

# Update on Suppression Research from the Research Foundation

2022 Fire Sprinkler International



June 1, 2022 | Amanda Kimball, Executive Director, Research Foundation



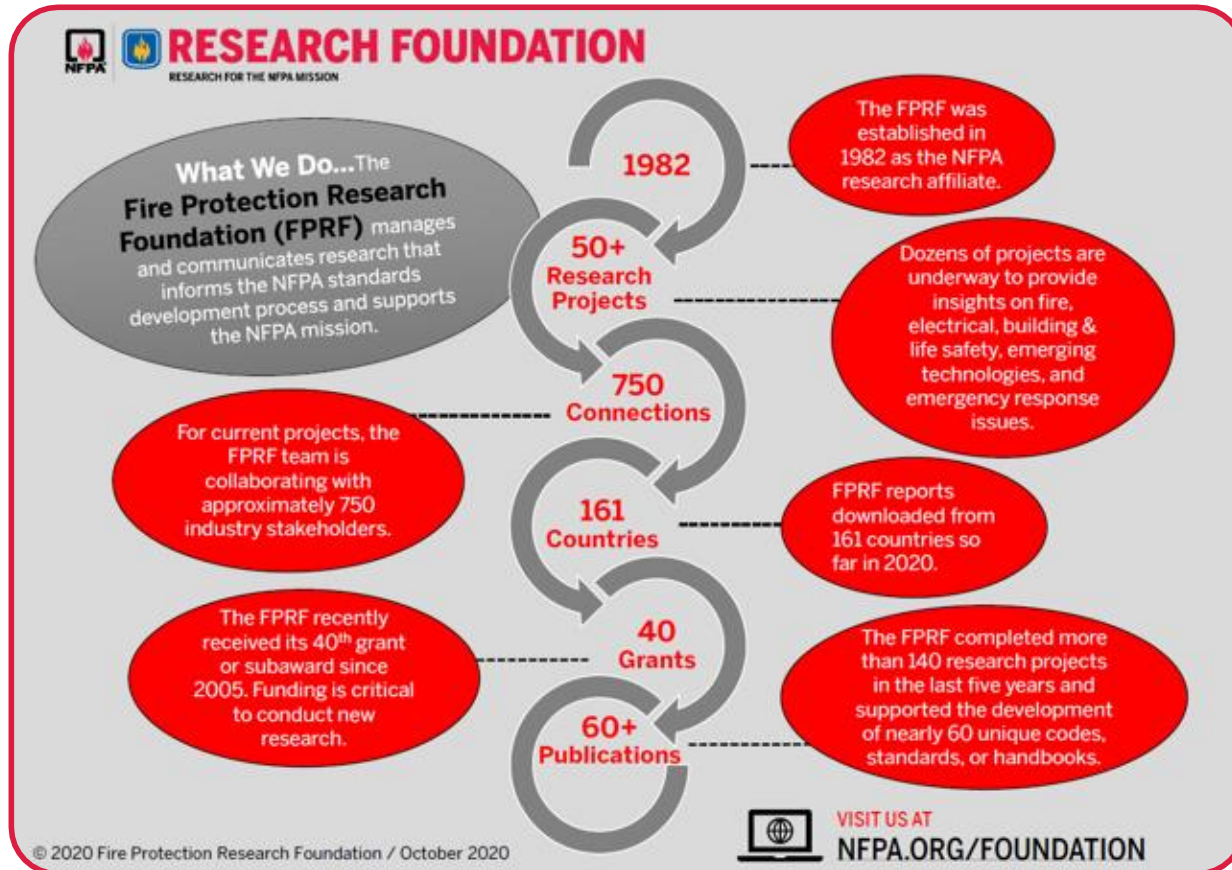
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# Who is the FPRF?

Independent charitable organization

- Formed by NFPA in 1982
- Intended to provide data to support the needs of NFPA codes & standards
- Research funds come primarily from:
  - Private and public sector consortia
  - Grants and government sources (e.g. DHS S&T, DOD, FEMA AFG, NIOSH, NIST, NSF, etc.)
  - Multiple other sources (including NFPA)



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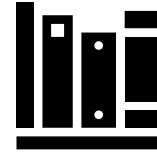
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# Relationship between NFPA and FPRF

**NFPA vision:** Be the leading global advocate for the elimination of death, injury, property, and economic loss due to fire, electrical and related hazards.

**NFPA mission:** To help save lives and reduce loss with information, knowledge, and passion.



**Mission:** The Research Foundation's mission is to plan, manage and communicate research in support of the NFPA mission.

**Vision:** To be the premier global research delivery organization for the elimination of death, injury, property and economic loss due to fire, electrical and related hazards.



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# FPRF Process



**FPRF Research is Driven by Stakeholder Needs**





# Characteristics of Foundation Projects

1. **Needs Driven** - technical committees, organizations/associations, manufacturers, end user groups, other affected interests
2. **Stakeholder Input** – advisory panel
3. **Expertise** – contractors selected through an open, qualifications-based process
4. **Transparency** – research reports available to all



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# 40 years of research

- 1<sup>st</sup> report: “Field Test of a Retrofit Sprinkler System
- Published in 1983
- Evaluated the use of plastic piping for hotel fire sprinkler retrofits



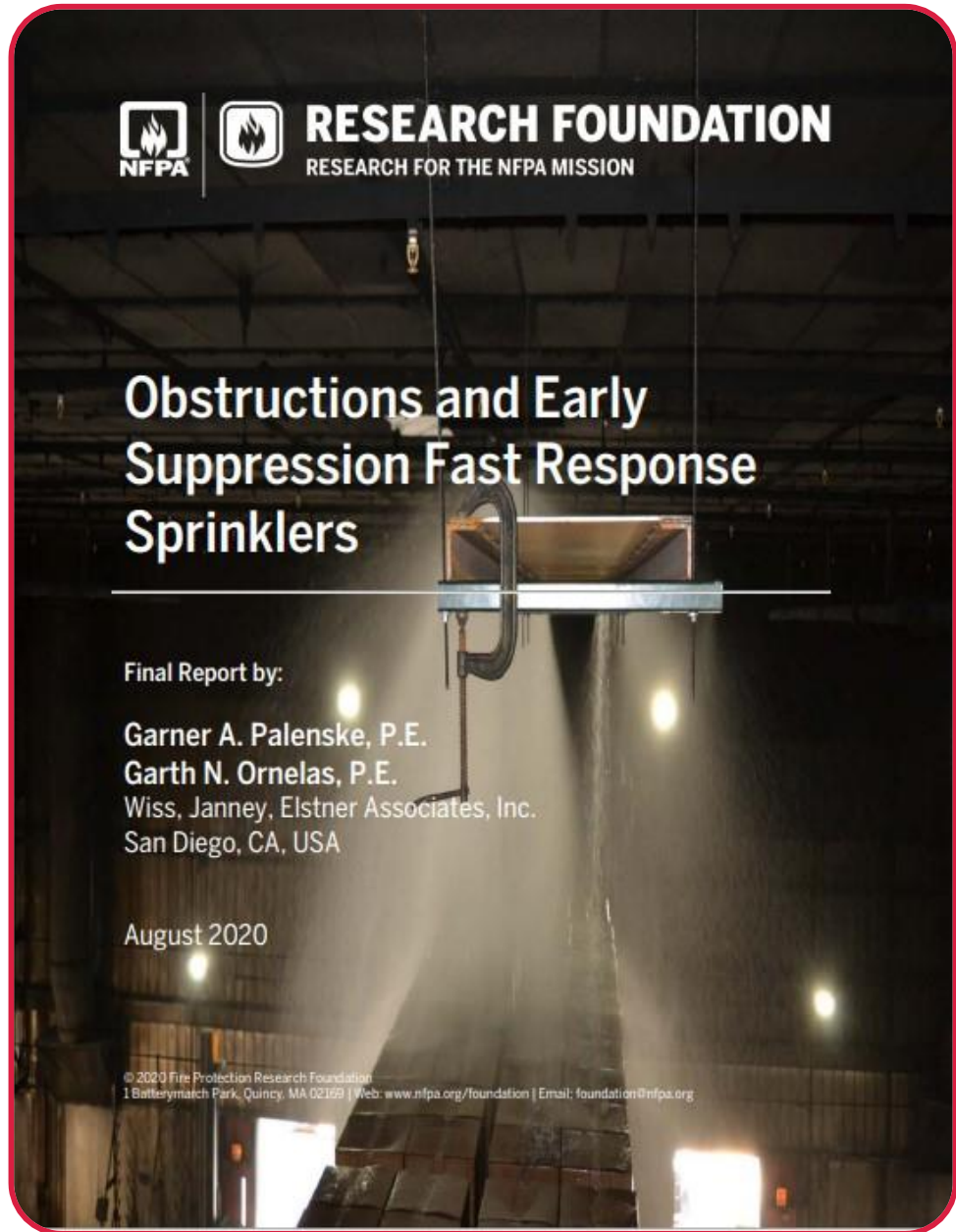
MGM Grand Fire, 1980



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# Recently Completed Research



- **Problem:** Prior to this research program, there had been some successful tests conducted with obstructions that are not allowable by NFPA 13 without eliminating the obstruction or adding sprinkler underneath the obstruction.
- **Goal:** To further investigate the impact of obstructions on ESFR sprinklers in a warehouse setting to inform the NFPA 13 technical committees.
- Four phases over 6 years
  - 65 Actual Delivered Density (ADD) tests
  - 9 full scale tests



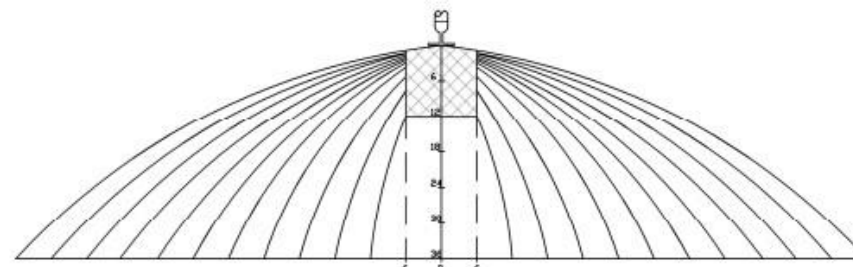
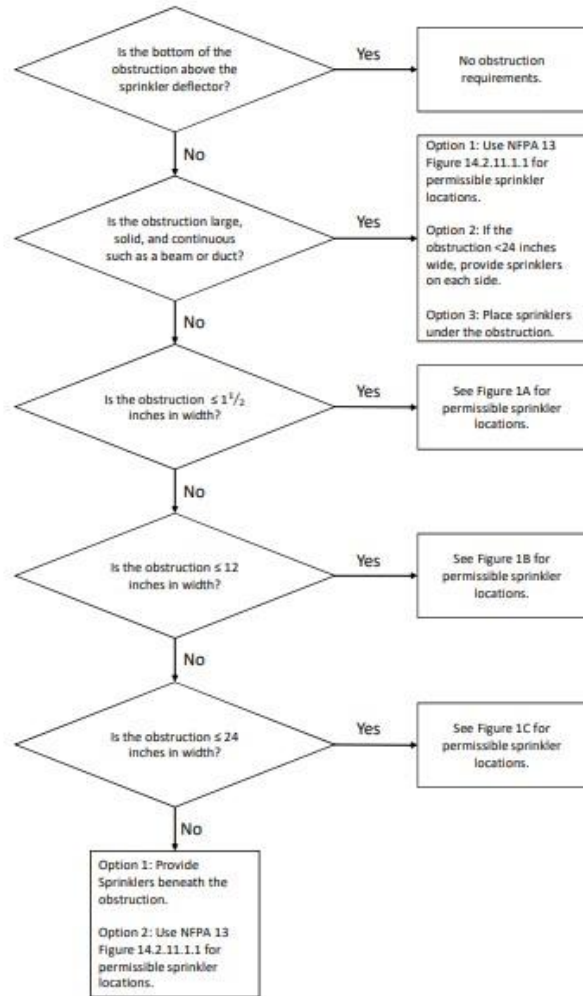


FIGURE 1A. OBSTRUCTIONS OF WIDTH  $\leq 1.5$  INCHES PERMITTED IN UNHATCHED AREA

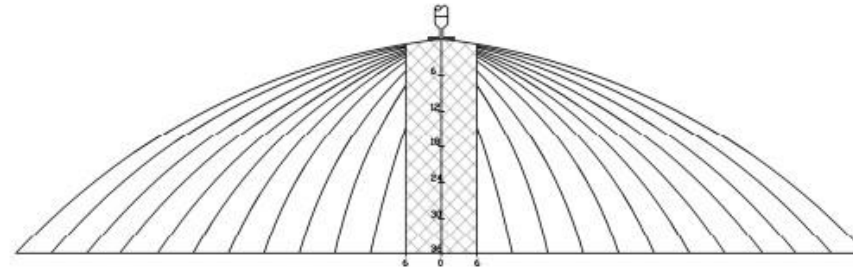


FIGURE 1B. OBSTRUCTIONS OF WIDTH  $\leq 12$  INCHES PERMITTED IN UNHATCHED AREA

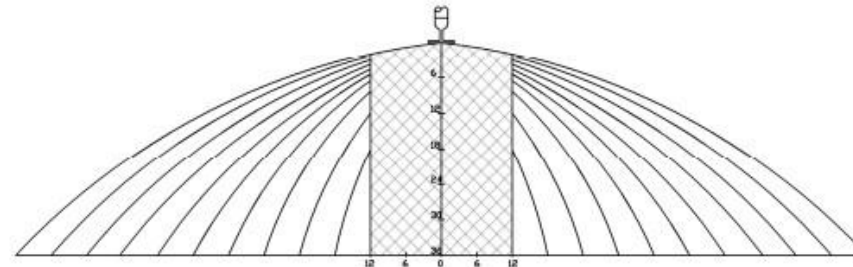


FIGURE 1C. OBSTRUCTIONS OF WIDTH  $\leq 24$  INCHES PERMITTED IN UNHATCHED AREA

Notes:

1. A large obstruction is defined as an obstruction where the sprinkler spray cannot be expected to reach both sides of the obstruction without creating a significant shadow on the other side of the obstruction.
2. Treat isolated and continuous obstructions the same.
3. Only the chord of open web steel trusses or bar joists is considered an obstruction (the web is not).

Figure 28. ESFR Sprinkler Obstruction Analysis Tool





**Impact on Codes & Standards:** NFPA 13 Technical Committee revised the 2022 edition to address

isolated and continuous obstructions below ESFR sprinklers.

**Impact on Industry:** Reduces challenges designers face by providing information and a tool that

simplifies the decision-making process for the placement of ESFR sprinklers in relation to obstructions.



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# Protection of Storage Under Sloped Ceilings Phase III: Large Scale Testing Summary and Guidance

Final Report by:

Stephen J. Jordan  
Noah L. Ryder, PhD, P.E.  
Fire & Risk Alliance  
Rockville, MD, USA

September 2020

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- Problem: Limited prior research related to protection of storage under ceilings with slopes steeper than 2/12
- Goal: Determine the impact of sloped ceilings on protection of storage and develop the technical basis for new requirements and guidance in NFPA 13
- Three phase project that culminated in full scale testing

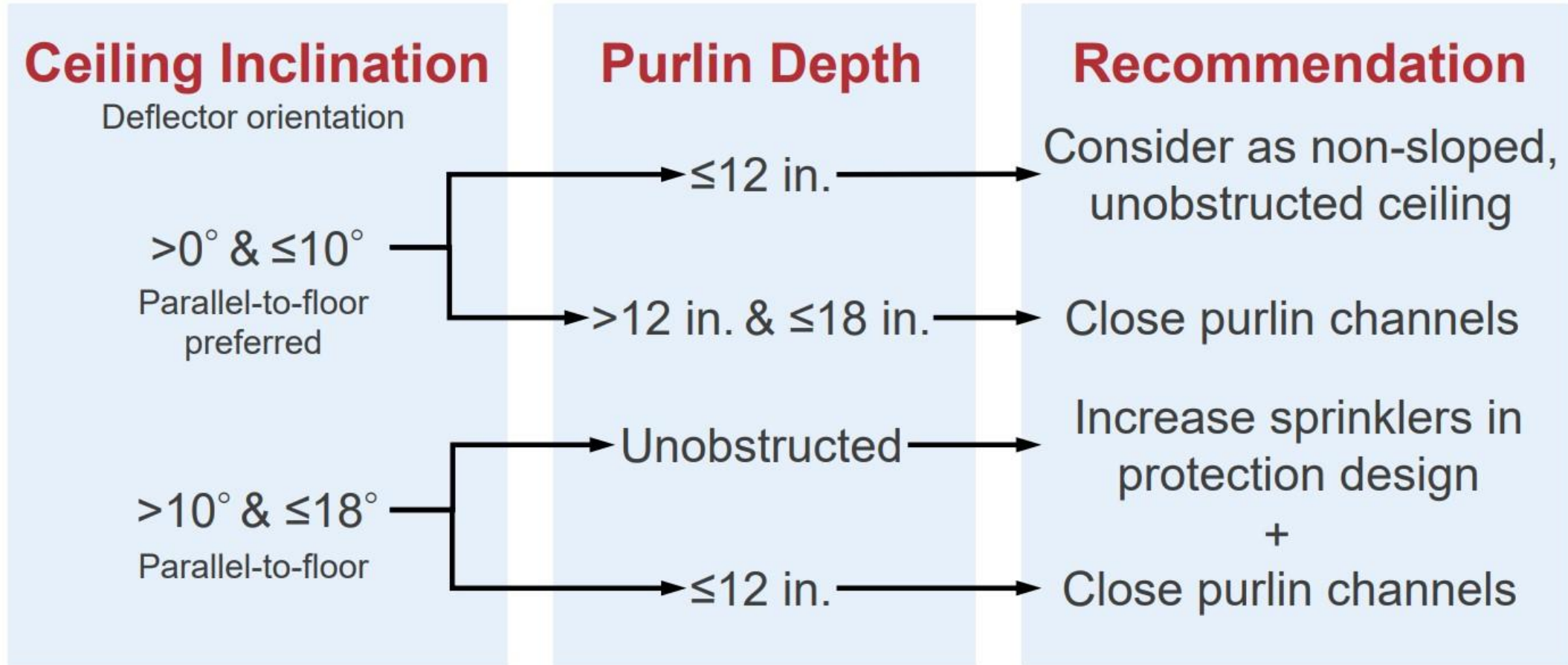


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# Guidance for sloped ceilings over storage





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## Performance Criteria for Aircraft Hangar Fire Protection Systems

Final Report by:

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College Park, MD, USA

Jack Poole, PE  
Poole Fire Protection  
Olathe, KS, USA

January 2022

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- Problem: No evaluation method for alternative fire protection for possible inclusion in NFPA 409
- Goal: Project reviewed alternative fire protection solutions for aircraft hangar facilities and established an evaluation method to assess their performance. Research and knowledge gaps were also documented for potential future work.
- Provided information to NFPA 409 committee for consideration for next cycle.



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Firefighters using firefighting foam on training fire

## An Evaluation of the Firefighting Effectiveness of Fluorine-Free Foams

**Problem:** There are knowledge gaps about the performance of Fluorine Free Foams (FFFs).

**Goal:** Conduct a blind study to assess the firefighting capabilities of five commercially available, UL listed (UL 162) FFFs.

Conducted 165 tests during this assessment.

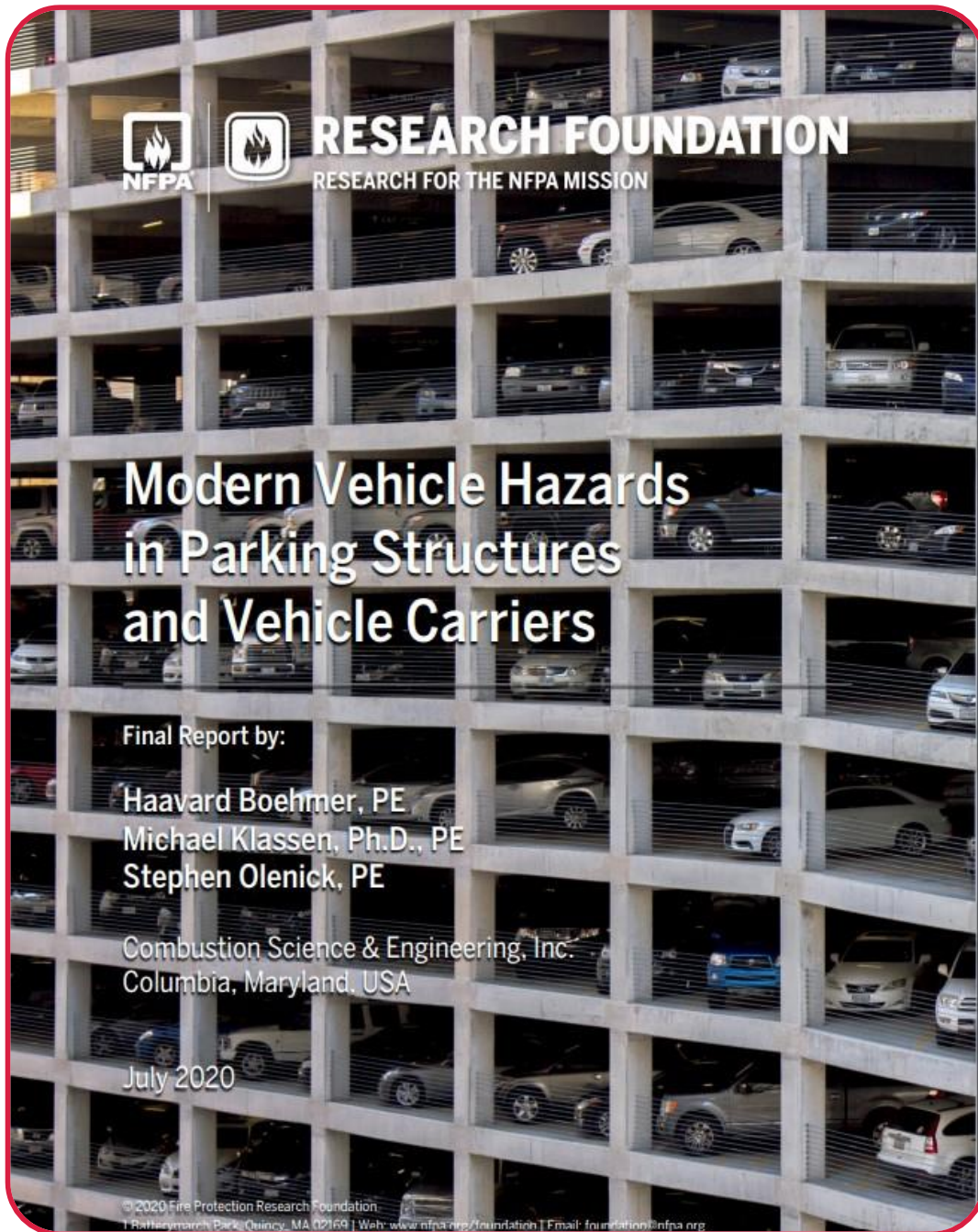


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# An Evaluation of the Firefighting Effectiveness of Fluorine-Free Foams

- The three major findings of this study include:
  - Foam quality/aspiration effects on the firefighting capabilities of FFFs,
  - Variations in extinguishment difficulty assorted with fuel type
  - Variations in capabilities between listed FFFs
- Impacts on NFPA 11: findings from this study were summarized as a new Annex H, “Synthetic Fluorine-Free Foam (SFFF) Research Testing Summary.”
- Impacts on Industry: Provided information and knowledge for other industrial reference documents such as the American Petroleum Institute’s foam transition guidance document.



**Problem:** There have been several high-profile parking garage fires.

**Goal:** Analyze currently available information regarding the fire hazard modern vehicles represent to parking garage and marine vessels, as well as knowledge gaps and areas of research required to address the hazard.



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Firefighter fighting a car fire

# Impacts of research

## **Impact on Codes & Standards:**

Provided information to technical committees for NFPA 13 and NFPA 88A, *Standard for Parking Structures*.

**Impact on Industry:** Raises awareness to the fire protection community on the hazards of modern vehicles and the potential need to update fire protection requirements for open garages.



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# Ongoing Research

# Cost and Impact of Fire Protection in Buildings

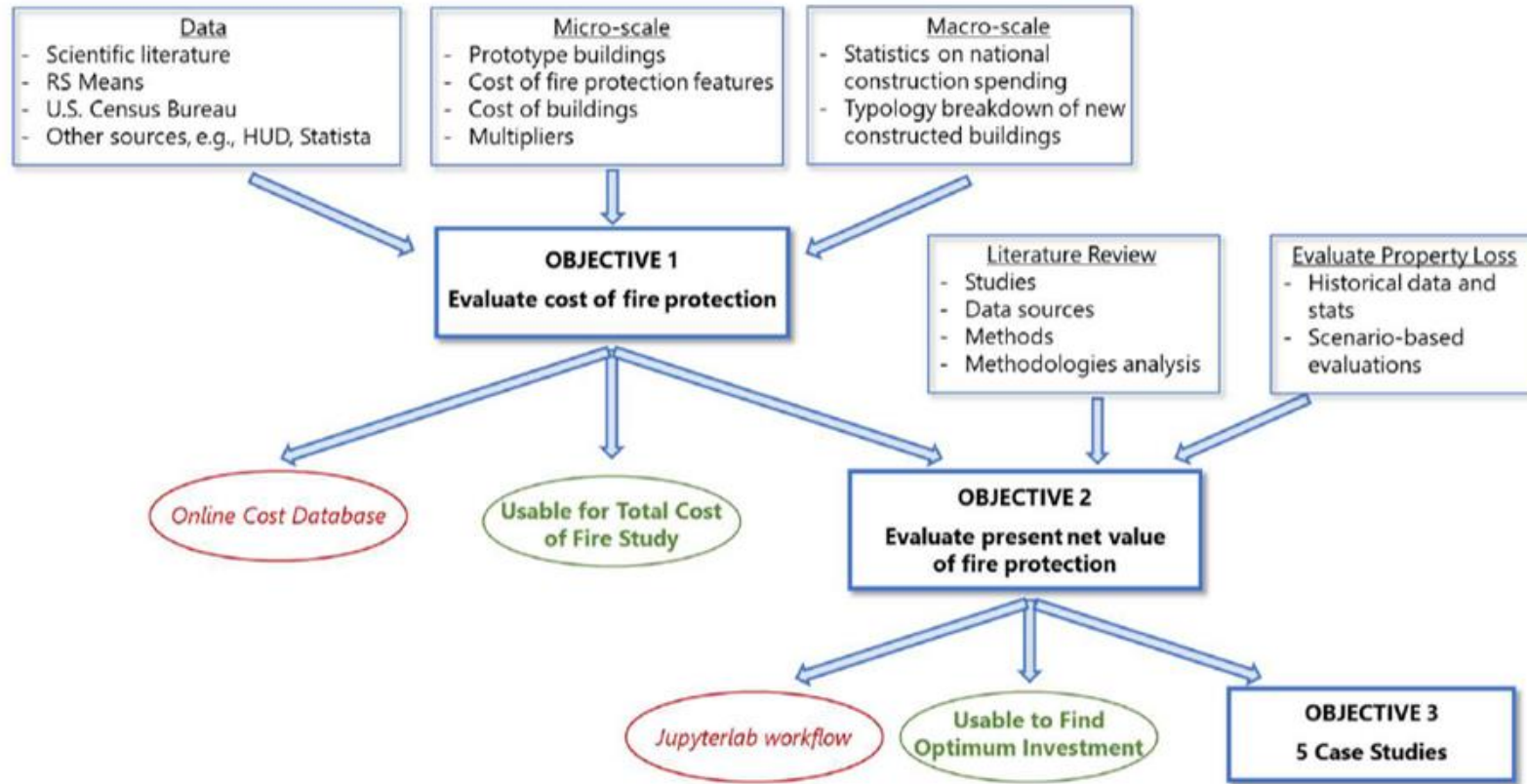


Figure 1. Flowchart of the project scope, approach, and outcomes.

# Impact of Elevated Walkways in Storage on Sprinkler Protection

- Problem: There are knowledge gaps related to the impact of walkways and mezzanines on sprinkler performance.
- Overall Goal: Provide technical substantiation and guidance for sprinkler protection in the presence of elevated walkways in storage occupancies. This phase aims to fill the knowledge gaps identified in Phase I and implement the research and testing plan to provide guidance back to the NFPA 13 technical committee.

# Review of Oxygen Reduction Systems for Warehouse Storage Applications

- Problem: Concerns with the applicability of the test standards to real-world scenarios in warehouse storage applications.
- Goal: Develop both a prescriptive and performance-based design approach to select design oxygen concentrations for oxygen reduction system installations in warehouse applications.
- Expected Fall 2023

What is next?

# How to get involved?

## Submit a research idea to FPRF

- Visit [www.nfpa.org/foundation](http://www.nfpa.org/foundation)
- Submit research idea via online submission portal

## FPRF Research Consortiums

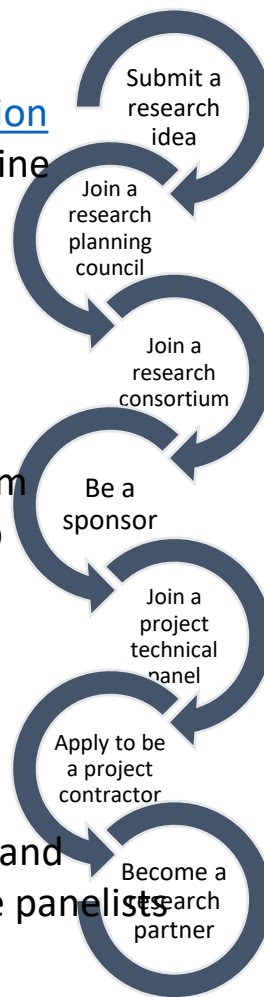
- Energy Storage Research Consortium
- Property Insurance Research Group
- Facilities Research Consortium

## Serve on a project technical panel

Let FPRF know your areas of expertise and interest in being considered as a future panelist

## Partner with FPRF

Partner with FPRF on future research through our advisory services program



## FPRF Research Planning Councils

- Detection and Signaling Research Council
- Automatic Sprinkler Research Council
- Electrical Safety Research Advisory Council

## Sponsor FPRF projects, webinars, or events

- Provide input on project scope and direction
- Provide input over the course of the project
- Get early access to results
- Brand visibility

## Apply to be the research lead for FPRF Projects

Bid on FPRF “Requests for Proposals” to have the opportunity to become a contractor on FPRF projects



# Submit a Project Idea

[www.nfpa.org/foundation](http://www.nfpa.org/foundation)



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Customer Support / Research Project Idea



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### Research Project Idea



#### Instructions:

- This form is intended to gather project ideas from our stakeholders. It is not an application for a research grant. The consideration and implementation of all project ideas will be in accordance with [FPRF Policies, Operating Principles, and Vetting Criteria](#).
- By submitting this form to the FPRF, the submitter acknowledges that the Foundation may conduct a research project by issuing an open request for proposals for a project contractor in accordance with the [FPRF Policies](#) (unless waived in certain circumstances).
- A project idea form may be considered for the Research Fund selection process. For more information about the Research Fund evaluation process, please visit [www.nfpa.org/NFPAresearchfund](http://www.nfpa.org/NFPAresearchfund).
- To submit a research project idea, complete all fields below and submit the form. Since you cannot save the form and submit at a later time, we suggest that you complete the required fields using [this word document](#) and when you are ready to submit, complete the submission by using the online system.
- If you have any questions, please contact us at [research@nfpa.org](mailto:research@nfpa.org).

#### Please complete the fields below.

Project Type:

- *Small Project* (e.g. Literature Review, Gap Analysis, Code Comparisons, Loss Summaries)
- *Large Project* (e.g. Fire Testing, Computer Modelling, Field Surveys, Risk Assessments)
- *Workshop* (e.g. Research Planning Meeting)
- *Project Concept* (e.g. Research concept, project idea that is not fully developed)
- *Advisory Service* (e.g. If you need the Foundation's assistance with project management where the submitter leads the research. For more information, visit the [Advisory Service page](#).)

Project Source:

Project Source (If Other, Please Specify):

Proposed Project Name:

(75 characters or less)



# Suppression Research Planning Council

- **Mission:** To enhance the design and installation of fire sprinkler systems through research and education in support of NFPA 13.
- **Membership:** Open to all with an interest in furthering the mission, strong connection to NFPA 13 Technical Committees

## **Activities:**

- Prioritize research
- Resource for advisory panels
- Support communication of results



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- Joint Research Planning meeting between AFSA, NFSA, and FPRF Suppression Research Planning Council
- Planned for June 5<sup>th</sup> at NFPA Conference in Boston

- Gathered research needs from each group via a survey
- Compiling all needs so that the participants at the meeting can prioritize
- Objective is to identify 3-5 high priority research needs of the suppression industry



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# SUPDET

- September 13 – 16<sup>th</sup>
- Sheraton Atlanta Hotel
- Atlanta, GA



# Thank you



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