



THE FIRE PROTECTION RESEARCH FOUNDATION

Capabilities and Limitations of Compressed Air Foam Systems (CAFS) for Structural Firefighting

PROJECT SUMMARY

29 August 2011

Background: Compressed air foam (CAF) used for firefighting involves applying a solution of water and a class-A foam concentrate to control or extinguish a fire. In the 1970's this technique gained popularity for use in wildland fire fighting, and in the decades that followed it was further adapted for fighting structural fires. This included it being incorporated into apparatus used by urban/suburban fire departments.

Over the years, however, the use of this technology for structural firefighting has not matured as had been anticipated. Despite generally favorable reviews on the overall extinguishing capabilities of CAFS, questions and concerns remain on certain performance characteristics such as operational tactics, maintenance, and reliability. Previous research on this topic has been limited and this project seeks to provide a comprehensive scientific study on the use of CAFS for structural firefighting.

Research Goal: The goal of this project is to investigate the capabilities and limitations of CAFS for interior structural firefighting to produce a better understanding of its effectiveness and safety implications.

Affected NFPA Documents: This project is directly applicable to the requirements addressed by NFPA 1145, *Guide for the Use of Class A Foams in Manual Structural Fire Fighting*. This project is also applicable to NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program* and other NFPA codes and standards.

Project Tasks: This two year project is led by California Polytechnic State University (CalPoly) and involves a collaborative effort with the National Institute of Standards and Technology (NIST) and Fire Protection Research Foundation (FPRF) in coordination with fire service partners. The project involves the following tasks:

- **Task 1: Advisory Panel.** Establish and administer an advisory panel to provide on-going guidance to the project research team.
- **Task 2 Literature Review.** Collect and analyze background information in the published literature applicable to this study, with consideration of performance characteristics such as operational tactics, maintenance, and reliability. Collect credible information on the effective and ineffective use of CAFS by the fire service.

- **Task 3: Workshop.** Conduct a workshop with interested and experienced parties to discuss safety effectiveness implications associated with CAFS, and to review and discuss the proposed project research plan. This includes clarifying the specific details proposed for conducting the Fire Tests (Task 4) and Fireground Evolutions (Task 5).
- **Task 4: Fire Tests.** Conduct and analyze a series of well-instrumented large-scale enclosure fire tests at the NIST fire research lab or similar suitable location, using plain water (as a baseline) and CAFS to evaluate the effectiveness and safety of CAFS for interior structural firefighting.
- **Task 5: Fireground Evolutions.** Conduct and analysis a number of fireground evolutions to evaluate differences between CAFS and plain water hose lines related to issues such as effective hose stream throw and distribution, forces needed to carry and move hoses streams both horizontally and vertically, forces need to kink hose lines and other topics identified during the workshop
- **Task 6: Reporting and Dissemination.** Finalize documentation, generate project report, and widely disseminate project deliverables.

Project deliverables will be a detailed report on the literature search, summary of the CAFS Workshop, results of the CAFS fire tests, results of the fireground evolutions, analysis of the effectiveness of CAFS, and recommendations for the implementation of this technology.

Implementation: The research program will be conducted under the auspices of CalPoly and will receive guidance throughout the project by a Project Technical Panel. Funding for this project is provided through a DHS/FEMA Assistance to Firefighters Grant. The final report is scheduled to be issued by July 2013.