TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
830 Power Building

JAN 3 1978

Director of Nuclear Reactor Regulation
Attention: Mr. S. A. Varga, Chief
Light Water Reactors Branch No. 4
Division of Project Management
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Varga:

In the Matter of the Application of) Docket Nos. 50-327
Tennessee Valley Authority) 50-328

In the enclosure to my letter to R. S. Boyd dated January 24, 1977, commitments were made to use a mastic coating similar to Flamemastic 71-A on exposed cables in the area of divisional interactions at Sequoyah Nuclear Plant. This material is also being used as part of the plant's cable tray penetration design.

The Tennessee Air Pollution Control Regulations and the Hamilton County Air Pollution Control Regulations prohibit the use of Flamemastic 71-A since it contains asbestos fibers in a concentration exceeding prescribed limits. We therefore request approval of asbestos-free Flamemastic 77 as a substitute for 71-A for the identified applications. The six enclosures listed below provide data and references justifying the adequacy of the substitution.

1. Flamemastic 77 Sprayable Fire Retardant Coating for Electrical Power and Control Cables, J. I. No. 1A4A6.AF; The Flamemaster Corporation.

2. Flamemastic 77 - Fire Tests, The Flamemaster Corporation.

3. The Effect of Flamemastic 77 Fire Protective Coating on the Ampacity of a Grouped Power and Control Cable Assembly Tested for the Flamemaster Corporation, Test Number 77-098; Joslyn Research Center.

4. Flamemastic 77 Test [illegible] ARLJ Lab Log 67083; Analytical Research Laboratories, Inc.

5. Flamemastic 77 System, Technical Bulletin, January 1978; The Flamemaster Corporation.

LPDR

7810110158

PDR ADOCK 05000327 A 781003
PDR ADOCK 05000328 A 781003 B001|S|E*

An Equal Opportunity Employer 7810110158 1/1

OCT 3 1978

Mr. S. A. Varga

6. List of Supporting Documents in Possession of the Nuclear Regulatory Commission.

Very truly yours,

J. E. Gilleland

J. E. Gilleland
Assistant Manager of Power

Enclosures (6)

ENCLOSURE 1

FLAMEMASTIC 77 SPRAYABLE FIRE RETARDANT COATING

FOR

ELECTRICAL POWER AND CONTROL CABLES

from

THE FLAMEMASTER CORPORATION

11120 SHERMAN WAY

SUN VALLEY, CALIFORNIA 91352

J. I. NO. 1A4A6.AF
(3971)

APRIL 19, 1978

Factory Mutual Research

1151 Boston-Providence Turnpike
Norwood, Massachusetts 02062

Factory Mutual Research

1151 Boston-Providence Turnpike
Norwood, Massachusetts 02062

1A4A6.AF
(3971)

April 19, 1978

FLAMEMASTIC 77 SPRAYABLE FIRE RETARDANT COATING FOR ELECTRICAL POWER AND CONTROL CABLES

from

THE FLAMEMASTER CORPORATION
11120 SHERMAN WAY
SUN VALLEY, CALIFORNIA 91352

I INTRODUCTION

1.1 The Flamemaster Corporation requested approval of their Flamemastic 77 sprayable fire retardant coating for use on electrical power and control cables. This coating will prevent flame spread in grouped conductors when exposed to a moderate fire source as might occur from arcs or sparks falling or occurring in a cable tray, or from fire exposure of combustible trash or foreign material around the cables in grouped or trayed arrangement.

1.2 Flamemaster 77 sprayable coating is compounded of water-based thermoplastic resin flame retardant chemicals and inorganic incombustible fibres. It contains no asbestos. It is thixotropic and the nonvolatiles average 69% by weight. It has an off-white appearance before and after curing. Service temperature range is from -30°F (-34°C) to 180°F (82°C) after application and curing in accordance with the manufacturer's instructions.

1.3 Precautions should be taken to insure that any storage, transportation or application of this material is done in temperatures above freezing because of the water content. Recommended storage limits are from 40°F (4°C) to 90°F (32°C).

II DESCRIPTION

2.1 Surfaces to be coated with Flamastic 77 must be clean and free from oil, dust and grease. Flamastic 77 must be thoroughly mixed to a uniform consistency. Either air atomized or airless spray equipment produces satisfactory results when applied as recommended by the manufacturer. Cleanup is accomplished with clean water.

2.2 Flamastic 77 must be preconditioned to a minimum 70°F (21°C) for 24 to 72 hr prior to spraying to achieve optimum results. Application of Flamemastic 77 is by applying a thin (fog) coat and allowing 10 min. drying time before building

time, this high potential test was repeated to insure that no change or damage had occurred to the cable insulation prior to or during the coating application. (This test is also repeated after the fire test described below, as an added means of determining any insulation breakdown.)

4.4 Three 3 ft (0.9 m) long coated cables were individually heated electrically with 150% of rated current (430 A) until the conductor temperature stabilized at 159°F (71°C). A flame from a Meeker gas burner, adjusted to give an overall natural gas flame height of 5 in. (127 mm) with a 3 in. (76 mm) inner cone was applied to the horizontally positioned cable for 2 min. with the tip of the inner cone touching the bottom of the coated cable. At the end of a 2 min. flame exposure, there was simultaneous burner flame cutoff and electrical shutdown. All flames extinguished within 15 sec. After cooling, the charred and scorched area exposed to the burner flame was measured and found to be less than 3 in. (76 mm) in length. This satisfies approval requirements that burning shall not continue longer than 1 min. after flame cutoff and that the burned (exposed) area shall not exceed 9 in. (228 mm) in length.

4.5 Results on the second and third cables exposed to the test described in Paragraph 4.4 were similar. The three cables were then given a repeat of the high potential test described in Paragraph 4.3 and current leakage was approximately 0.2 mA. This satisfies the approval requirement that leakage current shall not exceed 5.0 mA when measured between a conductor and the outer jacket during this high potential test.

4.6 A 3 ft (0.9 m) length of cable coated with Flamemastic 77 was subjected to a salt water test consisting of 8 hr submerged, alternating with 16 hr of drying in a 24 hr span over a 30 day period in a 1% salt solution with a water temperature of 150°F (66°C). At the end of this period the sample was allowed to dry for 36 hr. Examination showed that there was no disintegration or deterioration of the coating from this exposure. The cable sample was then subjected to the fire test described in Paragraph 4.4 and a high potential test (see Paragraph 4.3); and the results of these tests were satisfactory.

4.7 Two 3 ft (0.9 m) lengths of cable covered with Flamemastic 77 were subjected to alternating temperatures of 160°F (71°C) and -40°F (-40°C) for 24 hr periods over a 2 week duration. At the end of this accelerated aging test the sample cables were then subjected to the fire test described in Paragraph 4.4 and the high potential test (see Paragraph 4.3). The results of these tests were satisfactory.

4.8 A coated cable section was subjected to an ampacity test prior to which a No. 28 gage chromel-alumel thermocouple was imbedded in the bare copper conductor. The cable was then subjected to its rated current carrying capacity of 285 A (according the National Electric Code) until the temperature indicated by the thermocouple had stabilized, in approximately 1 hr 15 min. at 100°F (38°C) in an ambient temperature of 72°F (22°C). This is well below the 194°F (90°C) maximum temperature rating of the cable insulation. Therefore no electrical derating is necessary when a cable is coated with Flamemastic 77 according to the manufacturer's recommendations.

ENCLOSURE 2

FLAMEMASTIC 77 - FIRE TESTS

Flamemaster has conducted a series of fire tests to determine the fire protection afforded to grouped cables by Flamemastic 77. These tests were made in a Flamemaster designed fire chamber that is operated at the United States Testing Laboratories in Los Angeles.

Tests prove that Flamemastic 77 offers unsurpassed fire protection for grouped electrical cables. The performance was superior to any competitive material tested.

Flamemaster

MODIFIED IEEE - 383 FIRE TEST

Purpose:

To determine the effectiveness of Flamemastic 77 as a fire protective coating applied to grouped cables.

Test Method:

The pre-assembled cable tray was placed vertically in a fire chamber (3.0' W x 2.2L x 3.0'H) and a 20 minute fire test was conducted using IEEE-383 type burner. A 1500°F temperature was maintained throughout the test. The BTU input was 80000/Hr. for each test.

The results of the test were determined by the following observations:

1. The condition of the cable and or coating after the 20 minute test period.
2. Time to self-extinguish after burner was turned off.

Results:

Modification I - Uncoated: IEEE-383 cables burned completely where as cables coated with Flamemastic 77 did not propagate flame. The coating remained intact and there was no after-burn. IEEE-383 cables coated with a competitive coating were also completely destroyed in this test. (See Attached Table)

Modification II: In this case not only non IEEE-383 uncoated cables burned completely, but the cable coated with the competitors coatings also burned completely, while cables coated with Flamemastic 77 did not propagate flame and the coating material remained intact. There was no after-burn. (See Attached Table)

CONCLUSIONS:

Tests proved that Flamemastic 77 offers unsurpassed fire protection for grouped electrical cables. The performance was superior to any competitive material tested. When the tests of Flamemastic 77 were compared with similar tests conducted with Flamemastic 71A, it was concluded that Flamemastic 77 was equal or superior in its fire protective performance.

MODIFIED IEEE - 383 FIRE TEST RESULTS

TEST #	I	II	III	IV	V	VI
Type of Cable	#12,7 Copper Conductor PVC Jacketed IEEE-383 power and control cable.	#12,7 Copper Conductor PVC Jacketed IEEE-383 power and control cable.	#12,7 Copper Conductor PVC Jacketed IEEE-383 power and control cable.	4/10 AWG Al Conductor XLPE Non IEEE-383 power cable.	4/10 AWG Al Conductor XLPE Non IEEE-383 power cable.	4/10 AWG Al Conductor XLPE Non IEEE-383 power cable.
Type and Thickness Of Coating	None	Flamemastic 77 1/16" dry	Competitors 1/16" dry	None	Flamemastic 77 1/16" dry	Competitors 1/16" dry
Type of Fire Test (See Below)	Modification I IEEE-383	Modification I IEEE-383	Modification I IEEE-383	Modification II IEEE-383	Modification II IEEE-383	Modification II IEEE-383
Temperature ^{o}F	1500	1500	1500	1500	1500	1500
BTU/Hour	80000	80000	80000	80000	80000	80000
Flame time in minutes	20	20	20	20	20	20
Test Results	Burned completely	Did not burn completely, coating material remained intact, no after-burn	Burned completely in 20 minutes	Burned completely in 15 minutes	Did not burn completely. Coating material remained intact. No after-burn	Burned completely in 20 minutes Coating material disintegrated

NOTE: IEEE Modification I: (Standard) 3-3/8" x 6" x 3' punch bottom tray was filled with one layer of cable in a group without any separation between cables.

IEEE-383 Modification II: (Tunnel Test) 3-3/8" x 6" x 3' solid bottom tray was used and 4" center was filled with cable without separation. The tray was covered during the fire test, nine inches of cable in contact with flame was left uncoated.

In both cases the vertical tray was placed directly over the burner.

ENCLOSURE 3

JOSLYN RESEARCH CENTER
P.O. Box 749 • Woodstock, Illinois 60098 • (815) 338-6060

our 75th anniversary
a time to look forward

TEST REPORT

THE EFFECT OF FLAMEMASTIC 77

FIRE PROTECTIVE COATING

ON

THE AMPACITY OF A

GROUPED POWER AND CONTROL CABLE ASSEMBLY

TESTED FOR

THE FLAMEMASTER CORPORATION

SUN VALLEY, CALIFORNIA

TEST NUMBER: 77-098

TESTED AT: JOSLYN RESEARCH CENTER
WOODSTOCK, ILLINOIS

TESTED BY: H. J. Kaczmarek

H. J. Kaczmarek
Test Engineer

REVIEWED BY: J. A. Kise

J. A. Kise, P. E.
Manager, Hi Voltage Lab

TESTING COMPLETED: SEPTEMBER 9, 1977

TABLE OF CONTENTS

SCOPE

This test report covers the results of a 90°C hot-spot-temperature test conducted to determine the effect various thicknesses of Flamemastic 77 coating had on the ampacity of a grouped cable tray assembly.

Flamemastic 77 is a fire protective coating provided and described by The Flamemastic Corporation.

The punch bottom tray used was 40% filled (by volume) with a grouped power and control cable. The coating dry thickness varied from 1/16" to 1/4".

SUMMARY

This test shows that with a 1/16" dry thickness of the coating there was no measurable ampacity loss in either power or control cable.

Even with 1/4" dry thickness of the coating, the ampacity loss in the power cable was only 1.41% and there was no measurable ampacity loss in the control cable.

DESCRIPTION OF THE CABLE TRAY ASSEMBLY

An 18" wide by 3-5/8" deep by 8' long, punch bottom (inside dimension 17-1/2" wide by 3" deep by 8' long), E type cable tray was filled with both power and control cable in a 1:1 ratio, with all power cable on one side and all control cable on the other.

Two types of cables were used in this test. The 0.7" O.D. power cable consisted of a 4/0 AWG, stranded copper conductor insulated with a polyethylene jacket. The 0.6" O.D. control cable had a PVC jacket and consisted of seven, #12 AWG, stranded copper conductors insulated with polyethylene. Each type of cable was looped back and forth, neatly and tightly. Cable cross-overs were avoided. Both power and control cables were continuous lengths.

Nine thermocouples, four in each bundle and one for the ambient temperature, were used to record temperature changes during the test, starting 12" from one end of the tray and then at every 24" thereafter. Each thermocouple was placed at the cross sectional center of the power and control cable bundles about 1-1/4" from the top of the cable surface in each bundle.

The ambient temperature was monitored at an elevation equal to that of the tray and at a distance 24" from the side of the tray.

PROCEDURE

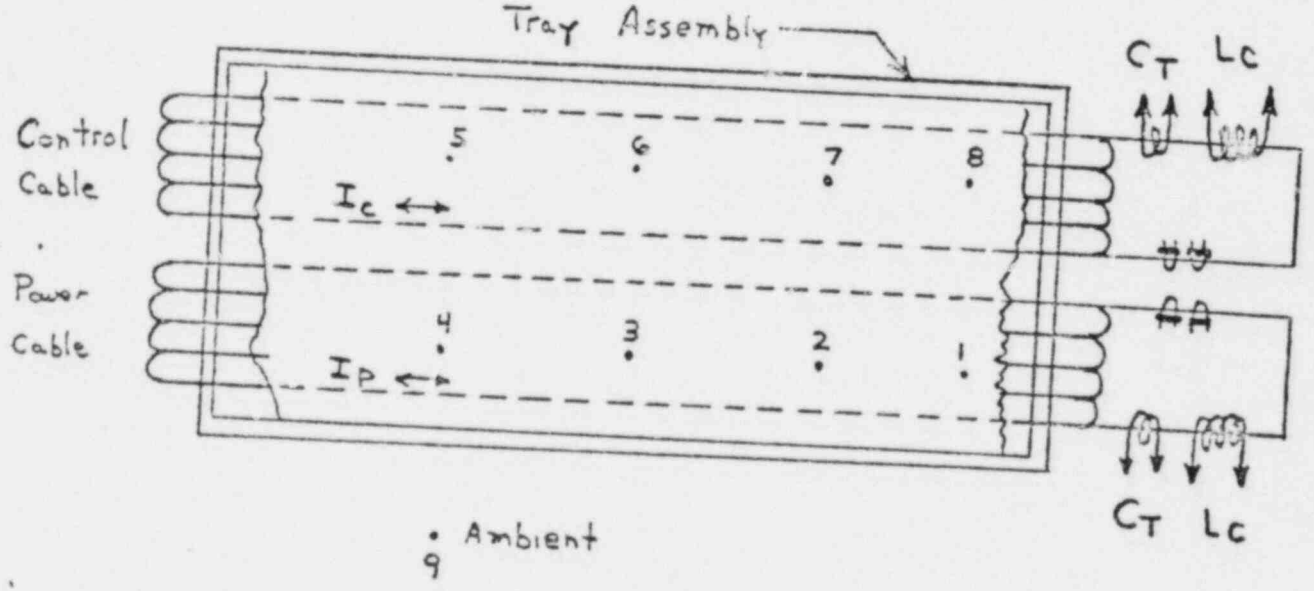
A separate closed electrical loop was formed for each power and control cable bundle and 60 Hz current was passed through each loop. The level of current in each loop was adjusted to produce the required steady-state hot spot temperature of 90°C over a period of two hours.

PROCEDURE (cont'd)

Two levels of current were used during the heating period. The first level, approximately twice that of the second, was used to quickly heat the bundles to a temperature of about 80°C. The second current level, that which produced the 90°C temperature, was obtained after several current level adjustments. When metering indicated that the steady state temperature had been reached, the two hour test period commenced.

The same draft-free test area was used for each test. The tray was mounted at an elevation of 17" from the top of the tray to the floor.

The coating was applied on both top and bottom of the cables in the tray by the Flamemaster Corporation personnel and after each coating, the tray was allowed to dry completely (72 hours) before ampacity testing was conducted.



TEST CIRCUIT DIAGRAM

CT = Current measuring circuit.
LC = Load coil circuit used to induce at 60Hz current in the bundles.
1-8 = Thermocouple locations in the bundles.
Ip = Power cable current (amps) - Average of 5 readings during test period.
Ic = Control cable current (amps) - Average of 5 readings during test period.

RESULTS

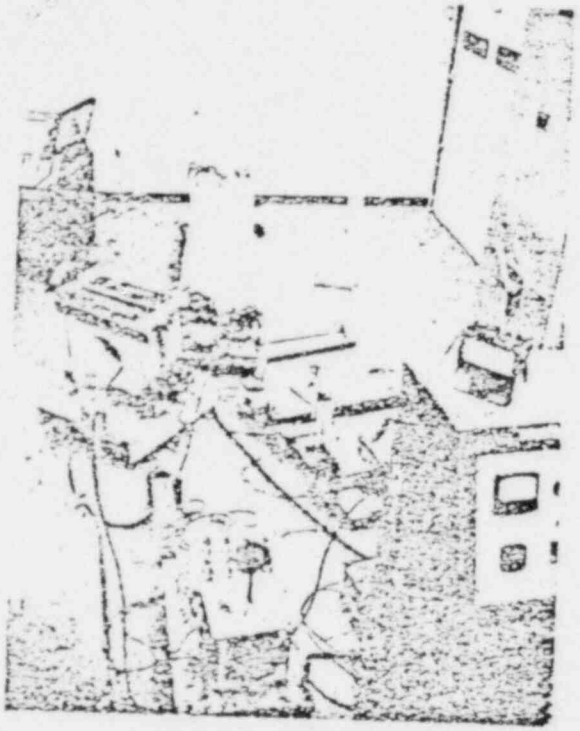
Ampacity test results of the grouped 0-600 volt, 4/0 power cable and the grouped #12 control cable in an open tray at 90°C hot spot are shown in the table below. (The ambient temperature varied from 21.5 to 24.0).

No. of Coats	Dry Thickness in Inches	Avg. Amps in Power Cables (Ip)	Ampacity Loss in Power Cable (%)	Avg. Amps in Control Cable (Ic)*	Ampacity Loss in Control Cable (%)
0	0	212.8	0.00	11.1	0.00
1	1/16	214.2	(0.66)	11.1	0.00
2	1/8	209.8	1.41	11.1	0.00
4	1/4	209.8	1.41	11.1	0.00

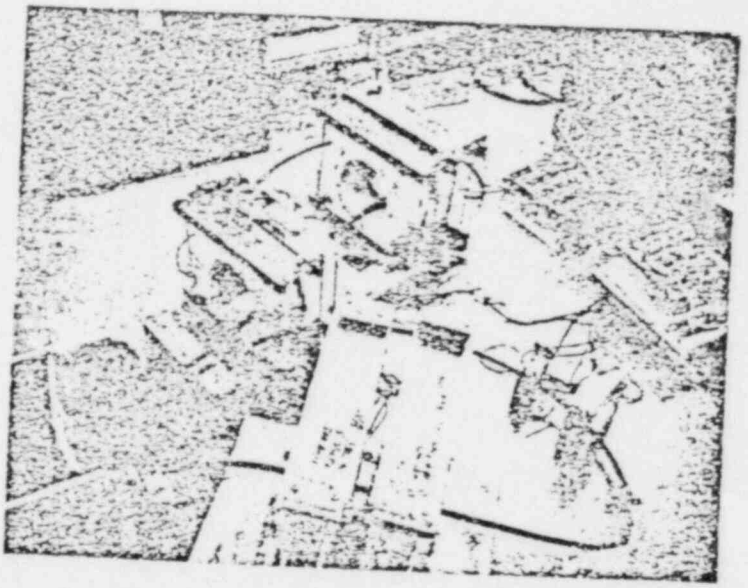
* This control cable value is for single conductor.

NOTE: Four coats were required to reach a dry thickness of 1/4".

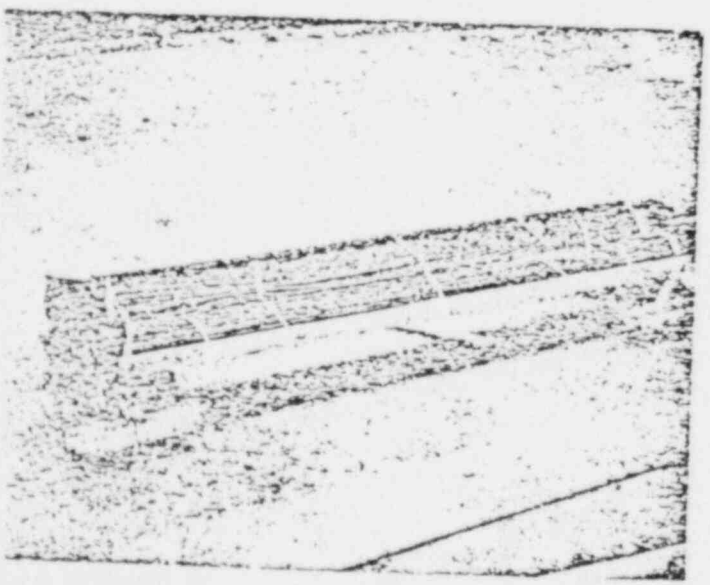
PHOTOGRAPHS



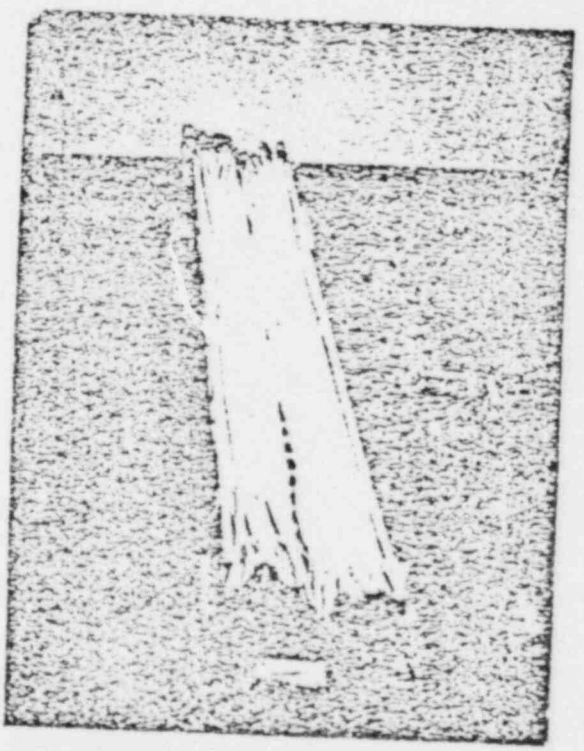
Overall view of test set-up.



Current injecting and measuring equipment.



View of uncoated tray.



View of coated tray.

APPENDIX I

DETAILED DATA OF AMPACITY TEST

Reading No.	Current --(Amps)---- Ib	Ic	Thermocouple Temperature - (°C)--------- 1	2	3	4	5	6	7	8	9
UNCOATED											
1	NR	78.0	NR	NR	89.0	NR	NR	91.0	NR	NR	NR
2	213	77.0	NR	NR	89.0	NR	NR	91.0	NR	NR	NR
3	212	77.0	76.5	81.5	90.0	83.0	84.5	90.5	85.0	78.5	22.5
4	212	77.0	77.0	81.5	90.5	83.5	84.5	89.5	84.5	78.0	22.5
5	214	78.0	77.0	81.5	90.5	84.0	84.5	89.0	84.0	77.5	23.5
Avg.	212.8	77.4	76.8	81.5	89.8	83.5	84.7	90.2	84.5	78.0	22.8
ONE COAT - 1/16" DRY THICKNESS OF FLAMEMASTIC 77											
1	214	77.0	77.0	82.5	90.5	85.0	85.5	89.5	85.0	79.0	22.5
2	213	78.0	76.5	82.0	90.0	84.5	85.0	89.0	84.5	79.5	23.0
3	216	79.0	76.5	82.0	90.0	84.5	86.0	90.0	85.5	79.5	24.0
	212	77.0	76.5	82.0	90.0	84.5	85.5	89.5	85.0	79.0	23.5
	216	79.0	76.5	82.5	90.5	85.0	85.0	89.0	84.5	78.5	23.5
Avg.	214.2	78.0	76.6	82.2	90.2	84.7	85.4	89.4	84.9	79.1	23.3
TWO COATS - 1/8" DRY THICKNESS OF FLAMEMASTIC 77											
1	210	76	79.5	84.0	90.5	85.0	85.5	89.5	86.5	81.0	23.5
2	208	79	79.5	83.5	90.0	84.5	85.5	90.0	86.5	81.0	24.0
	212	79	79.0	83.5	90.0	84.5	86.5	90.5	86.5	81.5	23.5
	208	77	79.0	83.0	90.0	84.5	86.0	90.0	86.5	81.0	23.5
5	211	79	79.5	83.0	90.0	84.5	86.0	90.5	87.0	81.5	23.5
Avg.	209.8	78	79.3	83.4	90.1	84.6	85.9	90.1	86.6	81.3	23.6
FOUR COATS - 1/4" DRY THICKNESS OF FLAMEMASTIC 77											
1	209	77	78.0	83.5	90.0	85.0	85.5	90.0	86.5	81.0	22.0
2	210	78	78.5	83.5	90.0	85.0	85.5	90.0	86.5	81.0	21.5
3	210	78	78.5	83.5	90.0	85.0	85.5	90.0	86.5	81.0	23.0
	210	77	78.0	83.0	90.0	84.5	85.5	90.0	86.0	81.5	23.5
	210	77	78.0	83.0	90.0	84.5	85.5	90.0	86.5	80.5	22.0
Avg.	209.8	77.4	78.2	83.3	90.0	84.8	85.5	90.0	86.5	80.9	22.4

NOTE: "NR" = Reading Not Taken

APPENDIX II*

Cable and Cable Tray Suppliers

1. Cable Tray:

P. W. Western, Inc.
Montebello, California 90641

2. Control Cables:

Collyer Insulated Wire Company
Lincoln, Rhode Island 02865

3. Power Cable:

Phelps Dodge
Yonkers, New York

(Both control and power cable were purchased from Anixter Corporation, New York.

*This information was supplied by Suresh Sheth of The Flamemaster Corporation.

ENCLOSURE 4

ANALYTICAL RESEARCH LABORATORIES, INC.

Lab/Shipper Log Number 67083

160 TAYLOR STREET, P.O. BOX 369, MONROVIA, CALIFORNIA 91016 • (213) 357-3247

Client	Work Order	P. O. Number
Flamemaster Corporation	6301-01	6527

Material/Simple Identity	Rec'd	Due
Flamemastic 77	6/21/77	7/5/77

Requested By	Sample Disposition
Name: Mr. Suresh Sheth Phone: 982-1650	Dispose

Report/Ship To:

Flamemaster Corporation
11120 Sherman Way
Sun Valley, CA 91352

Nature of Work and Information Desired

Determine Combustion Products

Summary of Laboratory Report

Q.C. Level N/A

Combustion tests indicate that Flamemastic 77 does not support combustion and burns only with difficulty as long as it is in contact with a very hot external flame. When the external flame is removed, the material is self-extinguishing. The pyrolysis-combustion process evolves a dense grayish white smoke, and leaves a dense char covered with small pearly glass beads on the surface.

Analyses were made of the combustion gases, smoke deposit on glass, and of the char/ash.

A discussion of the analytical methods along with results of the analyses are attached.

As a mutual protection to clients, this report is submitted for the exclusive use of the client to whom it is addressed. This report applies only to the sample(s) tested and is not necessarily indicative of the qualities of apparently similar or identical products. Use of this report, whether in whole or in part, or of any seals or insignia connected therewith, in any advertising or publicity matter, without prior written authorization is prohibited.

Analyst	Book - Page	Approved by	Date
CWB	58 28		7/5/77

Research and Development - Testing

ANALYTICAL RESEARCH LABORATORIES, INC.

160 TAYLOR STREET, P.O. BOX 369, MONROVIA, CALIFORNIA 91016 • (213) 357-3247

Flamemaster Corporation
ARLI Lab Log 67083

Scope

The following studies are of a general survey nature to develop the maximum useful information concerning pyrolysis-combustion characteristics of Flamemastic-77 in a short time.

Test Methods

Approximately 3 gms of Flamemastic-77 were put into a small nickel boat suspended with a wire from a post on the base of a bell jar chamber. The boat and contents were heated with an air-gas burner until the boat was red hot. During heating the glass bell jar was held just above the boat to entrap at least some of the evolved gases and smoke particles. No flame was observed above the mastic. While the boat was red hot, the burner flame was played over the surface of the mastic. This produced some flame above the mastic, and charring of the surface. When the burner flame was removed, the mastic flames extinguished immediately. At this time (boat still red hot) the glass bell was lowered to the base to entrap any further gases evolved.

The trapped gases were analyzed by mass spectrometry. To obtain an analysis of the minor components, the balance of the trapped gas was pumped through a liquid nitrogen cold trap which removes the noncondensible gases such as nitrogen, oxygen, and argon, leaving the condensibles for analysis.

The smoke deposit left on the glass walls of the bell jar, and a sample of the char ash were analyzed by emission spectrometry.

Results

Burning Observations - The specimen of Flamemastic-77 did not support

flame propagation. Playing an air-gas burner flame over the surface of the hot mastic produced a dense grayish white smoke and only a small flame which self extinguished immediately upon removal of the burner flame. The material subjected to the burner flame left a dense residual char, as described above, indicating incomplete combustion.

Analysis of Gaseous Combustion Products - Mass spectrometric analysis of the trapped atmosphere gave the following:

	Vol-%
N_2	79.9
O_2	18.1
A	1.0
CO_2	1.0

The above data indicates that only slight combustion of the organic matter in the sample took place after the removal of the burner as a little CO_2 and a large excess of air are evident. It is conceded that traces of carbon monoxide also may be present, but it is not detectable by mass spectrometry when a large amount of nitrogen is present.

Analysis of Condensible Products of Trapped Gas - Mass spectrometer analysis of the liquid nitrogen trapped atmospheric gases gave the following:

	ppm
Carbon dioxide	14,000.
Acetone	29.
Benzene	88.
Toluene	15.
Bromomethane*	44.
Bromoethane*	29.

* Tentative identification - the mass spectra are consistent for the presence of these compounds, but further work would be needed for unequivocal identification.

Analysis of Smoke Deposit and Char Ash - Emission spectrometric analysis (qualitative) of the smoke deposited on the walls of the bell jar and of the char-ash gave the following:

Element	Smoke Deposit	Char Ash
B	Major	Major
Si	Trace	Major
Sb	Major	Major
Mg	Trace	Minor
Fe	Trace	Trace
Al	Trace	Major
Ca	Not Detected	Major
Ti	Minor	Minor
Zn	Trace	Major

ENCLOSURE 5

TECHNICAL BULLETIN
January 1978

FLAMEMASTIC 77 SYSTEM

PRODUCT DESCRIPTION

Flamemastic 77 System Coatings are compounded of waterbase thermoplastic resins, flame retardant chemicals and inorganic incombustible fibers. These coatings contain no asbestos. The Flamemastic 77 System is protected by one or more of the following patents: United States 3642531, 3928210; Great Britian 1297710; West Germany 2039969 or other patents pending.

Flamemastic 77 Sprayable has been tested and approved by Factory Mutual for use on grouped electrical cables.

TYPICAL PROPERTIES

FIRE PROTECTION

Flamemastic 77 prevents propagation of fire on grouped electrical cables. The coating has shown exceptional fire protection in tests ranging from 3 hours ASTM E119 Wall Penetration Test, where the coating was used in conjunction with silicone foam and insulation board to vertical tray tests on non IEEE 383 rated cable under fire loads in excess of 210,000 BTU/hr. for a period of 20 minutes

EFFECT ON AMPACITY

Reduction in current carrying capacity varies with the size of the cable and the thickness of the coating. At the recommended coating thickness there is no effect on the ampacity of the coated cables.

PERMANENCE

Flamemastic 77 has been formulated from inert ingredients and materials that have proven their permanence and effectiveness in Flamemastic 71A and 71B.

11120 SHERMAN WAY SUN VALLEY CALIFORNIA 91352

TYPICAL PROPERTIES (continued)

EFFECT OF RADIATION

Flamemastic 77 coated cables were subjected to 3 X 10^8 rad of gamma radiation at a rate of 5 X 10^5 rad per hour for 600 hours. This exposure had no significant effect on the coating or its fire protective capability.

PHYSICAL PROPERTIES

	SPRAYABLE	MASTIC
Weight per Gallon Weight per gallon	12.4#/gallon	11#/gallon
Hardness of dried film	85 Shore A	88 Shore A
% Solids (min)	69%	70%
Consistency	Thixothopic	Heavy Mastic

SPECIAL NOTES

Flamemastic 77 must be protected from freezing during shipment and storage. Do not store at temperatures above 90°F.

Flamemastic 77, like most waterbase coatings, can conduct electricity until it thoroughly dries. Extreme caution should be exercised when the material is applied to energized cables or equipment. In any instance, the material should never be applied without the supervision of plant safety personnel. Hazards that may be encountered, include but are not limited to, open buss ducts, cable potheads, exposed conductors, faculty cable insulation and transformer bushings.

The information presented herein is based on data believed to be reliable. However, The Flamemaster Corporation cannot insure that your results will be the same as those described, as the conditions of use are beyond our control.

1120 SHERMAN WAY SUN VALLEY CALIFORNIA 91352

Enclosure 6

List of Supporting Documents in Possession of the

Nuclear Regulatory Commission

1. Plan for Evaluation, Repair, and Return to Service of Browns Ferry Nuclear Plant Units 1 and 2 (March 22, 1975, Fire), Part X, Section A, Subsection 3.4, Attachments 1 through 8. Plan forwarded to the NRC by TVA letter from J. E. Gilleland to E. G. Case dated April 13, 1975 (docket Nos. 50-259 and 50-260).

2. A Preliminary Report on Fire Protection Research Program - Fire Retardant Coatings Tests (December 7, 1977 - January 31, 1978), Sandia Laboratories, SAND 78-0518.