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AUTH. NAME AUTHOR AFFILIATION
MAIER, J. E. Rochester Gas & Electric Corp.
RECIP. NAME RECIPIENT AFFILIATION
CRUTCHFIELD, D. Operating Reactors Branch 5

SUBJECT: Forwards addl info providing qualification of certain electrical equipment, per commitment in 801031 ltr responding to NRC 8000919 revised order for mod of license.

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ROCHESTER GAS AND ELECTRIC CORPORATION • 89 EAST AVENUE, ROCHESTER, N.Y. 14649

JOHN E. MAIER
VICE PRESIDENT

TELEPHONE
AREA CODE 716 546-2700

December 8, 1980

Director of Nuclear Reactor Regulation
Attention: Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: SEP Topic III-12, Environmental Qualification of Electrical Equipment
R. E. Ginna Nuclear Power Plant
Docket No. 50-244

Dear Mr. Crutchfield:

By letter of October 31, 1980 from J. E. Maier to Mr. Darrell G. Eisenhut, RG&E transmitted information concerning the environmental qualification of electrical equipment, as required by the NRC's Revised Order for Modification of License, dated September 19, 1980. RG&E at that time committed to provide the NRC with additional pertinent information as it became available.

Attached is additional information providing the qualification of certain electrical equipment. This information is also being transmitted to Franklin Research Center in order to expedite their review of RG&E's October 31 submittal. It will also become a part of RG&E's central location auditable records, as required by the NRC's Order for Modification of License of October 24, 1980.

Very truly yours,

John E. Maier

J. E. Maier

JEM:ng
Attachments

A035
S
1/1

List of Attachments and Explanations

1. Mailgrams from Joe Drab, Limitorque, to George Wrobel, RG&E, stating that Limitorque Report B0003 does apply to MOV's 852 A,B. These mailgrams will become part of Reference 53, which will be cited as applicable to Table 3, Item No. 8H, and TER C5257, Paragraph No. 3.3.2.2.

2. Page A-1011:44 of Reference 65. This was inadvertently not included in the October 31, 1980 transmittal.

3. Letter from R. D. Butler, Westinghouse, to Mr. George Wrobel, RG&E, concerning the hydrogen recombiner motor insulation and igniter exciter. This letter and attachments will become Reference 71. Since the recombiner motor is not operated during normal operation, but only after an accident, and therefore sees only about a 50°C ambient, a qualified life of >40 years for the insulation is established. The igniter exciter, which contains no organic materials, should have no aging degradation, and therefore has an established qualified life of >40 years.

4. Letter from R. B. Budrow to Mr. J. B. Gardner, June 30, 1970, concerning the fan cooler motor splices (Reference 64). This information applies also to the hydrogen recombiner blower motor splices.

   The Westinghouse Drawing #206C391, listing the specific materials used in the Ginna splices, has not yet been received. Information to date indicates a Scotch 70 - Mica - Scotch 70 splice, shown to be acceptable.

   This drawing will be transmitted when available.

RG&E ROC

RG&E ROC

LIM CORP LY

NOV. 4, 1980

ATTN: MR. GEORGE WROBEL

SUBJ: GINNA PLANT
QUALIFICATION OF OPERATOR - O/N 324883-P 852A 852B

OUR MOTOR SUPPLIER'S RECORDS INDICATE THAT MOTOR S-N'S Y212327-A1 AND A2 DO NOT INCLUDE BRAKES.

BASED ON THIS INFO THE ACTUATORS EQUIPPED WITH THE ABOVE MOTORS CAN BE QUALIFIED TO B0003.

JOE DRAB
LIMITORQUE CORP.

LIM CORP LY

RG&E ROC

F

RG&E ROC

10/27/80

ATTN: MR GEORGE WROBEL - EWR2392

SUBJ: QUALIFICATION INFO - ROBERT E GINOA POWER PLANT

INFO RECEIVED FROM OUR MTR SUPPLIER INDICATES THAT OUR REPORT B0003 CAN BE APPLIED TO THE ACTUATORS SUPPLIED ON OUR O/N 324883P. -862A,B

J B DRAB
LIM CORP LY

RG&E ROC

EQUIPMENT	LUBRICANT	BLDG./ FLOOR	3 MONTH SURVEILLANCE * PERIOD	MAINTENANCE INSPECTION		
				PROCEDURE NUMBER	CHECK	INSP.
EQUIP NO. MG#4 PRESSURIZER ROBBINS & MYERS JIB CRANE		Cont/Op				
Hoist Gear Case	Mobil DTE Oil 26			MHE-300-1	As Specified	
Open Gears	Mobiltac E					
Hoist Cable	No Lubrication on Cable					
TROLLEY MOTOR						
Gear Housing	Mobil Compound GG					
Bearings	Mobilux EP No. 1					
POST ACCIDENT AIR HANDLING VALVES					Yearly	Yearly
No Lubrication Required						
CONTAINMENT RECIRCULATING FANS & FILTERS A.B.C.D.	ROT. BLUE GREASE				Yearly	Yearly
	(Rotonium)					
CONTROL ROD DRIVE SHROUD COOLING FANS (1A & 1B)		Cont/Op			Yearly.	Yearly
Motor Bearings	ROT. BLUE GREASE.					

ESA-EQ-193

Westinghouse Electric Corporation
Water Reactor Divisions
Nuclear Technology Division
Box 355
Pittsburgh Pennsylvania 15230

November 17, 1980

Mr. George Wrobel
R. E. Ginna Nuclear Power Plant
Unit #1
Rochester Gas & Electric Corporation
89 East Avenue
Rochester, New York 14649

Dear Mr. Wrobel:

I have reviewed information concerning the motors and insulation we discussed earlier (R&D Report 71-1C2-RADMC-R1). It was found that in Class H motors silicone rubber, which has an Ev value of 1.16 for retention of electrical properties, was used. The .3 Ev for elongation of this compound is not pertinent. The teflon glass cable was only used in Class H insulation systems for non-nuclear applications. The Class B motors we discussed had neither silicone or glass tape. Based upon available information and a test temperature of 200°C for two weeks, the life of the insulation system is five years at Class B limits (130°C total temperature) or approximately 2.7 years if the least conservative activation energy is used (approximately Ev of 1.0). Attached please find graphs.

Most motors are used intermittently and those which are used continuously are not used at their full service factor rating. This indicates a much greater life than those values I have given. If a motor is used in an ambient temperature of 40°C, but is not run at its full capacity, the temperature rise in the motor is much less than 80°C. With the total temperature less than 130°C, the life of the insulation would be greatly extended.

The above paragraph also applies to the thermoplastic epoxy insulation system supplied by Westinghouse for your Safety Injection Pump.

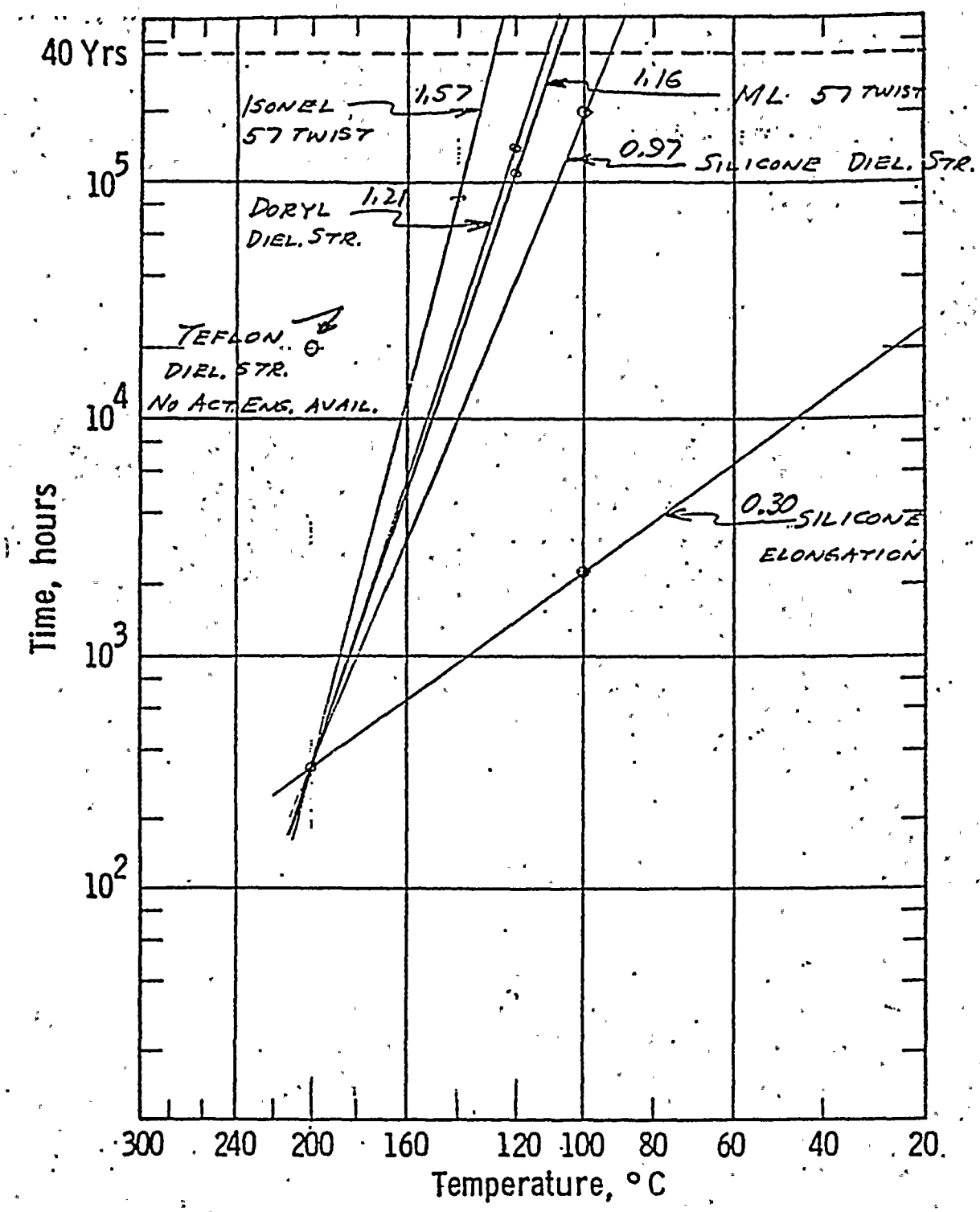
In reference to the H_2 Recombiner, please find attached drawing of Igniter/Exciter. Since there are no organics involved, this should meet qualification criteria.

Sincerely yours,

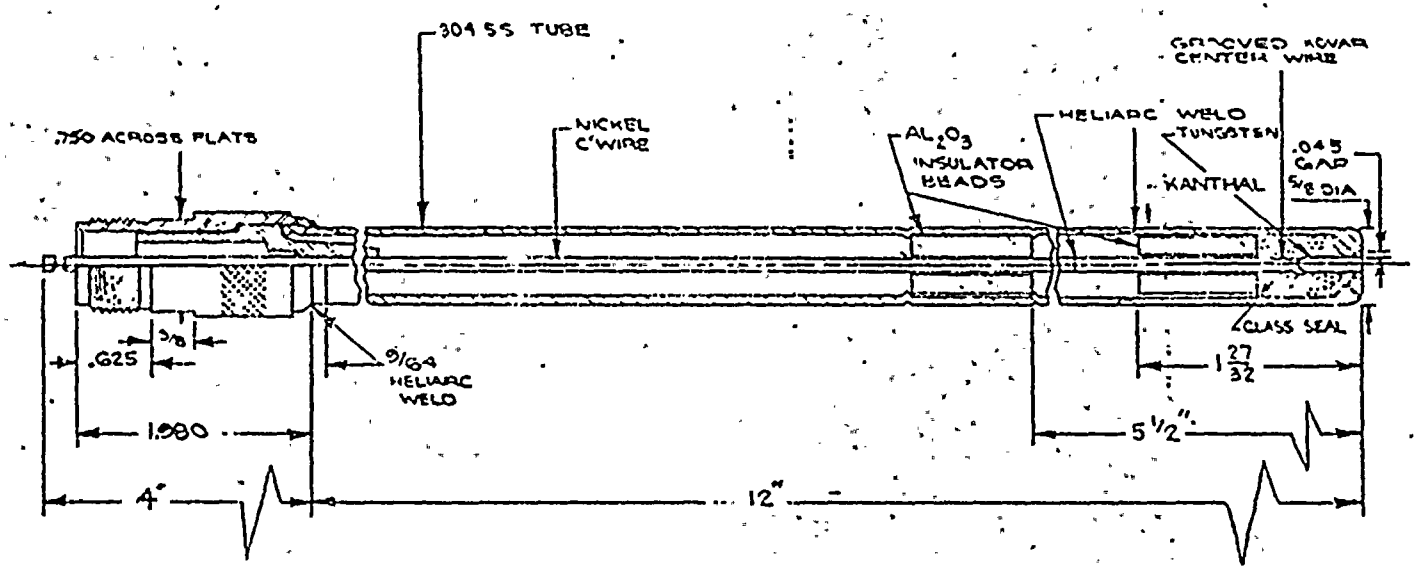
R. D. Butler

R. D. Butler
Environmental Qualification
MNC-309 412/373-4800

cc: R. B. Miller
A. E. Blanchard
C. Faust
D. L. McElhaney
J. L. Tain
G. Butterworth
H. Groot



WIRE, VARNISH, CABLE



(PLANT INT)

LOW TENSION IGNITOR

FABRICATING ENGINEERING CORP.

NO	REVISIONS	BY	DATE

B-11430

CONTROL PANEL

June 30, 1970

Attention: Mr. J. B. Gardner

Subject: Results of Electrical Tests Performed on Samples Returned by Westinghouse

Reference: Letter, R. B. Budrow to C. V. Fields, Westinhouse, September 26, 1969

Various control and power cable splices (unaged and pre-aged) have been irradiated to 1.7×10^8 rads by Westinghouse Electric Corp. Following the irradiation, some of the samples were autoclaved by Westinghouse at Franklin Institute as follows:

2 hours at 60 psig (2100 ppm of boric acid adj. to pH of 9.5 with NaOH)

18 hours at 20 psig

492 hours at 5 psig (152°F.)

2 hours at 90 psig (compressed air at 162°F.)

Electrical tests and dissection of the samples have been completed, the results of which are attached.

The hoped for objectives of this test series have not been completely attained, due primarily to three problems that occurred as the tests were being conducted. The problems encountered were:

1. The original schedule of irradiation and autoclaving was not adhered to by Westinghouse as called for in the reference letter to Mr. C. Fields - instead, all samples were irradiated.

2. Additional test samples to replace those irradiated in error were then made up with available cables,

materials, etc. and were rushed to Franklin Institute in an attempt to get back on schedule. These samples (which were in the form of a ring) were cut in half in error by the Franklin Institute technicians and were of no use.

3. Two differently colored Scotch 70 silicone rubber tapes (one light gray, one dark gray in color) were used to make several of the splices. These two tapes act quite differently when exposed to irradiation and autoclaving; this indicates that 3 M does make compound changes without changing the material designation. Incidentally, 3 M had been asked if the two tapes were the same except for the difference in color and the answer was 'yes'.

The following conclusions can be drawn from the test results:

Control Cable Splices

The use of Scotch 70 silicone rubber tape as the individual splice material with an overall layer of Scotch 70 and Permacel (P212) glass tape to bind the individual splices together is an acceptable splice. Tri Sil and Permacel silicone rubber tape should not be used due to their poor performance under the combination of steam and irradiation.

Power Cable Splices

The use of Scotch 70 silicone rubber tape as the insulating material with an outer layer of glass tape (Permacel P212) will probably be an acceptable splice but has to be explored and tested further.

Other comments are:

1. The use of Scotch 27 glass tape is not recommended due to its tendency to readily burn until all binder material has burned off. Permacel P212 glass tape exhibits this tendency to a much lesser degree.

JBG
Results of Elec. Tests

June 30, 1970

2. All samples which did not have an outer glass tape had split open, exposing the underlying tapes.

3. Attached are copies of letters sent to me by Mr. C. Fields indicating the irradiation and autoclaving levels.

R. B. Budrow
Engineer

RBB/dm

RESULTS OF VOLTAGE TESTS PERFORMED ON POWER CABLE SPLICES THAT HAVE BEEN IRRADIATED AND/OR AUTOCLAVED

Sample Designation	Sample Conditioning	Cable Make-Up See Note 1	Splice Make-Up See Note 2	Withstand 4 KV AC	Withstand 8 KV DC	Breakdown AC Quick-Rise - KV
A-1	Irradiated	1/0 HTK, FR	Bishop, Mica, Bishop	Yes	Yes	29
A-2	Irradiated, Autoclaved	1/0 HTK, FR	Bishop, Mica, Bishop	Yes	Yes	6
A-3	Irradiated, Autoclaved	1/0 HTK, FR	Bishop, Mica, Bishop	Yes	Failed 4 KV	--
A-4	Pre-aged, Irradiated	1/0 HTK, FR	Permacel, Mica, Permacel	Yes	Yes	7.5
A-5	Pre-aged, Irradiated, Autoclaved	1/0 HTK, FR	Permacel, Mica, Permacel	Failed 3.5 KV	-	--
A-6	Pre-aged, Irradiated, Autoclaved	1/0 HTK, FR	Permacel, Mica, Permacel	Failed 3 KV	-	--
A-8	Control Pre-aged	1/0 HTK, FR	Permacel, Mica, Permacel	Yes	Yes	19
A-10	Autoclaved	No. 4, HTK, FR	Scotch 70, Mica Scotch 70, P212	Yes	Yes	25
A-11	Autoclaved	No. 4, HTK, FR	Scotch 70, Mica Scotch 70, P212	Yes	Yes	23
A-12	Autoclaved	No. 4, HTK, FR	Scotch 70, P212	Yes	Yes	24
A-13	Autoclaved	No. 4, HTK, FR	Scotch 70, P212	Yes	Yes	22
A-10-C	Control	4/0 HTK, FR	Scotch 70, Mica Scotch 70, P212	Yes	Yes	25
A-11-C	Control	1/0 HTK, FR	Scotch 70, Mica, Scotch 70, P212	Yes	Yes	26
A-12-C	Control	4/0 HTK, FR	Scotch 70, P212	Yes	Yes	25

Test Results - Power Cable Splices - Irradiated and/or Autoclaved

Sample Designation	Sample Conditioning	Cable Make-Up See Note 1	Splice Make-Up See Note 2	Withstand 4 KV AC	Withstand 8 KV DC	Breakdown AC Quick-Rise-KV
B-1	Irradiated	No. 4, HTK, FR	Bishop, Mica Bishop	Yes	Yes	21
B-2	Irradiated, Autoclaved	No. 4, HTK, FR	Bishop, Mica Bishop	Failed 3 KV	-	--
B-3	Irradiated, Autoclaved	No. 4, HTK, FR	Bishop, Mica Bishop	Yes	Yes	22

Note 1 - Cable make-ups are as follows:

a) 1/0 (19), 1 KV, 6/64" HTK insulation (N-98), open glass braid, 4/64" FR jacket (HC-7-11).

b) No. 4 (7), 1 KV, 5/64" HTK insulation (N-98), 4/64" FR jacket (HC-7-11).

c) 4/0 (19), 1 KV, 6/64" HTK insulation (N-98), open glass braid, 4/64" FR jacket (HC-7-11).

Note 2 - Splice make-ups are as follows:

a) Insulation rasped and coated with Bishop 55-C adhesive, indents and voids filled with Dow Corning 899 RTV, one layer, half-lapped, Bishop No. 20 Tri Sil silicone rubber tape, one layer, half-lapped, 3 M mica tape (MX-2301), one layer, half-lapped, Bishop No. 20 Tri Sil. See Westinghouse Drawing 206C391.

b) Make-up same as Item a) except Permacel silicone rubber tape (P-2650) substituted for Tri Sil tape.

c) Make-up same as Item a) except Scotch 70 (3 M) silicone rubber tape substituted for Tri Sil tape and a half-lapped layer of Permacel glass tape (P212) was added over the outer layer of silicone rubber tape.

d) Insulation rasped and coated with Bishop 55-C adhesive, indents and voids filled with Dow Corning 899 RTV, four layers, half-lapped, Scotch 70 (3 M) silicone rubber tape, one layer, half-lapped, Permacel (P212) glass tape.

Test Results - Power Cable Splices - Irradiated and/or Autoclaved

Note 3 - Samples were irradiated by a Gamma source to 1.7×10^8 rads in a period of 280 hours at Westinghouse.

Note 4 - Samples were autoclaved at Franklin Institute as follows:

2 hours at 60 psig (2100 ppm of boric acid adj. to pH of 9.5 with NaOH)

18 hours at 20 psig

492 hours at 5 psig (152°F.)

2 hours at 90 psig (compressed air at 162°F.)

Note 5 - A.C. withstand voltage was obtained by applying 4 KV A.C. for one minute.

Note 6 - A D.C. withstand voltage of 8 KV D.C. was applied for five minutes if the splice successfully withstood the A.C. voltage.

Note 7 - A.C. breakdown strength was obtained by applying a quick rise voltage at a rate of 1000 volts/second until breakdown if the splice successfully withstood the D.C. voltage.

Portions of the above test were personally witnessed by the undersigned, and the data presented above is accurate and complete to the best of my knowledge and belief.

R. B. Budrow

R. B. Budrow
Engineer

Subscribed and sworn to, before me, this 7th day of July 1970.

RBB/dm

Clifford F. Schmitt

Notary Public

June 30, 1970

RESULTS OF VOLTAGE TESTS PERFORMED ON CONTROL CABLE SPLICES THAT HAVE BEEN IRRADIATED AND/OR AUTOCLAVED

Sample Designation	Sample Conditioning	Individual Splice (See Note 2)	Outer Covering (See Note 3)	Withstand 2.5 KV AC	Withstand 5 KV DC	Breakdown AC Quick-Rise - KV
C-1	Irradiated	Scotch 70	Scotch 70, Scotch 27	Yes	Yes	16
C-2	Irradiated, Autoclaved	Scotch 70	Scotch 70, Scotch 27	Yes	Yes	15
C-3	Irradiated, Autoclaved	Scotch 70	Scotch 70, Scotch 27	Yes	Yes	10.5
C-11	Autoclaved	Scotch 70	Scotch 70, P212	Yes	Yes	12.5
C-12	Autoclaved	Scotch 70	Scotch 70-Mica Scotch 70, P212	Yes	Yes	16
C-11-C	Control	Scotch 70	Scotch 70, P212	Yes	Yes	12
D-1	Irradiated	Scotch 70	Scotch 70, Scotch 27	Yes	Yes	15
D-2	Irradiated, Autoclaved	Scotch 70	Scotch 70, Scotch 27	Yes	Yes	10.5
D-3	Irradiated, Autoclaved	Scotch 70	Scotch 70, Scotch 27	Yes	Yes	12
D-4	Pre-aged, Irradiated	Scotch 70	Scotch 27, Scotch 70	Yes	Yes	15
D-5	Pre-aged, Irradiated, Autoclaved	Scotch 70	Scotch 27, Scotch 70	Yes	Yes	15
D-6	Pre-aged, Irradiated, Autoclaved	Scotch 70	Scotch 27, Scotch 70	Yes	Yes	6.5
D-8	Pre-aged	Scotch 70	Scotch 27, Scotch 70	Yes	Yes	15

Note 1 - Cable make-ups are as follows:

a) All samples except C-11; C-12, C-11-C are seven conductor No. 12 (7 strd.), 3/64" FR insulation (HI-70), 4/64" FR jacket (HC-7-11).

b) Samples C-11, C-12 and C-11-C make-ups - the same as Item a) except there are nine conductors.

Test Results - Control Cable Splices - Irradiated and/or Autoclaved

Note 2 - The individual insulated conductors had the insulation rasped and coated with Bishop 55-C and then were taped with three layers half-lapped of Scotch 70 (3 M) silicone rubber tape.

Note 3 - An overall outer covering was placed over the group of individual conductors as follows:

a) One layer, half-lapped, Scotch 70 (3 M) silicone rubber tape, one layer, half-lapped, Scotch 27 glass tape.

b) Two layers, half-lapped, Scotch 70 (3 M) silicone rubber tape, one layer, half-lapped, Permacel glass tape (P212).

c) One layer, half-lapped, Scotch 70 silicone rubber tape, one layer, half-lapped, 3 M mica tape (MX-2301), one layer, half-lapped, Scotch 70 silicone rubber tape, one layer, half-lapped, Permacel glass tape (P212).

d) One layer, half-lapped, Scotch 70 silicone rubber tape, one layer, half-lapped, Scotch 27 glass tape.

e) One layer, half-lapped, Scotch 27 glass tape, two layers, half-lapped, Scotch 70 silicone rubber tape.

Note 4 - Samples were irradiated to 1.7×10^8 rads by a gamma source in a period of 280 hours at Westinghouse .

Note 5 - Samples were autoclaved at Franklin Institute as follows:

2 hours at 60 psig (2100 ppm of boric acid adj. to pH of 9.5 with NaOH)

18 hours at 20 psig

492 hours at 5 psig (152°F.)

2 hours at 90 psig (compressed air at 162°F.)

Note 6 - A.C. withstand voltage was obtained by applying 2.5 KV A.C. for one minute.

Note 7 - D.C. withstand voltage was obtained by applying 5 KV D.C. for five minutes after the A.C. withstand.

Note 8 - A.C. breakdown strength was obtained by applying a quick rise voltage at a rate of 1000 volts/second until breakdown.

Westinghouse Electric Corporation Power Systems

Box 355
Pittsburgh Pennsylvania 15230

NSD-E-CVF-109

January 20, 1970

R. B. Budrow
The Kerite Company
49 Day Street
Seymour, Conn. 06483

SUBJECT: Cable Exposure at FIRL

Dear Mr. Budrow:

Confirming our telecon of Jan. 19, the following exposures were applied by Franklin:

2 hours at 60 psig (2100 ppm of boric acid adj. to pH of 9.5 with NaOH)

18 hours at 20 psig

492 hours at 5 psig (152°F)

2 hours at 90 psig (compressed air at 162°F)

If there are any further details about the cable exposure needed, please let me know.

Sincerely,

C. V. Fields
Engineering
Nuclear Services Department

/dw

cc: File: RCFC E

Westinghouse Electric Corporation Power Systems

PWR Systems Division
Box 355
Pittsburgh Pennsylvania 15230

December 1, 1969

NSD-E-CVF-970

Mr. R. B. Budrow
The Kerite Company
49 Day Street
Seymour, Conn. 06483

SUBJECT: Cable Splice Tests

REF: Kerite Letter of Sept. 26.

Dear Mr. Budrow:

Confirming our telecon of Nov. 25, all 18 samples were irradiated to 1.7×10^8 rads in a period of 280 hours.

Samples A4, 5 and 6 showed the most damage with the outer Permacel layer falling away for a space of three inches at the center of the splice. Samples A1, 2, 3 and B1, 2, 3 could not be handled without cracked outer layer of Bishop #20 falling off and exposing mica.

The only damage apparent to "C" and "D" samples were cuts apparently produced by metal tags on D-4, 5 and 6.

It is unfortunate that treatments were not varied as planned; but, hopefully, we can separate the cable splices and process them in meaningful ways from here on. There is surely a need to know how appearance correlates with electrical characteristics in both non-destructive and destructive tests.

There seems to be little doubt that the Scotch #70 tape is the best and it is apparently adequate, having withstood aging and radiation. I understand that you believe a Permacel glass tape (No.?) has been shown superior and is proposed as an outer protective layer. Although not so stated in your letter, I presume that all 18 samples have a layer of mica tape.

Please call me when you have had a chance to consider future steps.

Very truly yours,

C. V. Fields

C. V. Fields
Nuclear Services Department

/dw

File: RCFC Elec.