time creating storage arrangements that minimize wasted space. This presentation will look at some of the automatic storage systems being used in warehouse environments, what the fire hazards are for these types of systems, full-scale fire testing that has been conducted on them, and the recommendations now offered in F.M. Global Property Loss Prevention Data Sheet 8-34, Automatic Storage and Retrieval Systems, for these types of storage systems.  <b>Learning Objectives:</b> <i>Attendees will be able to:</i> <ul style="list-style-type: none"><li>• Understand the various types of automatic storage and retrieval systems used in warehousing</li><li>• Understand what the fire hazards are created by these storage systems</li><li>• What testing has been conducted on these types of storage systems</li><li>• What recommendations are offered in F.M. Global Data Sheet 8-34 for these types of storage systems</li></ul>

<p>9:00 – 9:45 a.m.</p>	<p><b>Tracey Bellamy: <i>Protection of Multi-Row Rack</i></b></p> <p><b>Description:</b> This session will explore the current provisions of NFPA 13, 2022 Edition and F.M. Data Sheet 8-9, Interim Revision January 2022 related to the protection of multi-row rack arrangements. These provisions of these latest standards include a major change in protection required by previous editions for rack depths greater than 20 ft without internal flue spaces. These changes and their impact on the fire sprinkler system design will be presented and discussed along with along with relevant test data utilized to support the change.</p> <p><b>Learning Objectives:</b> <i>Attendees will be able to:</i></p> <ul style="list-style-type: none"> <li>• Define and identify a multi-row rack arrangement</li> <li>• Understand the impact of abutted loads and lack of internal flue spaces in a multi-row rack arrangement on the required sprinkler system design selection</li> <li>• Select appropriate design criteria using the provisions of NFPA 13 and F.M. Data Sheet 8-9</li> </ul>
<p><i>Morning Break (9:45 – 10:00 a.m.)</i></p>	
<p>10:00 – 10:45 a.m.</p>	<p><b>John LeBlanc &amp; Christina Francis: <i>Special Commodity Storage</i></b></p> <p><b>Description:</b> This session will look at the changing commodities that are showing up in general purpose warehouses. Many of these products are hard to identify, and the hazard is not always apparent. The two primary commodities that will be examined are cosmetics and consumer products that represent an ignitable (flammable and/or combustible) liquid hazard and lithium-ion batteries (cell storage through modules for cars) that can represent an ignition hazard up to a lithium-ion battery fire hazard.</p> <p><b>Learning Objectives:</b> <i>Attendees will be able to:</i></p> <ul style="list-style-type: none"> <li>• Recognize what cosmetic and consumer products create an ignitable (flammable and/or combustible) liquid fire hazard.</li> <li>• Understand how to use NFPA 30 at a high level to address the fire hazard created by cosmetic and consumer products.</li> <li>• Recognize what a lithium-ion battery is and when it can be found in general purpose warehouses.</li> <li>• Understand the fire hazards created by various types of lithium-ion battery cells or modules.</li> </ul>

10:45 – 11:30 a.m.

**John Frank: *Expectation gaps between the fire service, the code community, and the fire protection engineering community.***

**Description:**

Several large warehouse fires will be discussed in the context of expectation gaps between various stakeholders and how these gaps contributed to major losses. Specific topics will include final extinguishment of complex arrangements such as automatic storage and retrieval systems and multi-tier mezzanines, as well as smoke removal and impairment management. The presenter will share his experience as a firefighter who was part of a hose team that completed the final extinguishment of a fire in a large ASRS that was controlled by four sprinklers. Successful smoke removal from this fire with standard positive pressure ventilation will also be discussed. Existing but severely underutilized solutions will be discussed, along with previously proposed solutions that have yet to be acted on and needed future research.

**Learning Objectives:**

*Attendees will be able to:*

- Understand what can be done now to increase the likelihood of successful firefighting operations at warehouse fires.

Understand what the participant can do to enact future near-term solutions to improve firefighting operations.

**Sean DeCrane: *AutoStore Manual Fire Extinguishment and Disassembly: Firefighting Tactical Considerations***

**Description:**

In 2020 and 2021, U.L. and AutoStore opened a project to evaluate a potential fire service response to a sprinkler-controlled fire within an AutoStore system. Previous recommendations included the installation of remote master streams with the dismantling of the system to permit access to confirm or complete extinguishment. Due to the extensive damage, business interruption that would be experienced and the risk of injury to the responding fire fighters with this particular approach AutoStore was interested in an alternative approach. U.L. utilized our strong relationship with the U.S. fire service to bring in five fire service operation subject matter experts. The process began with modest goals and developed over three phases which included the development of a bin removal methodology and a scaled fire scenario and response where fire fighters from various departments deployed and implemented this removal strategy. This presentation will provide an overview of the three phases and include video to demonstrate the developed fire service tactical consideration for a fire service operation for a response to a sprinkler-controlled fire in an AutoStore system.

**Learning Objectives:**

*Attendees will be able to:*

	<ul style="list-style-type: none"> <li>Identify the process followed to develop tactical considerations for the fire service in responding to an AutoStore system.</li> <li>Review pre-incident considerations the owners and fire service shall undertake when considering the fire service response to an AutoStore system</li> </ul>
11:30 – 12:00 PM	<b>Speakers Panel</b> <i>(Moderated by William Koffel)</i>
<i>Lunch Networking Break (Noon – 1:00 p.m.)</i>	
1:00 – 1:45 PM	<b>Rob Vincent &amp; Josh Macke: <i>Cold Storage Concepts, Concerns and Lessons Learned</i></b>
1:45 – 2:30 p.m.	<p><b>Noah Ryder: <i>Sloped Ceiling Challenges</i></b></p> <p><b>Description:</b> This presentation will discuss the challenges that a sloped ceiling poses to sprinkler activation and spray patterns. Variables such as the ceiling slope, ceiling &amp; storage height, storage configuration, location of purlins &amp; girders, and other parameters will be covered. Conclusions from the extensive Fire Protection Research Foundation work will be covered along with advances in tools that can assist in assessing the performance of systems.</p> <p><b>Learning Objectives:</b> <i>Attendees will be able to:</i></p> <ul style="list-style-type: none"> <li>Attendees will learn the impacts that various parameters can have on activation time and water delivery</li> <li>Attendees will learn general guidance for acceptable ceiling slopes and when additional analysis may be required.</li> <li>Attendees will learn about the variations in sprinkler characteristics and what impact they can have.</li> </ul>
<i>Afternoon Break (2:30 – 2:45 p.m.)</i>	

<p>2:45 – 3:30 p.m.</p>	<p><b>Wes Baker, Kerry Bell, James Golinveaux: <i>Design Area for K-28 and K-33.6 ESFR</i></b></p> <p><b>Description:</b> Historically sprinkler designs where ESFR sprinklers have been used has always included 12 sprinklers as the design area. Many years ago the designs in F.M. Global Property Loss Prevention Data Sheet 8-9, <i>Storage of Class 1, 2, 3, 4 and Plastic Commodities</i>, introduced designs for ESFR sprinklers that were more than 12 sprinklers, and recently introduced designs that are less than 12. In the 2022 cycle of NFPA 13, proposals were submitted for ESFR sprinklers that would have allowed for designs less than 12 sprinklers. These proposals were not accepted by the Discharge Committee of NFPA 13. This presentation will address why the NFPA 13 Committee voted against introducing designs for ESFR sprinklers that would be less than 12 sprinklers as well as why F.M. Global has allowed for designs that involve less than 12 sprinklers.</p> <p><b>Learning Objectives:</b> <i>Attendees will be able to:</i></p> <ul style="list-style-type: none"> <li>• Review testing performed at F.M. to validate the new ceiling heights and the reduced design area</li> <li>• Discuss equivalent method criteria to NFPA 13</li> <li>• Understand the availability of this wet sprinkler system design and the consideration of the nominal K-28 and K-33.6 sprinklers during the 2022 and 2025 revision cycles for NFPA 13.</li> <li>• Become familiar with the considerations associated with the application of this system design including NFPA 13 equivalency as well as the criteria for the F.M. Approval.</li> </ul>
<p>3:30 – 4:45 p.m.</p>	<p><b>William Smith &amp; Rodger Reiswig: <i>Fire Sprinkler Challenges of Future Installation and Protection Criteria</i></b></p> <p>This session will focus on the specific challenges and controversial topics as it relates to storage structures and will review proposals for the 2025 edition of NFPA 72 as well as previous proposals that have been added or rejected for NFPA 72. Initiating devices, notification appliances as well as Mass Notification will be discussed with major focus on proposed changes, technology direction and inspection and testing of these systems.</p> <p>As NFPA 13 has developed over the last few decades, installation requirements and protection criteria have increased in complexity. NFPA 13 has evolved, writing and re-writing protection schemes and design criteria as additional test data have become available. This presentation provides insight to some of the challenges committee members face for the next edition and beyond.</p>

4:45 – 5:00 p.m.	Wrap up and Day 2 Overview ( <i>William Koffel</i> )
DAY 2 – Friday, September 9	
7:30 – 7:45 a.m.	<b>Transportation* to U.L. Solutions in Northbrook, IL</b> DEPARTURE FROM HOTEL  *Provided by generous support from U.L. Solutions.
7:45 – 8:00 a.m.	<b>Check-in</b> ALL GUESTS MUST BE PRE-REGISTERED AND WILL BE REQUIRED TO WEAR PROTECTIVE GEAR
8:00 – 10:30 a.m.	<b>U.L. Solutions Tours and Fire Test</b>
10:30 – 10:45 a.m.	<b>Transportation back to meeting hotel in Wheeling, IL</b> DEPARTURE FROM TESTING FACILITY
Lunch (11 a.m. – 12 p.m.)	

<p style="text-align: center;"><b>12:00 – 12:30 PM</b></p>	<p><b>Garner Palenske: <i>New ESFR Sprinkler Obstruction Requirements - What they are and how to use them</i></b></p> <p><b>Description:</b> Early Suppression Fast Response (ESFR) sprinklers are the workhorse of the storage sprinkler protection world. Their quick response and efficiency in delivering water flux to a storage fire distinguish them from other storage sprinklers. Yet, until recently, the effect common obstructions can have on ESFR performance was mostly unknown. This presentation will summarize the scientific basis of the new obstruction requirements for ESFR sprinklers found in both NFPA 13 and F.M. Global Data Sheet 2-0. A new obstruction analysis tool will also be demonstrated through the evaluation of real-world obstruction scenarios.</p> <p><b>Learning Objectives:</b> <i>Attendees will be able to:</i></p> <ul style="list-style-type: none"> <li>• Understand the basis of the new ESFR sprinkler obstruction requirements</li> <li>• Recognize the NFPA 13 obstruction analysis methodology, including the use of obstruction analysis tool (developed in the Fire Protection Research Foundation ESFR Sprinkler Research Project)</li> </ul>
<p style="text-align: center;"><b>12:30 – 1:30 PM</b></p>	<p><b>Robert Accosta, Jr.: <i>Escaping Tunnel Vision: A Holistic Approach to Addressing Life Safety and Fire Alarm Challenges in Storage Occupancies</i></b></p> <p><b>Description:</b> The integration of storage technology, evolution of product design, and desire to store at greater densities/heights continue to provide challenges in the design of life safety and fire alarm systems for storage facilities, warehouses and distribution centers. This presentation will further identify common challenges encountered during the design, construction and operation of these facilities as well as propose a holistic approach to addressing these challenges.</p> <p><b>Learning Objectives:</b> <i>Attendees will be able to:</i></p> <ul style="list-style-type: none"> <li>• Identify challenges associated with life safety and fire alarm design in these applications.</li> <li>• Explore a holistic approach to life safety system design</li> </ul>

1:30 – 2:15 p.m.	<p><b>John Denhardt: <i>Back to Reality - Applying Storage Criteria in the Real World</i></b></p> <p><b>Description:</b> Design criteria for storage have and continue to involve as more testing is completed. Addressing commodity classifications that do not fit into the examples provided in the annex of NFPA 13 can be a complex issue. Often, the design criteria specified for a project are not applicable to the actual building being built. The design team needs to coordinate the design criteria with the building design before a sprinkler contractor has been selected to avoid issues during the construction phase.</p> <p><b>Learning Objectives:</b> <i>Attendees will be able to:</i></p> <ul style="list-style-type: none"> <li>• Identify issues with building designs which will not work with certain design criteria</li> <li>• Explain product listing limitations that impact building designs</li> </ul>
Afternoon Break (2:15 p.m. – 2:30 p.m.)	
2:30 – 3:30 p.m.	Q&A Panel
3:30 – 3:45 p.m.	Wrap up ( <i>William Koffel</i> )

**Primary Locations:**

The Westin Chicago North Shore, 601 N. Milwaukee Avenue, Wheeling, IL

Tour/Fire Test: U.L. Solutions, 333 Pfingsten Rd., Northbrook, IL

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