



Amy Beasley Cronin  
Secretary, Standards Council

23 March 2012

To: Interested Parties

Subject:

Standards Council Decision (Final):	<b>D#12-2</b>
Standards Council Agenda Item:	<b>SC#12-3-8</b>
Date of Decision*:	6 March 2012
<i>In re "Antifreeze Solutions Supplied through Spray Sprinklers: Interim Report"</i> (Fire Protection Research Foundation, February 21, 2012)	

Dear Interested Parties:

At its meeting of March 5-6, 2012, the Standards Council issued a decision on the above-referenced matter.

Attached is a copy of that decision.

Sincerely,

A handwritten signature in black ink that reads "Amy Beasley Cronin".

Amy Beasley Cronin  
Secretary, NFPA Standards Council

- c: D. Berry, M. Brodoff, L. Fuller, M. Klaus, E. Carroll  
Members, TC on Residential Sprinkler Systems (AUT-RSS)  
Members, TC on Sprinkler System Installation Criteria (AUT-SSI)  
Members, TCC Automatic Sprinkler Systems (AUT-AAC)  
Members, TC on Inspection, Testing, and Maintenance of Water-Based Systems (INM-AAA)  
Members, NFPA Standards Council (AAD-AAA)  
Individuals Providing Appeal Commentary

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\*NOTE: Participants in NFPA's codes and standards making process should know that limited review of this decision may be sought from the NFPA Board of Directors. For the rules describing the available review and the method for petitioning the Board for review, please consult section 1.7 of the NFPA Regulations Governing Committee Projects and the NFPA Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council. Since this Council decision is not "related to the issuance of a document" as referenced in 1.7.2 of the Regulations Governing Committee Projects, notice of the intent to file such a petition must be submitted to the Clerk of the Board of Directors within a reasonable time period.



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At its meeting of March 5-6, 2012, the Standards Council reviewed a report recently issued by the Fire Protection Research Foundation (hereafter, “the Research Foundation”) entitled, “Antifreeze Solutions Supplied through Spray Sprinklers: Interim Report” (hereafter, “the Non-Residential Report”).

The Council’s consideration of the Non-Residential Report is part of ongoing activities within the NFPA standards development process relating to the use of antifreeze in automatic sprinkler systems to protect piping in unheated areas subject to freezing temperatures. The background relating to this subject can be accessed in greater detail in previous decisions of the Council (See Standards Council Decision #10-10 [SC #10-8-15 thru 10-8-20, August 5, 2010] and SC Decision #11-5 [SC #11-3-3-e, 11-3-4-e and 11-3-5-d, March 1, 2011]; see also SC Minute Items 10-10-21 [October 2010], 11-3-6 & 7 [March 2011], and 11-8-48 [August 2011]). This and other information, including previous Research Foundation reports can be found at [www.nfpa.org/antifreeze](http://www.nfpa.org/antifreeze).

For present purposes, it suffices to say that standards development activities related to antifreeze began when reports emerged of an August, 2009, fire incident that occurred in an apartment in Truckee, California. Information concerning the incident raised concerns surrounding the combustibility of antifreeze solutions in residential sprinkler systems. These concerns led to intensive activity within the research community, including two reports by the Research Foundation, as well as extensive consideration within the NFPA standards development process. As a result, Tentative Interim Amendments (TIAs) to NFPA sprinkler standards were issued in March 2011 that, in various ways, regulate the use of antifreeze in sprinkler systems and specify limits on the concentrations of antifreeze that are permitted in sprinkler systems. Because the concerns with antifreeze had arisen in the context of residential fire sprinklers systems, the research had focused on studying the use of antifreeze in residential sprinkler systems. As a precautionary measure, however, the responsible technical committees applied the new limits on antifreeze to nonresidential commercial applications as well as to residential applications. See, generally, SC Decision #11-5. The Council regarded the inclusion of limits on the use of antifreeze in commercial sprinkler systems as an important step See SC Decision #11-5 at page 3. At the same time, it stressed that the consideration of issues related to antifreeze was not at an end, and specifically noted that the use of antifreeze in commercial applications (generally, applications using spray sprinklers) was an area for further research.

At its August 2011, meeting, the Council again expressed its expectation that interested parties would continue investigation and research aimed at insuring the safety of freeze protection in sprinkler systems and the adequacy of all of the current antifreeze limits. See SC Minute Item 11-8-48 (August 2011 Standards Council Minutes). It stressed that it was not the Council's role to identify all gaps in the research that may exist. Nevertheless, it pointed in the following terms to one gap, in the area of commercial sprinkler protection, which had been clearly identified in the available reports:

[T]he data that has been generated in the recent research on residential sprinklers has been extrapolated to standard spray sprinklers (i.e. commercial sprinklers). Standard spray sprinklers have different characteristics than residential sprinklers and research appears to be necessary to verify that the extrapolation of the data obtained on residential sprinklers is either valid for standard spray sprinklers or needs adjustment.

Id.

The Council then requested that interested parties report back to the Council on plans and progress toward filling that gap at its March 2012 meeting.

Following this request, the Research Foundation was able to fund and carry out an initial program of testing on antifreeze using spray sprinklers. The results have now been published in the Non-Residential Report. This report was submitted to the Council in response to its request of August 2011, and an oral presentation on the report was provided by Kathleen Almand, Executive Director of the Research Foundation, and Steve Wolin, of Code Consultants, who authored the report.

The Council has affirmed many times, including in the context of the activity surrounding antifreeze in sprinkler systems, that it is generally not the Council's role to fully analyze technical data and make its own judgments about the content of NFPA standards. That is generally the task of the responsible consensus technical committees. Nevertheless, it is clear that the Non-Residential Report raises significant concerns about whether the current limits on antifreeze in commercial applications contained in NFPA standards are adequate.

Generally speaking, the testing referenced in the Non-Residential Report was developed, along lines similar to "Scope A" of the Research Foundation's prior research on residential sprinkler systems, to investigate the potential for ignition of antifreeze supplied through nonresidential, spray sprinklers. Unlike the Research Foundation's research into residential sprinklers, the scope of this project did not include a "Scope B" investigating the effectiveness of the antifreeze sprays in controlling a fire condition. Investigating the potential for ignition, however, was identified as particularly important to developing requirements for antifreeze solutions used with spray sprinklers.

As with the residential sprinkler testing program, the spray sprinkler testing used antifreeze solutions of 50% glycerine (tests on 40% propylene glycol were omitted on the assumption, based on the prior research, that the performance would be similar to that of 50% glycerine). Solutions of 50% glycerine and 40% propylene glycol performed well in the residential sprinkler tests and were described as acting similar to water in the reports summarizing those tests. Based

on this, a maximum allowable concentration of 48% glycerine and 38% propylene glycol (after a factor of safety was applied) was generally permitted in the March 2011 TIAs (See SC Decision #11-5 and SC Minute Item 11-3-6).

As documented in the Non-Residential Report, however, spray sprinklers did not perform well in many of the tests. In the earlier residential sprinkler tests using 50% glycerine, ignition of the spray pattern was not seen. In the Non-Residential Report, however, ignition of the spray pattern occurred in 4 of the 15 fire tests, and in many of the 15 tests substantial increases in heat release rates were recorded. For example, tests 2 and 15 experienced spray pattern ignition. See Non-Residential Report at pp. 6 and 8. In addition to the tests noted at 8 feet and 15 feet, tests at 20 feet experienced ignition of the solution and substantial increases in heat release rates, including increases as high as 8 MW and 22 MW. As the Non-Residential Report noted with respect to the 20 foot tests, “substantial ignition of the antifreeze spray and flames extending away from the ignition source were observed during two of the tests with the sprinkler positioned at 20 ft above the floor.” See Non-Residential Report at p. 6.

The above discussion is not meant to describe or analyze the Non-Residential Report in depth or set forth all its results or areas of concern. It does illustrate, however, that the Non-Residential Report raises serious concerns that need to be reviewed and addressed. At a minimum, and as the Non-Residential Report itself suggests, “the results of this test program indicate that limitations should be considered on the use of 50% glycerine or 40% propylene glycol antifreeze solutions in non-residential sprinkler systems.” See Non-Residential Report at p. 10.

As the Non-Residential Report indicates, further research will be required to fully understand how to address the use of antifreeze with spray sprinklers. A supplement to the Non-Residential Report documenting some limited additional testing is expected to be completed in April 2012, but it clearly will not answer all remaining questions. As was the case with residential sprinklers, however, the absence of full research data does not mean that standards development activities must await the funding and conduct of a complete research program. As with residential sprinklers, interim emergency action can and should be taken if a safety hazard has been shown to exist with the use of antifreeze with spray sprinklers as currently permitted by NFPA standards. The Council, therefore, is requesting that the responsible committees meet and review the Non-Residential Report (and any supplemental report, as it becomes available) as soon as possible.

The Automatic Sprinkler Project and the NFPA 25 TC should take one of the following steps. These technical committees should process Tentative Interim Amendments (TIAs) for submission to the Council no later than its August 2012 meeting. Should the Committees wish to act prior to the August 2012 Council meeting, the Council will make every effort to expedite its consideration of the matter through a special meeting or letter ballot. If TIAs are not proposed, the committees should provide the Council with a full report detailing why the current antifreeze requirements do not require revision based on the findings of the Non-Residential Report (and any supplement), and why the findings of the Non-Residential Report do not present safety concerns requiring emergency action.

Roland Huggins recused himself from the vote on the issue.