

The goal is in sight

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The CSMA Aerosol Storage and Warehousing effort is now in its eighth year. We have made great strides in recent months due to the outstanding results of the latest fire tests at Factory Mutual in February of this year, and the recent approval by NFPA for the formation of a new code committee to cover aerosol storage, warehousing and manufacturing.

The development of ESFR sprinkler technology for high challenge fire scenarios such as aerosol and plastic products in storage is in its final stages. Factory Mutual (FM) has developed a product approval standard for the sprinkler hardware and an installation standard in now ready for publication. FM has received and is testing several pieces of hardware for approval as ESFR sprinklers. The cur-

rent estimate is for hardware approval by September with commercial production of ESFR sprinklers available by the first of the year.

Going into this program, the objective of ESFR technology was to detect and suppress a fire quickly, while the fire was in its early stage of development. In doing so, the heat, smoke and water damage would be limited. Specifically, the goal was to suppress the fire with four or fewer ESFR sprinkler heads operating.

The CSMA Aerosol Storage Task Force recently conducted a series of full scale tests of a production model ESFR sprinkler on Level II and III aerosol products with dramatically successful results. In all three test scenarios, four ESFR sprinklers operated and suppressed the fire in both

palletized and rack storage arrays of aerosol products. This test series demonstrated that aerosol products fall under the umbrella of ESFR sprinkler protection for buildings up to 25 feet in height.

Achieving that level of protection for the warehousing of aerosol products is quite an accomplishment. Current conventional automatic sprinkler system designs are based on anywhere from 30 to 60 sprinkler heads operating to control a warehouse fire. It should be noted that those designs per-

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TARGET AREAS FOR CODE REVISION MANUFACTURING AND WAREHOUSING OF AEROSOLS 1987-1990

NFPA

National Fire Protection Association
Batterymarch Park
Quincy, Massachusetts

Publishers of present NFPA Code 30, including Sub Chapter 4, covering storage and warehousing of aerosols

New Aerosol Code Committee approved for manufacturing and warehousing 4/24/87.

BOCA Building Officials and Code Administrators

Country Club Hills, Illinois
Publishers of the BOCA National Building Code and Fire Prevention Code for the East and Midwest.

SSBC Southern Standard Building Code

Birmingham, Alabama
Publishers of Building Code and Fire Prevention Codes for the Southern States and Texas

ICBO International Conference of Building Officials

Whittier, California

Publishers of Uniform Building Code (UBC)

Publishers of Uniform Fire Code (UFC)

Written by the western Fire Chiefs Association which covers the 15 Western States

A BRIEF CHRONOLOGY OF THE AEROSOL STORAGE ISSUE

April 1983

Factory Mutual issued revised Data Sheet 7-29S, containing significant revisions based on CSMA test data and other input.

NFPA Standards Council denied CSMA's petition for a new project to modify aerosol standards in Code 30.

October 1983

CSMA conducted fifth fire test (Phase II, Series I); fire tests under 25-foot ceiling; first test using 0.64" head with 160°F, 50 RTI link (Viking quick response).

April 1984

CSMA Task Force begins deliberations to support efforts to develop more effective quick response sprinklers, including Early Suppression - Fast Response (ESFR) project begun by Factory Mutual.

January 1985

CSMA conducted sixth fire test series (Phase II, Series 2); first rack storage tests, designed to simulate ESFR sprinklers.

February 1985

CSMA decided to become a principal sponsor of the National Fire Protection Research Foundation (NFPRF) Quick Response Fire Sprinkler Project through a \$100,000 contribution, and to begin a Phase III fund-raising effort.

January 1986

Additional CSMA fund-raising effort begun to ensure sufficient funds to complete Phase III testing.

June 1985

NFPRF began fire testing using prototype ESFR sprinklers on rack storage of plastics.

March 1986

Du Pont announced completion of Aerosol Flammability Test Research.

September 1986

CSMA conducted seventh series of fire tests (Phase III, Series I), all rack storage tests simulating ESFR sprinkler protection installed on 25-30-foot ceiling.

October 1986

Special Aerosol Storage Task Force meeting on communications leads to plans for seminars to update aerosol industry on aerosol warehouse storage issue.

December 1986

CSMA petitioned NFPA to establish a new and separate code to cover aerosol storage and manufacture.

January 1986

NFPA Standards Council approved CSMA petition to form new aerosol code.

Los Angeles County Fire Officials began enforcement campaign on flammable liquids storage, including aerosols.

February 1987

CSMA conducted eighth series of fire tests (Phase III, Series 2), consisting of three full scale confirmatory fire tests on rack and palletized aerosol storage using production-design ESFR sprinklers (K=14, 160°F, 50 RTI).

April 1987

National Fire Protection Association approved the formation of a new code committee for the Aerosol Industry covering manufacturing and warehousing of aerosols.

mit only five foot high palletized storage for Level II or higher aerosol products. One expensive alternative for higher storage heights would be to utilize racks with in-rack sprinklers at each level of storage.

ESFR sprinkler technology offers the user several benefits. Higher storage heights are permitted without requiring costly in-rack sprinklers. An ESFR ceiling sprinkler design will permit either palletized or rack storage or a combination of the two which is found in a number of warehouses. This flexibility is important to warehouses in the aerosol distribution chain.

For existing warehouses, utilizing ESFR sprinklers is *not* as simple as changing out the conventional sprinkler heads for the new ESFR heads. However, virtually anyone storing Level III aerosols would need a significant overhaul of their existing sprinkler protection to adequately protect their warehouse. Providing good fire protection for today's warehouse requires an engineering solution to achieve proper protection at the least cost due to the number of variables involved.

The CSMA Aerosol Executive Board and advisors, over the last three

months, have reviewed the past efforts and future recommendations of the Aerosol Storage Committee. At the CSMA May mid-year meeting, they approved the committee's recommendations for the research and regulatory phase. Jim Scott, Chesapeake Engineering, will be engaged to assist industry in the regulatory portion including NFPA committee work as well as assistance with needed changes in existing national building codes.

The board further approved the publishing of a White Paper to be used for fund raising. The entire program was then approved by the CSMA

AEROSOL STORAGE TESTING RESULTS TO DATE—MARCH 6, 1987

LEVEL	STORAGE TYPE	STORAGE HEIGHT	CEILING HEIGHT
I	Rack	25 feet	30 feet
I	Palletized	25 feet	30 feet
II	Rack	20 feet	25 feet
II	Palletized	20 feet	25 feet
III	Rack	15 feet	25 feet
III	Palletized	20 feet	25 feet

As a result of recent meetings with the principals at Factory Mutual, they recommended three new tests and if these recommended tests are successful, the resulting changes to Level II and Level III storage requirements would be as follows (changes noted by *s):

II	Rack	20 feet	*30 feet*
II	Palletized	20 feet	*30 feet*
II	Rack	*20 feet*	*30 feet*
III	Palletized	20 feet	*30 feet*

If the three new tests are successful, the results would be the ability to store any aerosol products in an ESFR sprinklered building and all levels could be stored in warehouses with 30 foot ceilings allowing a maximum 20 foot stacking height for Level II and Level III. The need for in-rack sprinklers would be eliminated. Level I is protectable as combustible goods in cartons and can be stored in 25 foot stack heights with 30 foot ceilings.

The estimated costs of the three additional tests recommended by Factory Mutual is a maximum of \$120,000

A Summary of Outside Research and Consultant Expenses (est.) to be Paid for by the CSMA

Year	Research (F.M.)	NFPA Code	Building Codes	Total
1987	\$110,000 max.	\$25,400	\$12,000	\$147,400 max.
1988	0	\$16,780	0*	\$16,789
1989	0	\$12,340	0*	\$12,340
1990	0	\$ 7,720	0*	\$ 7,720
				\$184,240 max.

*Must be reviewed in December of each preceding year to determine if consultant assistance is needed. Added cost for consultant is estimated at:

1988	\$36,918
1989	\$33,516
1990	\$20,490

CSMA Tests Conducted at Factory Mutual Test Center West Glocester, Rhode Island

1. November 24 - 26, 1980	6 Tests
2. June 2 - 3, 1981	6 Tests
3. August 31 - Sept. 3, 1981	7 Tests
4. March 11 - 12, 1982	5 Tests
5. October 24 - 26, 1983	3 Tests
6. January 14 - 17, 1985	5 Tests
7. September 2 - 5, 1986	4 Tests
8. February 10 - 12, 1987	2 Tests
9. February 18, 1987	1 Test
Total	39 Tests

Aerosol Warehouse Storage Testing Fund Contribution Breakdown 1981 - 1986

	No. of Contributors	Total \$
Phase I	26	\$224,308
Phase II	25	203,267
Phase III	64	207,625
		635,200
Phase III		
	49 New Contributors	
	15 Repeat Contributors	
	64 Total Contributors	

Dollar Value per products
donated for tests

Phase I, II, and III.	247,600
	\$882,800

Board of Directors at the conclusion of the mid-year meeting.

The aerosol industry's financial support of this important effort is the key to its success. Over the next 3.7 years, this effort will lay the groundwork for industry's future in the storage, warehousing and manufacturing of aerosols. The total funds required in this period will be \$184,000. To date, more than \$2 million have been spent on this effort by CSMA and industry.

For information on contributions, please contact Don Rowson, Industrial Hydrocarbons, 602-282-1881 or Doug Fratz at CSMA, 202-872-8100.



Results of CSMA Aerosol Fire Test Program

Demonstrated aerosol industry leadership in addressing aerosol storage issue. Through this developed strong rapport and working relationship with the following groups:

National Fire Protection Research Foundation; National Fire Protection Association Standards Council; NFPA Flammable & Combustible Liquids Code Committee and the chairman of the chapter affecting aerosol storage; Factory Mutual Research Corporation; Other Insurance Companies, including IRI, Travelers and Kemper; Viking Corp., Automatic Sprinkler Corp. and other Sprinkler Manufacturers and Underwriters Laboratory.

- Divided aerosols into three major categories for warehousing, each containing approximately 1/3 of all aerosol products.
- Showed that Level I aerosols are not a high hazard and are equivalent to NFPA Class III Commodities which include such items as magazines stored in cardboard cartons.

This allows for storage up to 25 foot stack heights, racked or palletized, with ceiling heights up to 30 feet with appropriate ceiling sprinklers.

- Showed that Level II aerosols can be safely housed in palletized and racked storage up to four pallets high with a 25 foot ceiling.
- Level III can be stored up to three high in racked storage and up to 4 high in palletized storage with ceiling heights up to 25 feet with appropriate ceiling sprinklers.
- Through these efforts, DuPont became involved and developed the single can - AFT (Aerosol Fire Test)
- Worked with NFPA and Factory Mutual to develop ESFR technology. (Early Suppression Fast Response Sprinklers)
- Confirmed that ESFR technology is applicable to aerosols.

CSMA AEROSOL STORAGE INVESTMENT MARCH 1987 UPDATE

Volunteer Labor	\$310,230
Expenses	320,490
Test at Factory Mutual (Funded by contributions)	
\$ Expended	675,779
Test products Contributed	247,600
Total Investment	\$1,554,099

Thirty-nine tests have been conducted over 6 1/2 years consuming 26 working days. The following is a breakdown of the volunteer hours expended:

Tests - 1335 hrs; Reviews - 990 hrs; Meetings - 6077 hrs; Planning - 1449 hrs; Seminars, Communications - 490 hrs. Total hours expended: 10,341.

Steps to Establishing a New NFPA Code

Step	Timing	Action
1	11/86	*Aerosol Executive Board approved project
2	12/86	*CSMA Board approved project
3	12/86	*CSMA petitioned NFPA Standards Council for establishing the project
4	1/87	*Dave Frederickson and Jim Scott presented an overview of CSMA research to NFPA Standards Council. *Council agreed in principle to establish a new committee project.
6	4/87	NFPA Standards Council - Votes to approve new Aerosol Manufacturing & Warehousing Code. THIS WILL BE PUBLISHED IN FIRE NEWS
Possible Dates		
7	7/87	NFPA Standards Council to approve scope of new code. Selection of Committee Chairman
8	10/87	NFPA Standards Council appoints the committee for the new code
10	1/88 1/89	NFPA Committee drafts new Aerosol Manufacturing & Warehousing Code
11	6/89	Technical Committee report published (Technical Committee Report comments due 10/89)
12	12/89	Committee reviews comments - Technical Committee Documentation to be published
13	5/90	NFPA Annual Meeting - Membership approval of new code
14	7/90	NFPA Standards Council approval of new code
15	12/90	Aerosol Manufacturing & Warehousing Code Published by NFPA

*Work completed to date

CSMA Aerosol Storage Committee Members

Roger Beutner	Amway Corporation
David Church	Amway Corporation
Mark Jagusiak	Barr Company
Richard J. Carter	Boyle-Midway
James Dennehy	Carter-Wallace
Jack Sussman	Cello Corporation
Richard Stalker	Chesebrough-Pond's
James Scott	Chesapeake Engineering
Peter Clapp	Creative Products
Paul Szczesny	Dow Consumer Products
Dave Haartz	Drackett Company
Don Strobach	DuPont Company
Earl Schifffhauer	Eastman Kodak
Donald Patch	Gillette Company
Donald Rowson	Industrial Hydrocarbons
David Fredrickson	S. C. Johnson & Son
John Loftus	Lohn & Fink Products Group
Montfort Johnsen	Peterson/Puritan
William Gregg	Precision Valve Corporation
Lee Kremer	Seaquist Valve Company
Gus Leep	Seymour of Sycamore