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Facility: Browns Ferry Nucle Unit: 1 Docket: 50-259	ear Plant	SYSTEM COMP	ONENT EVALUA	TION WORK SH	EET (Rev 2)	(3) Sheet No Revision Date	B-63-0001
FOULPMENT DESCRIPTION		ENVIRONMENT	•••••••	DOCUMEN	TATION REF	QUALIFICATION METHOD	OUTSTANDING
	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation	• •	
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	l Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WCA 1/c, #14, PN Manufacturer:Attachment B	Temperature (°F)	153	153	(4)	Attachments C.1 and C.2	Attachment C.3	None ·
Nodel Number: N/A	Pressure (PSIA)		N/A	(4)	N/A	N/A	\None
Function: Control/Power	Relative Humidity (%)	100	100 ·	<u>(4)</u>	1PCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Category: Attachment A	Chemical Spray	N/A ·	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	3,1x10 ⁴	4x10 ⁷	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: 14	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
Flood Level Elev: 552' Above Flood Level: Yes × No	Submergence	N/A	N/A	(4)	N/A ·	. N/A	- None
Notes: (1) See Section 2	.4 in 79-01B re	eport.		•	•	· Prepared by: <u>R</u>	2. mills
(2) See Section 4. (3) All notes and	1.2 in 79-01B other informat	report. tion not on i	these		• • * •	Reviewed by: Ø	7 Ulagric
sheets are on • (4) See Section 3	the attached a .0 and/or Apper	appendix shee ndix B in 79-	olb report.	; ;	*	QA Acceptance:	. •

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Attachment A

System: 63		•		EEB-63-0001
Unit: 1		· ·		Rev O
Component: Cab Mark: WCA	le	1/c, #14, PN		
<u>Plant I. D. No</u>	. Rocm	Function/Service	Category	<u>Operating Time</u>
1PL5103	14	SLC Storage Tank	A	l Year
1222102	14 . ,	INK HEALET CONLECT	A	I ICAL

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EEB -63-0001

Rev <u>O</u>

ATTACHMENT B

Mark WCA

Туре

PN PN PN PN PN. PN

PN

	Contract No.	
	72C7-75128	
	72X7-74885-1	
	73C7-84528	
	67C3-91618	
	72C7-75328-1	
	70C7-54179-1	
TR	822378)	
	822639) Sequoyah	
	822915) 7207-75228-1	
٠.	7207-83874-1	
•	1201-03014-1	•

-		Manufacturer						
		Plastic Wire Brand-Rex	Ł	Cable	Corp			
•		Plastic Wire Brand-Rex	8	Cable	Corp			
	-	Brand-Rex Brand-Rex			*			
	•	Plastic Wire	&	Cable	Corp	•		
		Plastic Wire	&	Cable	Corp			

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Sheet No.: <u>EEB-63-0001</u>

Revision: 0

ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

3C

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of 75° C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121 C (250° F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

- C.3 Temperature Qualification Method
 - C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:_____

Reviewed by:_____

QA Acceptance:_____

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		•				Date10-	22-80
EQUIPMENT DESCRIPTION	•	ENVIRONMENT	e	DOCUMEN	ITATION REF	QUALIFICATION	OUTSTANDING
	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation		
System: 63 / Plant ID No. Attachment A	Operating Time	Attachment A	lyear.	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WDF 1/c, #4, CPJ Manufacturer: Attachment B	Temperature (°F)	153	325	(4)	Attachment C.1	Generic Simultaneous Test	None ·
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	·. N/A	• . None . ·
Function: Control/Power	Relative Humidity (%)	100	100	. (4)	Attachment C.1	Generic Simultaneous Test	None
Demon: N/A Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A ·	N/A	· None
Service: Attachment A	Radiation (RAD)	3,1x10 ^{4 ·}	6.9x10 ⁷	. (4)	Attachment C.1	Generic Sequential Test	None
Location: 14	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	None
Flood Level Elev: 552' Above Flood Level: Yes X	Submergence	N/A	N/A		N/A	N/A	, None

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(4) See Section 3.0 and/or Appendix B in 79-01B report.

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QA Acceptance:

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Attachment A

EEB -63-0002 System: 63 Unit: 1 Rev O Component: Cable Mark: WDF. 1/c, #4, CPJ • Operating Time Function/Service Category Plant I. D. No. Room 14 1PL5100 TANK HEATER SUPPLY A· 1 Year

EEB 63-0002 ; .

Rev O

ATTACHMENT B

Mark WDF

Contract No. 67C7-91619 71C7-54180-1 72C7-75328-3

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Type

CPJ CPJ CPJ

Manufacturer

General Cable Corp Phelps Dodge Cable Wire Rome

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Sheet No.: EEB- 63-0002

Revision: 0

ATTACHMENT C

- C.1 Wyle Laboratory Report No. 43854-3.
- C.2 NUREG-0588 Material List.

9C

C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Prepared by: R.L. Mills / DTH .

Reviewed by:

QA Acceptance:

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(3) SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Facility: Browns Ferry Nuclear Plant Sheet No. FFB-63-0003 Unit: Revision 0 50-259 Docket: Date 10-22-80 OUALIFICATION DOCUMENTATION REF OUTSTANDING ENVIRONMENT EQUIPMENT DESCRIPTION METHOD ITEMS Specifi-Oualifi-Specifi-Oualification cation Parameter cation cation System: 63 Operating Attachment A Engineering 1 year . Attachment C.3 None Plant ID No. Attachment A Time Analysis and . (1)Test Cable WDG Component Generic 1/c, #2, CPJ Simultaneous Temperature Manufacturer: Attachment B Attachment C.1 Test None -325 (4)(°F) 153 Pressure Model Number: N/A (PSIA) 15.0 (4) N/A None . • N/A N/A Function: Control/Power Generic Relative Simultaneous Humidity (%) None (4) Attachment C. 1 Test 100 100 Accuracy: Reg'd: N/A **Chemical** Demon: N/A Spray Category: Attachment A • None N/A N/A N/A N/A (4) Service: Attachment A Generic Radiation -Sequential <u>3.1x</u>10⁴ 6.9x10⁷ Attachment C (RAD) (4)Test None Location: 14 N/A (2)None Aging 40 years Attachment C.2Generic Mat1_Test Flood Level Elev: 552' None N/A Above Flood Level: Yes X Submergence N/A N/A N/A (4) No Prepared by: R.L. Mill Notes: (1) See Section 2.4 in 79-01B report.

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

Reviewed by: &7-Wagn

QA Acceptance:



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Attachment A

System: 63 Unit: 1				EEB <u>63-0003</u>
Component: Cable Mark: • WDG	۲,	1/c, #2, CPJ		
<u>Plant I. D. No.</u>	Room	Function/Service	Category	Operating Time
1PL754 1PL769	14 14	PMP SUPPLY PMP SUPPLY	A A	1 Year 1 Year







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EEB <u>63-0003</u>

Rev O

ATTACHMENT B

Mark WDG

Contract No.	Туре	Manufacturer
67C7-91619	CPJ	General Cable Corp
•71C7-54180-1	CPJ	Phelps Dodge
86150 XFR Bellefonte	, CPJ	Plastic Wire & Cable Corp
72C7-75328-3	CPJ	Rome
78K5-824443-2	PXJ	GE
72C7-75533-1	PXJ	Essex

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Sheet No.: EEB- 63-0003

Revision: 0

### ATTACHMENT C

- C.1 Wyle Laboratory Report No. 43854-3.
- C.2 NUREG-0588 Material List.
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Prepared by: R. L. Mills / Dort

Reviewed by: \_\_\_\_\_

QA Acceptance:

(3) SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Facility: Browns Ferry Nuclear Plant Sheet No. EEB-63-0004 Unit: Revision 0 50-259 Docket: Date 10-22-80 DOCUMENTATION REF ENVIRONMENT QUALIFICATION **OUTSTANDING** EQUIPMENT DESCRIPTION METHOD ITEMS Specifi-Qualifi-Specifi-Qualifi-Parameter cation cation cation cation System: 63 1 Year Attachment Engineering None Operating Attachment A C.4 Analysis Plant ID No. Attachment A Time (1) Cable WGB Component :2/c, #12, PNJ Attachments Temperature' Manufacturer: Attachment B None -(<sup>0</sup>F) 153 (4)C.1 and C.2 · Attachment C.3 174 ۰. Pressure Model Number: N/A (PSIA) (4) 15.0 N/A N/A N/A None . Function: Control/Power IPCEA S-61-402 Standard Relative par 3.9, 3.7.3 Material Humidity (%) 6.7 Requirement None (4) <sup>-</sup> 100 100 Accuracy: Reg'd: N/A Demon: N/A Chemical Spray Category: Attachment A (4)N/A N/A N/A -N/A None Service: Attachment A NUREG-0588 Generic Radiation . Materials Material 3.1x10<sup>4</sup> 4x107 (RAD) (4)List Test None Location: 12 .(2) None Aaina N/A 20 years Attachment C.2 Oper. Experience. Flood Level Elev: 552' . Above Flood Level: Yes X Submergence N/A N/A N/A N/A (4) . . None No : ` See Section 2.4 in 79-01B report. Notes: (1)Prepared by: K.L. Mill (2) See Section 4.1.2 in 79-01B report. s. 1 Reviewed by: (3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

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QA Acceptance:

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Attachment A

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| System: 63<br>Unit: 1<br>Component: Cable<br>Mark: WGB | ta.  | 2/c, #12, PNJ    |                 | EEB <u>63-0004</u><br>Rev <u>0</u> |
|--------------------------------------------------------|------|------------------|-----------------|------------------------------------|
| <u>Plant I. D. No.</u>                                 | Room | Function/Service | <u>Category</u> | Operating Time                     |
| 1PL790                                                 | 12   | Injection Flow   | A               | l Year                             |

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# EEB 63-0004

Rev O

# ATTACHMENT B

Mark WGB

<u>Contract No</u>. 67C3-91618

73C7-84528

75K7-86150-1

75K5-86506-1

74C7-85069-1 70C7-54179-2

71X7-54761-1 72C7-54872

70C7-54179-1

Type

PNJ

PJJ

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PJJ

PJJ PNJ.

PNJ PNJ

PNJ

## Manufacturer

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| Brand-Rex       | · ·        |
|-----------------|------------|
| Rome Cable      | · · ·      |
| Cyprus          |            |
| American Insula | ated Wire  |
| Rome            | •          |
| Plastic Wire &  | Cable Corp |
| General Cable   | •          |
| Plastic Wire &  | Cable Corp |
| Brand-Rex       | •          |

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Sheet No.: \_\_\_\_\_\_\_ EEB- 63-0004

Revision: 0

### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous,  $95^{\circ}$  C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121 C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

| Prepared by:   | <u>\</u> |
|----------------|----------|
| Reviewed by:   | ·        |
| QA Acceptance: |          |



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| Facility: Browns Ferry Nucl<br>Unit: 1<br>Docket: 50-259          | ear Plant                        | SYSTEM COMP                           | ONENT EVALUA      | TION WORK SH       | EET (Rev 2)                             | (3)<br>Sheet No. <u>EE</u><br>Revision <u>O</u><br>Date <u>10</u> | <u>B-63-0005</u><br>-22-80 |
|-------------------------------------------------------------------|----------------------------------|---------------------------------------|-------------------|--------------------|-----------------------------------------|-------------------------------------------------------------------|----------------------------|
| EQUIDMENT DESCRIPTION                                             |                                  | ENVIROMENT                            | • •               | DOCUMEN            | TATION REF                              | QUALIFICATION                                                     | OUTSTANDIN                 |
|                                                                   | Parameter                        | Specifi-<br>cation                    | Qualifi<br>cation | Specifi-<br>cation | Qualifi-<br>cation                      | • •                                                               |                            |
| System: 63<br>Plant ID No. Attachment A                           | Operating<br>Time                | Attachment A                          | 1 Year            | (1)                | Attachment<br>C.4                       | Engineering<br>Analysis                                           | None                       |
| Component Cable WGB<br>2/c, #12, PNJ<br>Manufacturer:Attachment B | Temperature<br>( <sup>o</sup> F) | 153                                   | 153               | (4)                | Attachments<br>C.1 and C.2              | Attachment C.3                                                    | None ·                     |
| Model Number: N/A                                                 | Pressure<br>(PSIA)               | 15.0                                  | N/A               | . (4)              | N/A                                     | N/A                                                               | None .                     |
| Function: Control/Power                                           | Relative<br>Humidity (%)         | 100                                   | 100 -             | (4)                | LPCEA S-61-402<br>par 3.9, 3.7.3<br>6.7 | Standard<br>Material<br>Requirement                               | None                       |
| Accuracy: Req'd: N/A<br>Demon: N/A<br>Category: Attachment A      | Chemical<br>Spray                | · · · · · · · · · · · · · · · · · · · | N/A               | (4)                | N/A                                     | <br>N/A                                                           | None                       |
| Service: Attachment A                                             | Radiation<br>(RAD)               |                                       | 4x10 <sup>7</sup> | . (4)              | NUREG-0588<br>Materials<br>List         | Generic<br>Material<br>Test                                       | None                       |
| Location: 14                                                      | Aging ·                          | N/A                                   | 20 years          | (2)                | Attachment C.2                          | Oper. Experience                                                  | None                       |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No          | Submergence                      | N/A                                   | N/A               | · (4) ·            | N/A .                                   | . ~ N/A                                                           | None                       |

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets.are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

Reviewed by:

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Attachment A

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| System: 63                  |              |                        |          | · EEB <u>63-0005</u> |
|-----------------------------|--------------|------------------------|----------|----------------------|
| Unit: 1                     |              | ·                      | _        | Rev O                |
| Component: Cab<br>Mark: WGB | le           | 2/c, No, 12, PNJ       |          |                      |
| Plant I. D. No.             | Room         | Function/Service       | Category | Operating Time       |
| 1PL2175<br>1PL2182          | 14<br>14     | Trace Heater<br>Heater | A<br>A   | l Year<br>l Year     |
| 1PL2194                     | 14<br>14<br> | Heater                 | A<br>A   | l Year<br>1 Year     |

TEB 63-000

Rev Q

## ATTACHMENT B

Mark WGB

Contract No.

8783-9:013 73C7-84528 75K7-86150-1 75K5-86506-1 74C7-85069-1 70C7-54179-2 71X7-54761-1 72C7-54872 70C7-54179-1

## <u>Type</u>

P::....

**PJJ** 

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PJJ

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PNJ

PNJ

PHJ

PNJ

## Manufacturer

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Crand-Nex Rome Cable Cyprus American Insulated Wire Rome Plastic Wire & Cable Corp General Cable Plastic Wire & Cable Corp Brand-Rex


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Sheet No.: <u>EEB-63-0005</u> Revision: 0

#### ATTACHMENT C

C.1 IPCEA'S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA NC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous,  $95^{\circ}$  C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.] Standard' material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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|-----------------------------------------------------------------|----------------------------------------------------|-----------------------------------------|--------------------|--------------|-----------------------------------------|----------------------------------------------|----------------------|
| Facility: Browns Ferry Nucl<br>Unit: 1<br>Docket: 50-259        | lear Plant                                         | SYSTEM COMP                             | PONENT EVALUA<br>- | TION WORK SH | EET (Rev 2)                             | (3)<br>Sheet No. El<br>Revision O<br>Date IC | B-63-0006            |
| EQUIPMENT DESCRIPTION                                           | • *                                                | ENVIRONMENT                             | 0                  | DOCUMEN      | TATION REF                              | QUALIFICATION<br>METHOD                      | OUTSTANDING<br>ITEMS |
| ······                                                          | Parameter                                          | cation                                  | cation             | cation       | Qualiti-<br>cation                      |                                              |                      |
| System: 63<br>Plant ID No. Attachment A                         | Operating<br>Time                                  | Attachment A                            | 1 Year             | · (1)        | Attachment<br>C.4                       | Èngineering<br>Analysis                      | None                 |
| Component Cable WGD<br>4/c, #12, PNJ                            |                                                    |                                         |                    |              |                                         |                                              |                      |
| Manufacturer:Attachment B                                       | Temperature<br>(°F)                                | 153 .                                   | 153                | (4)          | Attachments<br>C.1 and C.2              | Attachment C.3                               | None •               |
| .Model Number: N/A                                              | Pressure<br>(PSIA)                                 | 15.0                                    | N/A                | (4)          | Ν/Δ .                                   | ν                                            | None                 |
| Function: Control/Power                                         | Relative<br>Humidity (%)                           | 100                                     | . 100              | (4)          | IPCEA S-61-402<br>par 3.9, 3.7.3<br>6.7 | Standard<br>Material<br>Requirement          | None                 |
| Accuracy: Reg'd: N/A<br>Demon: N/A<br>Category: Attachment A    | Chemical<br>Spray                                  | N/A                                     | N/A                | (4)          | N/A                                     | N/A                                          | None                 |
| Service: Attachment A                                           | Radiation<br>(RAD)                                 | 3,1x10 <sup>4</sup>                     | 4x10 <sup>7</sup>  | . (4)        | NUREG-0588<br>Materials<br>List         | Generic<br>Material<br>Test                  | None                 |
| Location: 14                                                    | Aging                                              | N/A                                     | 20 years           | (2)          | Attachment C.2                          | Oper. Experience                             | None                 |
| Flood Level Elev: 552'<br>Above Flood Level: Yes $\times$<br>No | Submergence                                        | N/A                                     | N/A                | (4)          | N/A                                     | . N/A                                        | None                 |
| Notes: (1) See Section 2                                        | .4 in 79-01B re                                    | port.                                   |                    | •            |                                         | Prepared by: <u>R</u>                        | 1. mills             |
| (2) See Section 4<br>(3) All notes and<br>sheets are on         | .1.2 in 79-01B<br>other informat<br>the attached a | report.<br>ion not on t<br>ppendix shee | hese               |              | · · ·                                   | Reviewed by: &                               | Fillagner 218.       |
| (4) See Section 3                                               | .0 and/or Appen                                    | dix B in 79-                            | 018 report.        |              |                                         | QA Acceptance:                               |                      |
| 1.                                                              | •                                                  | •                                       |                    | . `          |                                         | · · ·                                        | •                    |





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Attachment A

| System: 63                    |                           | •        | EEB <u>63-0006</u> |
|-------------------------------|---------------------------|----------|--------------------|
| ONTE: 1                       |                           | ,        | Rev O              |
| Component: Cable<br>Mark: WGD | 4/c, #12, PNJ             | •        | •                  |
| Plant I. D. No. Room          | n <u>Function/Service</u> | Category | Operating Time     |
| 1PL758 14                     | Stby Liquid Control       | A        | 1 Year             |
| IPL//3 14                     | Stby Liquid Control       | A        | 1 Year             |

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# EEB 63-0006

Rev O

# ATTACHMENT B

Mark WGD

Contract No. 73C7-84528 67C3-91618 72C7-75228-1 72C7-54762-2 74C7-85069 70C7-54179-1

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Туре

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Manufacturer

| • | PJJ<br>PNJ<br>PJJ<br>PNJ<br>PJJ<br>PJJ<br>PNJ | ~ <b>~</b> | Rome Cable<br>Plastic Wire &<br>Plastic Wire &<br>Plastic Wire &<br>Rome<br>Brand-Rex | & Cable Corp<br>& Cable Corp<br>& Cabel Corp<br>& Cabel Corp | • |
|---|-----------------------------------------------|------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------|---|
|   |                                               |            | •                                                                                     |                                                              | • |

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Sheet No.: \_\_\_\_\_\_ EEB-63-0006

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

**3**C

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous,  $95^{\circ}$  C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

- C.3 Temperature Qualification Method
  - C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

| C.4 | The post-HELB conditions are less than the normal cable rating and | 2 |
|-----|--------------------------------------------------------------------|---|
|     | in our judgment, the cables could operate satisfactorily for a     |   |
|     | post-accident of a year.                                           |   |

Prepared by:\_\_\_\_\_

Reviewed by:

QA Acceptance:

| acility: Browns Ferry Nucl<br>Nit: 1<br>Wocket: 50-259             | ear Plant                                           | SYSTEM COMP                        | ONENT EVALUA<br>-  | TION WORK SH       | EET (Rev 2)                             | (3)<br>Sheet No. <u>EE</u><br>Revision <u>O</u><br>Date <u>JO</u> | 3-63-0007<br>-22-80  |
|--------------------------------------------------------------------|-----------------------------------------------------|------------------------------------|--------------------|--------------------|-----------------------------------------|-------------------------------------------------------------------|----------------------|
| FOULDNENT DESCRIPTION                                              |                                                     | ENVIRONMENT                        |                    | DOCUMEN            | TATION REF                              | QUALIFICATION                                                     | OUTSTANDING          |
| EQUIFNENT DESCRIPTION                                              | Parameter                                           | Specifi-<br>cation                 | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                      | нетор                                                             | 1 LHJ                |
| System: 63<br>Plant ID No. Attachment Λ                            | Operating<br>Time                                   | Attachment A                       | 1 Year             | (1)                | Attachment<br>C.4                       | Engineering<br>Analysis                                           | None                 |
| Component Cable WGG<br>Vc, #12, PNJ<br>Manufacturer:Attachment B   | Temperature<br>(°F).                                | 153                                | 153                | (4)                | Attachments<br>C.1 and C.2 .            | Attachment C.3                                                    | None · ·             |
| odel Number: N/A                                                   | Pressure<br>(PSIA)                                  | 15.0                               | N/A                | (4)                | N/A                                     | N/A                                                               | None                 |
| Function: Control/Power                                            | Relative<br>Humidity (%)                            | 100                                | 100                | (4)                | IPCEA S-61-402<br>par 3.9, 3.7.3<br>6.7 | Standard<br>Material<br>Requirement                               | None                 |
| Demon: N/A<br>Detegory: Attachment A                               | Chemical<br>Spray                                   | N/A                                | N/A                | (4)                | N/A                                     | N/A                                                               | None                 |
| Service: Attachment A                                              | Radiation<br>(RAD)                                  | .3.1x10 <sup>4</sup>               | 4x10 <sup>7</sup>  | . (4)              | NUREG-0588<br>Materials<br>List         | Generic<br>Material<br>Test                                       | None                 |
| _ocation: 14                                                       | Aging                                               | N/A                                | 20 years           | (2)                | Attachment C.2                          | Oper, Experience                                                  | None                 |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No           | Submergence                                         | N/A                                | N/A                | (4)                | N/A .                                   | . N/A                                                             | None                 |
| Notes: (1) See Section 2<br>(2) See Section 4<br>(3) All notes and | .4 in 79-01B r<br>.1.2 in 79-01B<br>l other informa | eport.<br>report.<br>tion not on t | hese               | •                  | •                                       | Prepared by: <u>K</u><br>Reviewed by: <u>K</u>                    | 1. mills<br>7 Wagner |

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report. QA Acceptance:

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Attachment A

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| System: 63                    |          | •                                                |                 | EEB 63-0007      |
|-------------------------------|----------|--------------------------------------------------|-----------------|------------------|
| Unit: 1                       |          |                                                  |                 | Rev O            |
| Component: Cable<br>Mark: WGG | •?       | 7/c, #12, PNJ                                    |                 | •                |
| Plant I. D. No. F             | Room     | Function/Service                                 | <u>Category</u> | Operating Time   |
| 1PL755 1<br>1PL770 1          | 14<br>14 | Stdby Lqid Pmp 2A Cont<br>Stdby Lqid Pmp 2A Cont | A<br>A          | l Year<br>1 Year |



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# EEB 63-0007

### Rev O

# ATTACHMENT B

## MarkwGG

| Contract No.               |
|----------------------------|
| 67C3-91618                 |
| 71 X7-54761-1              |
| 70C7-54179-1               |
| /2C/-/5328-2<br>69C7-64923 |

Type

PNJ PNJ PNJ PNJ PNJ Manufacturer

Plastic Wire & Cable Corp General Cable Brand-Rex Tamaqua Rockbestos

Sheet No.: \_\_\_\_\_\_\_ EEB- 63-0007

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

80

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous,  $95^{\circ}$  C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

- C.3 Temperature Qualification Method
  - C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

| <b>C.4</b> | The post-HELB conditions are les | s than the normal cable rating and, |
|------------|----------------------------------|-------------------------------------|
| •          | in our judgment, the cables coul | d operate satisfactorily for a      |
|            | post-accident of a year.         |                                     |

Prepared by:\_\_\_\_\_\_

QA Acceptance:

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| Facility: Browns Ferry Nucl<br>Unit: 1<br>Docket: 50-259          | ear Plant                         | SYSTEM COMP         | ONENT EVALUA       | TION WORK SH       | EET (Rev 2)                             | (3)<br>Sheet No. <u>EFF</u><br>Revision <u>O</u><br>Date <u>10</u> : | -22-80      |
|-------------------------------------------------------------------|-----------------------------------|---------------------|--------------------|--------------------|-----------------------------------------|----------------------------------------------------------------------|-------------|
|                                                                   |                                   | ENVIRONMENT         |                    | DOCUMEN            | TATION REF                              | QUALIFICATION                                                        | OUTSTANDING |
| EQUIPMENT DESCRIPTION -                                           | Parameter                         | Specifi-<br>cation  | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                      |                                                                      |             |
| System: 63<br>Plant ID No. Attachment A                           | Operating<br>Time                 | Attachment A        | l Year .           | (1)                | Attachment<br>C.4                       | Engineering<br>Analysis                                              | None        |
| Component Cable WHG<br>5/c, #14, PNJ<br>Manufacturer:Attachment B | Temperature<br>(°F)               | 153                 | 153                | (4)                | Attachments<br>C.1 and C.2              | Attachment C.3                                                       | None        |
| Model Number: N/A                                                 | Pressure<br>(PSIA)                | 15.0                | N/A                | (4)                | N/A                                     | N/A                                                                  | None :      |
| Function: Control/Power                                           | Relative<br>Humidity (%)          | 100                 | 100                | (4)                | 1PCEA S-61-402<br>par 3.9, 3.7.3<br>6.7 | Standard<br>Material<br>Requirement                                  | None        |
| Accuracy: Reg'd: N/A<br>Demon: N/A                                | Chemical<br>Spray                 | . N/A               | N/A                | (4)                | Ν/Δ                                     | <br>. Ν/Δ                                                            | None        |
| Service: Attachment A                                             | Radiation<br>(RAD)                | 3;1x10 <sup>4</sup> | 4×10 <sup>7</sup>  | (4)                | NUREG-0588<br>Materials<br>List         | Generic<br>Material<br>Test                                          | None        |
| Location: 14                                                      | Aging                             | N/A                 | 20 years           | (2)                | Attachment C.2                          | Oper, Experience                                                     | None        |
| .Flood Level Elev: 552'<br>Above Flood Level: Yes $\chi$<br>No    | Submergence                       | N/A                 | N/A                | (4)                | N/A.                                    | . N/A                                                                | None        |
| Notes: (1) See Section 2<br>(2) See Section 4                     | 2.4 in 79-01B r<br>.1.2 in 79-01B | eport.<br>report.   | •                  | • •                |                                         | * Prepared by: 2<br>Reviewed by: 0                                   | 2. mills    |

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

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Attachment A

| System: 63                    |          |                    |            | EEB 63-0008    |
|-------------------------------|----------|--------------------|------------|----------------|
| 'Unit: 1                      |          |                    |            | Rev 🛆          |
| Component: Cable<br>Mark: WHG | 2<br>. ` | 5/c, #14, PNJ      |            |                |
| <u>Plant I. D. No.</u>        | Room     | Function/Service   | Category   | Operating Time |
| 1PL5101                       | 14       | Tnk Heater Control | <b>A</b> , | 1 Year         |

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# EEB <u>63-0008</u>

Rev O

# ATTACHMENT B

Mark WHG

Contract No.

67C3-91618 72C7-75328-2 70C7-54179-1

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Туре

PNJ PNJ PNJ

#### Manufacturer

Plastic Wire & Cable Tamaqua Brand-Rex

Sheet No.: EEB- 63-0008

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

80

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121° C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

| C.4 | The post-HELB conditions are less than the normal cable rating and, |
|-----|---------------------------------------------------------------------|
|     | in our judgment, the cables could operate satisfactorily for a      |
|     | post-accident of a year.                                            |

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:

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|-------------------------------------------------------------------|---------------------------------|--------------------------|---------------------|--------------------|--------------------|-------------------------------------|----------------------------|
|                                                                   | -                               | •                        |                     |                    | , *<br>,           |                                     |                            |
| acility: Browns Ferry Nuclo<br>nit: 1<br>ocket: 50-259            | ear Plant                       | SYSTEM COMP              | ONENT EVALUA        | TION WORK SH       | EET (Rev 2)        | (3)<br>Sheet No<br>Revision<br>Date | EB-63-0009<br>2<br>0-22-80 |
|                                                                   | ž                               | ENVIRONMENT              |                     | DOCUMEN            | TATION REF         | QUALIFICATION                       | OUTSTANDING                |
| EQUIPMENT DESCRIPTION -                                           | Parameter                       | Specifi-<br>cation       | Qualifi-<br>cation. | Specifi-<br>cation | Qualifi-<br>cation | METROD .                            |                            |
| ystem: 63<br>lant ID No. Attachment A                             | Operating<br>Timé               | Attachment A             | l Year              | (1)                | Attachment<br>C.3  | Engineering<br>Analysis             | None                       |
| omponent Cáble WVA<br>2/c, #16, CSPE<br>anufacturer: Attachment B | Temperature<br>(°F)             | <br>153                  | 250                 | (4)                | Attachment C.      | Generic<br>Simultaneous<br>.Test    | None                       |
| odel Number: N/A                                                  | Pressure<br>(PSIA)              | 15.0                     | N/A                 | (4)                | . N/A              | N/A                                 | None                       |
| unction:<br>Signal/Instrumentation                                | Relative<br>Humidity (%)        | 1 <sup>0</sup> 0         | 100                 | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test     | None                       |
| ategory: Attachment A                                             | Chemical<br>Spray               | N/A                      | N/A                 | (4)                | N/A                | N/A                                 | "None                      |
| ervice: Attachment A                                              | Radiation<br>(RAD)              | 3.1x10 <sup>4</sup>      | 5x10 <sup>7</sup>   | (4)                | Attachment C.1     | Generic<br>Sequential<br>Test       | None                       |
| ocation: 14                                                       | Aging                           | N/A ·                    | 40 years            | · (2) ·            | Attachment C.2     | Generic Mat'l Test                  | None                       |
| lood Level Elev: 552'<br>bove Flood Level: Yes X<br>No            | Submergence                     | N/A                      | N/A                 | (4)                | N/A                | N/A                                 | None                       |
| btes: (1) See Section 2                                           | .4 in 79-018 re                 | eport.                   |                     | •                  | •                  | Prepared by: <u></u>                | 1. mills                   |
| (2) See Section 4.<br>(3) All notes and                           | 1.2 in 79-01B<br>other informat | report.<br>tion not on t | · .<br>these        |                    | • • •              | Reviewed by:                        | 7 alagner 420              |

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Attachment A

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|   | .Svstem: 63                   | •          |                                              |          | EEB <u>63-0009</u> |  |
|---|-------------------------------|------------|----------------------------------------------|----------|--------------------|--|
|   | Unit: 1                       |            |                                              |          | Rev <u>O</u> ·     |  |
|   | Component: Cable<br>Mark: WVA | v          | 2/c, \$16                                    | ·        | •                  |  |
| • | <u>Plant I. D. No.</u>        | Room       | Function/Service                             | Category | Operating Time     |  |
| • | 1R986<br>1R985                | 14 .<br>14 | Stdby Lqid Tnk Level<br>Stdby Lqid Tnk Level | A<br>A   | 1 Year -<br>1 Year |  |

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# EEB 63-0009

Rev O

# ATTACHMENT B

#### Mark WVA

Type

FRXLPE/CSPE FRXLPE/CSPE PE/PVC

XLPE/CSPE

FREP/CPE

FREP/CPE

FREP/CPE

t

| Conti | ract | No. |
|-------|------|-----|
| 7745  | 0222 |     |

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7785-823265 72C7-83944 69C3-64863-1 72C7-74910-1

TR 822676 from SQN 76K5-87232

TR 827773 from BLN 78K5-824447

TR 826953 from 8LN 78K5-824447

> 77K5-820991 73C7-84211

#### Manufacturer

2

Rockbestos : Continental Wire & Cable Rockbestos Continental Wire & Cable

Continental Wire & Cable

Anaconda

Anaconda

Boston Ins. Wire ITT

Sheet No.: EE8-63-0009

Revision: \_\_\_\_\_\_

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Prepared by:   | r                                     |
|----------------|---------------------------------------|
| Reviewed by:   |                                       |
| QA Acceptance: | · · · · · · · · · · · · · · · · · · · |

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(3) SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Sheet No. EEB-63-0010 Facility: Browns Ferry Nuclear Plant Revision Unit:  $\cap$ 50-259 Date 10-22-80 Docket: QUALIFICATION OUTSTANDING DOCUMENTATION REF ENVIRONMENT ITEMS METHOD EQUIPMENT DESCRIPTION Specifi-Qualifi-Specifi-Oualification cation cation cation Parameter 63 System: Engineering None Attachment C.3 1 year Operating Attachment A Analysis and Time Plant ID No. Attachment A (1)Test Component Cable WVA Generic 2/c, #16, XLPE Simultaneous Temperature (°F) Yanufacturer: Attachment B None (4) Attachment C.1 Test 153 385 Pressure N/A N/A None N/A 4odel Number: N/A (PSIA)(4) 15.0 Function: Generic Signal/Instrumentation Relative Simultaneous Humidity (%) (4) None 100 100 Attachment C.1 Test Accuracy: Reg'd: N/A Demon: N/A Chemical Spray Category:Attachment A (4) None N/A N/A N/A N/A Service: Attachment A Generic Radiation Sequential Test 2x10<sup>8</sup> <u>3.1x10</u>4 (4)Attachment C. (RAD) None \_ocation: 14 · Generic Mat'l Test Attachment C. None 40 years (2)Aging N/A Flood Level Elev: 552' None N/A N/A N/A Shove Flood Level: Yes X Submergence Ł N/A (4) \* No Prepared by: <u>R. I. Mill</u> (1) See Section 2.4 in 79-01B report. votes: (2) See Section 4.1.2 in 79-01B report. Reviewed by (3) All notes and other information not on these sheets are on the attached appendix sheets. QA Acceptance: See Section 3.0 and/or Appendix B in 79-01B report. (4)

Attachment A

EEB 63-0010 .System: 63 Unit: 1 : Rev O Component: Cable Mark: WVA 2/c, \$16 v . Operating Time Plant I. D. No. Function/Service Room Category 1R986 1R985 14. Stdby Lqid Tnk Level Stdby Lqid Tnk Level l Year l Year Α 14 A . ;



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## EEB 63-0010

Rev \_O

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#### C ATTACHMENT B

Mark WVA

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Contract No

Type

| -  | contract no.                                              |   | 1790                                              | * | manarac                                                | curer            |                |
|----|-----------------------------------------------------------|---|---------------------------------------------------|---|--------------------------------------------------------|------------------|----------------|
|    | 77K5-823265<br>72C7-83944<br>69C3-64863-1<br>72C7-74910-1 |   | FRXLPE/CSPE<br>FRXLPE/CSPE<br>PE/PVC<br>XLPE/CSPE | : | Rockbestos<br>Continental<br>Rockbestos<br>Continental | Wire &<br>Wire & | Cable<br>Cable |
| TR | 822676 from SQN<br>76K5-87232                             | • | FREP/CPE                                          |   | Continental                                            | Wire &           | Cable          |
| TR | 827773 from BLN<br>78K5-824447                            | L | FREP/CPE                                          |   | Anaconda                                               |                  |                |
| TR | 826953 from BLN<br>78K5-824447                            |   | FREP/CPE                                          |   | Anaconda                                               |                  | •              |
|    | 77K5-820991<br>73C7-84211                                 |   |                                                   |   | Boston Ins.<br>ITT                                     | Wire             |                |

Sheet No: EEB 63-0010

Revision: 0

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Reviewed by:   |  |  |  |  |
|----------------|--|--|--|--|
| Prepared by:   |  |  |  |  |
| QA Acceptance: |  |  |  |  |

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N/A

4x107

20 years

N/A ·

N/A

N/A

N/A

 $3.1x10^4$ 

Radiation

(RAD)

Aging .

See Section 2.4 in 79-01B report.

See Section 4.1.2 in 79-01B report.

Submergence

(3) All notes and other information not on these sheets are on the attached appendix sheets.

N/A NUREG-0588

Attachment C.

N/A

Haterial

List

(4)

(4)

(2)

(4)

QA Acceptance:

Prepared by: R.L. Mille

None

None

· None

N/A

Generic

Tests

Material.

N/A

Reviewed by:

Oper. Experience

(4) See Section 3.0 and/or Appendix B in 79-01B report.

No

Service: Attachment A

Flood Level Elev: 552' Above Flood Level: Yes X

> (1)(2)

Location: 14

Notes:



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Attacnment A

| Svstem: 63                    |          | •                                            |                 | EEB <u>63-0011</u> |
|-------------------------------|----------|----------------------------------------------|-----------------|--------------------|
| Unit: 1.                      |          |                                              |                 | Rev <u>O</u> ·     |
| Component: Cable<br>Mark: WVA | . '      | 2/c, \$16                                    | • ,             |                    |
| Plant I. D. No.               | Room     | Function/Service                             | <u>Category</u> | Operating Time     |
| 1R986<br>1R985                | 14<br>14 | Stdby Lqid Tnk Level<br>Stdby Lqid Tnk Level | A .<br>. A      | l Year .<br>l Year |



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# EEB 63-0011

Rev O

# ATTACHMENT B

Mark WVA

Туре Contract No. 77K5-823265 FRXLPE/CSPE 72C7-83944 FRXLPE/CSPE -69C3-64863-1 PE/PVC 72C7-74910-1 XLPE/CSPE TR 822676 from SQN FREP/CPE 76K5-87232 TR 827773 from BLN FREP/CPE 78K5-824447 TR 826953 from BLN FREP/CPE 78K5-824447

> 77K5-820991 73C7-84211

# Manufacturer

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Rockbestos : Continental Wire & Cable Rockbestos Continental Wire & Cable

Continental Wire & Cable

Anaconda .

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Anaconda

Boston Ins. Wire ITT

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Sheet No: EEB-63-0011

Revision: 0

### ATTACHMENT C

C.1 TVA Engineering Report No. 1942

Coax, Triax, and Signal Cable

Coaxial and Triaxial cable installed at Browns Ferry were purchased in accordance with General Electric Company Specification 22A1181, and the appropriate MIL-C-17 specification. Signal cables, both twisted pair and multiconductor, were purchased in accordance with TVA specifications. Some cable were of cross-linked polyethylene and chloronated polyethylene construction while the same kind of cable furnished under other contracts were of high molecular weight, high density polyethylene/polyvinyl chloride construction and some even polyethylene/polyvinyl chloride construction. It is not possible to make a complete identification by contract as to which circuit and function they serve. Recent reclassification of some functions to lE status has made it almost a certainty that some cables now in a safety category are of polyethylene/polyvinyl construction.

Accordingly, we have examined the 20 HELB temperature profiles and find that only compartments 1, 3, 6, and 9 show profiles which more than briefly surpass the softening temperature of the linear polyethylene. However, owing to the thermal time lag in the cable material and the cable installation including the heat sink of conduit, tray, and shield material, the insulation will not experience the HELB temperature profile until some time has elapsed and the temperature is lower. Further, no load heat rise need be taken into account for these signal cables.

TVA has conducted tests (Chattanooga Central Laboratories Report No. L81-81-6821 dated October 1980, of PE, PVC cables under a temperature profile which envelops all the HELB profiles. Following this exposure, these cables sustained a dielectric test while immersed in water of 660 volts for 5 minutes, 960 volts for 5 minutes, and 220 volts ac for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April, or replaced at the next refueling outage.

For those cables located in compartment 0 (the containment), the service which these cables have seen thus far has exposed them to a gamma radiation dose of  $6.25 \times 10^{\circ}$  rads or more. This is sufficient to have cross-linked the polyethylene and PVC as well. Consequently, the insulation is now in fact a thermoset material and is capable of the same temperature that TVA's cross-linked polyethylene cable has demonstrated and is capable of withstanding the LOCA/SLB and the post-LOCA environment for a year.



Sheet No: EEB-63-001

Revision: 0

# ATTACHMENT C (Continued)

# C.1 (Continued)

Continued operation is justified, and TVA has prepared a LOCA/SLB, thermal aging, and radiation test procedure to be performed by Wyle Laboratories on samples of this cable to demonstrate the validity of this conclusion. Results of this testing program are expected to be available in April 1981.

One cable RG-114A/U has the possibility of being sensitive to pressure changes owing to its partial air dielectric; however, an analysis of this effect has indicated that the change in dielectric constant can be tolerated. Consequently for this cable too, there is justification for continued operation. The compression effect on the dielectric will be likewise tested at Wyle Laboratories along with the other cable tests and results are expected to be available by April 1981.

- C.2 Standard Material Long-Term Overload Temperature Rating
- C.3 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by: Reviewed by:

QA Acceptance:\_\_\_\_\_

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|-----------------------------------------------------------------------|-------------------------------------|----------------------|---------------------|--------------------|----------------------|-------------------------------------|-------------|
| Facility: Browns Ferry Nucl<br>Unit: 1<br>Docket: 50-259              | lear Plant                          | SYSTEM COMP          | ONENT EVALUA        | TION WORK SH       | IEET (Rev 2)         | (3)<br>Sheet No<br>Revision<br>Date |             |
|                                                                       |                                     | ENVIRONMENT          | •                   | DOCUMEN            | ITATION REF          | QUALIFICATION                       | OUTSTANDING |
| EQUIPMENT DESCRIPTION                                                 | Parameter                           | Specifi-<br>cation · | Qualifi-<br>cation. | Specifi-<br>cation | . Qualifi-<br>cation |                                     | 4<br>4      |
| System: 63<br>Plant ID No. Attachment A                               | • Operating<br>Time                 | Attachment A         | 1 Year              | (1)                | Attachment<br>C.3    | Engineering<br>Analysis             | • None<br>• |
| Component Cable WVA-1<br>2/c, #18, CSPE<br>Manufacturer: Attachment B | Temperature<br>(°F)                 | 174                  | 250                 | (4)                | Attachment C.1       | Generic<br>Simultaneous<br>Test     | None ·      |
| i<br>Model Number: N/A                                                | Pressure<br>(PSIA)                  |                      | N/A                 | (4)                | N/A                  | N/A                                 | None        |
| Function:<br>Signal/Instrumentation                                   | Relative<br>Humidity (%)            | 100                  | 100                 | (4)                | Attachment C.1       | Generic<br>Simultaneous<br>Test     | None .      |
| Accuracy: Req'd: N/A<br>. Demon: N/A<br>Category: Attachment A        | Chemical<br>Spray                   | N/A                  | N/A                 | (4)                | N/A                  | :<br>N/A                            | " None      |
| Service: Attachment A                                                 | Radiation<br>(RAD)                  | 3.1×10 <sup>4</sup>  | 5x10 <sup>7</sup>   | (4)                | Attachment C.1       | Generic<br>Sequential<br>Test       | None        |
| _ocation: 12                                                          | Aging                               | N/A                  | 40 years            | (2)                | Attachment C.2       | Generic Mat'l Test                  | None        |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No              | Submergence                         | N/A                  | N/A                 | (4)                | N/A                  | N/A                                 | None        |
| votes: (1) See Section 2<br>. (2) See Section 4                       | 2.4 in 79-01B re<br>1.1.2 in 79-01B | eport.<br>report.    | •                   | • • •              | •                    | Prepared by: X                      | 2. 1. mills |

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

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|   | Rev | 0       |  |
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System: 63 Unit: 1. Component: Cable Mark: •WVA-1 Ŷ

2/c, **#18** 

. Operating Time Function/Service Category Plant I. D. No. Room 1A1479 12 Injection Flow 1 Year A . .













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# EEB 63-0012

Rev O

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# ATTACHMENT B

Mark WVA-1

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|    | <u>Contract No.</u>                                     |       | Type                                          |      | Manufac                                                 | turer                      |                         | • |
|----|---------------------------------------------------------|-------|-----------------------------------------------|------|---------------------------------------------------------|----------------------------|-------------------------|---|
| h. | 68C7-61986<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 | · • , | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE |      | Continental<br>Rockbestos<br>Continental<br>Continental | Wire &<br>Wire &<br>Wire & | Cable<br>Cable<br>Cable |   |
| TR | From SQN<br>73C7-84211                                  |       | XLPE/CSPE                                     | • `, | ITT .                                                   | •                          | ÷ .                     |   |
| TR | 85255 from<br>SQN 72C7-83944                            | · 1   | XLPE/CSPE                                     |      | Continental                                             | Wire &                     | Cable                   |   |
| TR | 87049 from<br>SQN 73C7-84211                            |       | XLPE/CSPE                                     | • •  | ITT .                                                   |                            | ·                       |   |
| TR | 86757 from<br>SQN 73C7-84211                            |       | XLPO/CSPE                                     |      | ITT                                                     |                            |                         |   |
| TR | 823079 from<br>WBN 74C7-85259                           |       | XLPE/CSPE                                     |      | Belden                                                  |                            | ۰.                      |   |

Sheet No.: EEB-63-0012

Revision: \_\_\_\_\_

# ATTACHMENT C

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Prepared by: \_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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| Facility: Browns Ferry Nucle<br>Unit: 1<br>Decket: 50.050             | ear Plant .              | SYSTEM COMP              | ONENT EVALUA                                                      | TION WORK SH       | EET (Rev 2)        | (3)<br>Sheet NoE<br>RevisionC<br>Date | EB-63-0013  |
|-----------------------------------------------------------------------|--------------------------|--------------------------|-------------------------------------------------------------------|--------------------|--------------------|---------------------------------------|-------------|
|                                                                       |                          | ENVIRONMENT              | م<br>                                                             | DOCUMEN            | TATION REF         | QUALIFICATION                         | OUTSTANDING |
| EQUIPMENT DESCRIPTION                                                 | Parameter                | Specifi-<br>cation       | Decifi- Qualifi- Specifi- Qualifi-<br>cation cation cation cation |                    | Qualifi-<br>cation | METHOD                                | 11265       |
| System: 63<br>Plant ID No. Attachment A                               | Operating<br>Time        | Attachment A             | l year <sub>.</sub>                                               | (1)                | Attachment C.3     | Engineering<br>Analysis and<br>Test   | • None<br>• |
| Component Cable WVA-1<br>2/c, #18, XLPE<br>Manufacturer: Attachment B | Temperature<br>(°F)      | 174                      | 385                                                               | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test       | None        |
| Aodel Number: N/A                                                     | Pressure<br>(PSIA)       | 15.0                     | N/A                                                               | . (4)              | N/A                | N/A                                   | None        |
| Function:<br>Signal/Instrumentation ·                                 | Relative<br>Humidity (%) | 100                      | 100                                                               | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test       | None        |
| Accuracy: Req'd: N/A<br>Demon: N/A<br>Category:Attachment A           | Chemical<br>Spray        | N/A                      | N/A                                                               | (4)                | N/A                | N/A                                   | None        |
| Service: Attachment A                                                 | Radiation<br>(RAD)       | 3,1x10 <sup>4</sup>      | 2x10 <sup>8</sup>                                                 | . (4)              | Attachment C.1     | Generic<br>Sequential .<br>Test       | None        |
| _ocation: 12                                                          | Aging                    | N/A                      | 40 years                                                          | (2)                | Attachment C.2     | Generic Mat'l Test                    | None        |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No              | Submergence              | N/A                      | N/A                                                               | (4) <sup>.</sup> . | N/A                | N/A                                   | None        |
| Notes: (1) See Section 2                                              | .4 in 79-01B r           | eport.                   |                                                                   | •                  |                    | Prepared by: 🗶                        | 1. mills    |
| (2) See Section 4<br>(3) All notes and                                | .1.2 in 79-01B           | report.<br>tion not on 1 | these                                                             | ••••               |                    | Reviewed by:                          | J. Wagner   |

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(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

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|   | System: 63<br>Unit: 1`.         | x    | · .              | E               | EB <u>63-0013</u> | - |
|---|---------------------------------|------|------------------|-----------------|-------------------|---|
| ( | Component: Cable<br>Nark: WVA-1 | Ŷ    | 2/c, #18         | ·               |                   |   |
| ! | Plant I. D. No.                 | Room | Function/Service | <u>Category</u> | Operating Time    | • |
| - | 1A1479                          | 12   | Injection Flow   | A               | l Year            |   |



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# EEB <u>63-0013</u>

Rev O

# ATTACHMENT B



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| •  | Contract No. Type                                       |                                               | Manufacturer                                                                                   |
|----|---------------------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------|
|    | 68C7-61986<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE | Continental Wire & Cable<br>Rockbestos<br>Continental Wire & Cable<br>Continental Wire & Cable |
| TR | From SQN<br>73C7-84211                                  | XLPE/CSPE                                     | ITT                                                                                            |
| TR | 85255 from<br>SQN 72C7-83944                            | , XLPE/CSPE                                   | Continental Wire & Cable                                                                       |
| TR | 87049 from<br>SQN 73C7-84211                            | XLPE/CSPE                                     | ITT                                                                                            |
| TR | 86757 from<br>SQN 73C7-84211                            | XLPO/CSPE                                     | ITT                                                                                            |
| TR | 823079 from<br>WBN 74C7-85259                           | XLPE/CSPE                                     | Belden                                                                                         |
|    |                                                         | - •                                           |                                                                                                |

Sheet No: EEB-63-00/3

Revision: 0

### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

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Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Reviewed by:   | <u></u> |   |
|----------------|---------|---|
| Prepared by:   | ,       |   |
| QA Acceptance: |         | ( |
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| Facility: Browns' Ferry Nucl<br>Unit: 1<br>Docket: 50-259           | SYSTEM COMP              | PONENT EVALŬ#<br>-  | (3)<br>Sheet No. <u>FEB-63-0014</u><br>Revision <u>O</u><br>Date <u>10-22-80</u> |                    |                                             |                                     |             |
|---------------------------------------------------------------------|--------------------------|---------------------|----------------------------------------------------------------------------------|--------------------|---------------------------------------------|-------------------------------------|-------------|
| FOULDMENT DESCRIPTION                                               |                          | ENVIRONMENT         |                                                                                  | DOCUMEN            | ITATION REF                                 | QUALIFICATION                       | OUTSTANDING |
|                                                                     | Parameter                | Specifi-<br>cation  | Qualifi-<br>cation                                                               | Specifi-<br>cation | Qualifi-<br>cation                          |                                     |             |
| System: 63<br>Plant ID No. Attachment A                             | Operating<br>Time        | Attachment A        | l Year'.                                                                         | (1)                | Attachment<br>C.3                           | Engineering<br>Analysis .           | None<br>•   |
| Component Cable WVA-1<br>2/c, #18, PE<br>Manufacturer: Attachment B | Temperature<br>(°F)      | 174                 | 203                                                                              |                    | IPCEA S-61-402<br>par 3.9 and<br>Appendix D | Attachment C.2                      | None .      |
| Model Number: N/A                                                   | Pressure<br>(PSIA)       | 15.0                | N/A                                                                              | (4)                | N/A                                         | <br>N/A                             | None        |
| Function:<br>Signal/Instrumentation                                 | Relative<br>Humidity (%) | 100                 | 100                                                                              | (4)                | IPCEA S-61-402<br>par 3.9,<br>3.7.3, 6.7    | Standard<br>Material<br>Requirement | None        |
| Category: Attachment A                                              | Chemical<br>Spray        | N/A                 | N/A                                                                              | (4)                | N/A                                         | N/A                                 | None        |
| Service: Attachment A                                               | Radiation<br>(RAD)       | 3.1x10 <sup>4</sup> | 4x10 <sup>7</sup>                                                                | . (4)              | NUREG-0588<br>Material<br>List              | Generic<br>Material<br>Tests        | None ·      |
| Location: 12                                                        | Aging ·                  | N/A                 | 20 years                                                                         | (2)                | Attachment C.1                              | Oper. Experience                    | None        |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No            | Submergence              | N/A                 | N/A                                                                              | (4)                | N/A                                         | . N/A                               | None        |

See Section 2.4 in 79-01B report. Notes: (1)

(2) See Section 4.1.2 in 79-01B report.

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: K. I. Mills

10/22/80 Reviewed by

QA Acceptance:

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Attachment A

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| System: 63                      | ,    | •                       | , E      | EB <u>63-0014</u> |  |
|---------------------------------|------|-------------------------|----------|-------------------|--|
| Unit: 1                         |      |                         | I        | Rev O             |  |
| Component: Cable<br>Mark: WVA-1 | v    | 2/c, #18                |          | •                 |  |
| <u>Plant I. D. No.</u>          | Room | <b>Function/Service</b> | Category | Operating Time    |  |
| 1A1479                          | 12   | Injection Flow          | Ϋ́Α      | 1 Year            |  |



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# ATTACHMENT B

EEB 63-0014

Rev O

Mark WVA-1

| •  | Contract No.                                            | Ту                                   | <u>'pe</u>        |        | Manufacturer                                                                                   |
|----|---------------------------------------------------------|--------------------------------------|-------------------|--------|------------------------------------------------------------------------------------------------|
| ۶  | 68C7-61986<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 | PE/PVC<br>XLPE/C<br>XLPE/C<br>XLPE/C | SPE<br>SPE<br>SPE | •<br>• | Continental Wire & Cable<br>Rockbestos<br>Continental Wire & Cable<br>Continental Wire & Cable |
| TR | From SQN<br>73C7-84211                                  | XLPE/C                               | SPE               | •      | ITT                                                                                            |
| TR | 85255 from<br>SQN 72C7-83944                            | , XLPE/C                             | SPE               | • •    | Continental Wire & Cable                                                                       |
| TR | 87049 from<br>SQN 73C7-84211                            | XLPE/C                               | SPE               |        | ш                                                                                              |
| TR | 86757 from<br>SQN 73C7-84211                            | XLP0/C                               | SPE               |        | ITT                                                                                            |
| TR | 823079 from<br>WBN 74C7-85259                           | XLPE/C                               | SPE               |        | Belden                                                                                         |

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Sheet No: EEB-63-00/4

Revision: O

### ATTACHMENT C

### C.1 TVA Engineering Report No. 1942

### Coax, Triax, and Signal Cable

Coaxial and Triaxial cable installed at Browns Ferry were purchased in accordance with General Electric Company Specification 22A1181, and the appropriate MIL-C-17 specification. Signal cables, both twisted pair and multiconductor, were purchased in accordance with TVA specifications. Some cable were of cross-linked polyethylene and chloronated polyethylene construction while the same kind of cable furnished under other contracts were of high molecular weight, high density polyethylene/polyvinyl chloride construction and some even polyethylene/polyvinyl chloride construction. It is not possible to make a complete identification by contract as to which circuit and function they serve. Recent reclassification of some functions to 1E status has made it almost a certainty that some cables now in a safety category are of polyethylene/polyvinyl construction.

Accordingly, we have examined the 20 HELB temperature profiles and find that only compartments 1, 3, 6, and 9 show profiles which more than briefly surpass the softening temperature of the linear polyethylene. However, owing to the thermal time lag in the cable material and the cable installation including the heat sink of conduit, tray, and shield material, the insulation will not experience the HELB temperature profile until some time has elapsed and the temperature is lower. Further, no load heat rise need be taken into account for these signal cables.

TVA has conducted tests (Chattanooga Central Laboratories Report No. L81-81-6821 dated October 1980, of PE, PVC cables under a temperature profile which envelops all the HELB profiles. Following this exposure, these cables sustained a dielectric test while immersed in water of 660 volts for 5 minutes, 960 volts for 5 minutes, and 220 volts ac for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April, or replaced at the next refueling outage.

For those cables located in compartment 0 (the containment), the service which these cables have seen thus far has exposed them to a gamma radiation dose of  $6.25 \times 10^{\circ}$  rads or more. This is sufficient to have cross-linked the polyethylene and PVC as well. Consequently, the insulation is now in fact a thermoset material and is capable of the same temperature that TVA's cross-linked polyethylene cable has demonstrated and is capable of withstanding the LOCA/SLB and the post-LOCA environment for a year.

Sheet No: EEB-63-0014

Revision: 0

# ATTACHMENT C (Continued)

# C.1 (Continued)

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Continued operation is justified, and TVA has prepared a LOCA/SLB, thermal aging, and radiation test procedure to be performed by Wyle Laboratories on samples of this cable to demonstrate the validity of this conclusion. Results of this testing program are expected to be available in April 1981.

One cable RG-114A/U has the possibility of being sensitive to pressure changes owing to its partial air dielectric; however, an analysis of this effect has indicated that the change in dielectric constant can be tolerated. Consequently for this cable too, there is justification for continued operation. The compression effect on the dielectric will be likewise tested at Wyle Laboratories along with the other cable tests and results are expected to be available by April 1981.

- C.2 Standard Material Long-Term Overload Temperature Rating
- C.3 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by: Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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(3) SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Facility: Browns Ferry Nuclear Plant Sheet No. EEB-63-0015 Unit: Revisión 0 Docket: 50-259 Date 10-22-80 ENVIRONMENT DOCUMENTATION REF OUALIFICATION • OUTSTANDING EQUIPMENT DESCRIPTION ITEMS METHOD Specifi-Oualifi-Specifi-Oualifi-Parameter cation cation cation cation 63 System: Attachment A Operating Engineering None Attachment 1 Year. Plant ID No. Attachment A Time Analysis C.3 (1)Component Cable / WVA-1 Generic 2/c, #18, CSPE Simultaneous Temperature Manufacturer: Attachment B None -Attachment C.1 Test 250 (4)(<sup>0</sup>F) 153 None Pressure N/A . N/A N/A Model Number: N/A (PSIA) (4) 15.0 Function: Generic ·Signal/Instrumentation Relative · · Simultaneous Humidity (%) Attachment C.1 100 100 (4) Tëst None Accuracy: Reg'd: N/A . Demon: N/A Chemical Spray **Category:** Attachment A (4) N/A • N/A N/A " None N/A Service: Attachment A Generic Radiation Sequential · 5x10<sup>7</sup> 3.1x10<sup>4</sup> Attachment C.1 (RAD) (4)Test None :ocation: 14 Generic Mat'l Test Attachment C. • None 40 years .2 Aaina (2)N/A -Flood Level Elev: 552' 1bove Flood Level: Yes  $\times$  Submergence N/A · None N/A N/A N/A · (4) · · No lotes: (1) See Section 2.4 in 79-01B report. Prepared by: R. L. mill (2) See Section 4.1.2 in 79-01B report. istra/se Reviewed by: (3) All notes and other information not on these sheets are on the attached appendix sheets. QA Acceptance: (4) See Section 3.0 and/or Appendix B in 79-01B report.

Attachment A.

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|     | Ŧ | System: 63                      |      |                   | E               | EB <u>63-0015</u> |
|-----|---|---------------------------------|------|-------------------|-----------------|-------------------|
|     |   | Unit: 1                         |      | •                 | F               | Rev. O            |
| 1 7 |   | Component: Cable<br>Mark: WVA-1 | ۹.   | 2/c, <b>#18</b>   |                 |                   |
|     | • | Plant I. D. No.                 | Room | Function/Service  | <u>Category</u> | Operating Time    |
|     |   | 1A1470                          | 14   | Stdby Liquid Temp | A               | l Year ·          |
|     |   |                                 |      |                   |                 |                   |

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# EEB 63-0015

Rev O

# ATTACHMENT B

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Mark WVA-1

| •  | Contract No.                                            | Туре  |                                               |        | <u>Hanufacturer</u>                                                    |                                     |  |
|----|---------------------------------------------------------|-------|-----------------------------------------------|--------|------------------------------------------------------------------------|-------------------------------------|--|
|    | 68C7-61986<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 | · · . | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE | ·<br>· | Continental Wird<br>Rockbestos<br>Continental.Wird<br>Continental Wird | e & Cable<br>e & Cable<br>e & Cable |  |
| TR | From SQN<br>73C7-84211                                  |       | XLPE/CSPE                                     | •.     | ITT                                                                    | · · · ·                             |  |
| TR | 85255 from<br>SQN 72C7-83944                            | 3     | XLPE/CSPE                                     |        | Continental Wir                                                        | e & Cable                           |  |
| TR | 87049 from<br>SQN 73C7-84211                            | \     | XLPE/CSPE                                     | •••••  | ITT .                                                                  | •                                   |  |
| TR | 86757 from<br>SQN 73C7-84211                            |       | XLPO/CSPE                                     |        | ITT                                                                    | •<br>•                              |  |
| TR | 823079 from                                             |       | XLPE/CSPE                                     |        | Belden                                                                 | ٠.                                  |  |
Sheet No.: EEB-63-0015

Revision: 0

### ATTACHMENT C

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

C.2 NUREG-0588 Material List

C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Prepared by:   |             |                  |
|----------------|-------------|------------------|
| Reviewed by:   |             | ə<br>برویست<br>م |
| QA Acceptance: | <u>~</u>    |                  |
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|-----------------------------------------------------------------------|---------------------------------|--------------------------|---------------------|---------------|----------------|-------------------------------------|------------------------|
| acility: Browns Ferry Nucle<br>Init: 1<br>locket: 50-259              | ear Plant .                     | SYSTEM COMP              | ONENT EVALUA        | TION WORK SHI | EET (Rev 2)    | (3)<br>Sheet No<br>Revision<br>Date | CEB-63-0016<br>C-22-80 |
| EQUIPMENT DESCRIPTION                                                 |                                 | ENVIRONMENT              | Qualifia            | DOCUMEN       | TATION REF,    | QUALIFICATION<br>METHOD             | OUTSTANDING<br>ITEMS   |
|                                                                       | Parameter                       | cation                   | cation              | cation        | cation         |                                     |                        |
| System: 63<br>Plant ID No. Attachment A                               | Operating<br>Time               | Attachment A             | l year              | (1)           | Attachment C3  | Engineering<br>Analysis and<br>Test | None                   |
| Component Cable NVA-1<br>2/c, #18, XLPE<br>Manufacturer: Attachment B | Temperature                     | 153                      | 385                 | (4)           | Attachment C.1 | Generic<br>Simultaneous<br>Test     | None                   |
| odel Number: N/A                                                      | Pressure<br>(PSIA)              | 15.0                     | N/A                 | (4)           | N/A            | ·.<br>N/Ą                           | None                   |
| Signal/Instrumentation                                                | Relative<br>Humidity <b>(%)</b> | 100                      | 100                 | (4)           | Attachment C.1 | Generic<br>Simultaneous<br>Test     | None                   |
| Demon: N/A<br>Category:Attachment A                                   | Chemical<br>Spray               | N/A                      | N/A                 | (4)           | N/A            | N/A                                 | None                   |
| Service: Attachment A                                                 | Radiation<br>(RAD)              | 3.1×10 <sup>4</sup>      | · 2×10 <sup>8</sup> | . (4)         | Attachment C.1 | Generic<br>Sequential .<br>Test     | None                   |
| .ocation: 14                                                          | Aging                           | N/A                      | 40 years            | (2)           | Attachment C.2 | Generic Mat'l Test                  | None                   |
| Flood Level Elev: 552'<br>Above Flood Level: 'Yes $	imes$<br>No       | Submergence                     | N/A                      | N/A                 | (4)           | N/A            | N/A                                 | None                   |
| Notes: (1) See Section 2                                              | .4 in 79-018 re                 | eport.                   | 1                   | ٩             |                | ' Prepared by: R                    | L'mills                |
| <ul><li>(2) See Section 4,</li><li>(3) All notes and</li></ul>        | 1.2 in 79-018<br>other informat | report.<br>tion not on 1 | these               | • •           | · · ·          | Reviewed by:                        | 7 Wagnu                |
| • (4) See Section 3                                                   | .0 and/or Apper                 | idix B in 79-            | 01B report.         | : ``          | • •            | QA Acceptance;                      |                        |

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 Attachment A

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| System: 63                        |                   | EEB 63-0016             |
|-----------------------------------|-------------------|-------------------------|
| Component: Cable<br>Mark: WVA-1 & | 2/c, ≇18          | Rev                     |
| <u>Plant I. D. No. Room</u>       | Function/Service  | Category Operating Time |
| 1A1470 · 14                       | Stdby Liquid Temp | A l Year •              |

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## EEB 63-0016

Rev O

# ATTACHMENT B

Mark WVA-1

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|    | <u>Contract No</u> .                                    |                      | Туре                                  |       | Manufacturer                                                                                   |  |
|----|---------------------------------------------------------|----------------------|---------------------------------------|-------|------------------------------------------------------------------------------------------------|--|
| •  | 68C7-61986<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 | PE<br>XL<br>XL<br>XL | /PVC<br>PE/CSPE<br>PE/CSPE<br>PE/CSPE | •     | Continental Wire & Cable<br>Rockbestos<br>Continental Wire & Cable<br>Continental Wire & Cable |  |
| TR | From SQN<br>73C7-84211                                  | XL                   | PE/CSPE                               | ••••• | ITT                                                                                            |  |
| TR | 85255 from<br>SQN 72C7-83944                            | , XL                 | .PE/CSPE                              | •     | Continental Wire & Cable                                                                       |  |
| TR | 87049 from<br>SQN 73C7-84211                            | × · XL               | .PE/CSPE                              |       | ITT                                                                                            |  |
| TR | 86757 from<br>SQN 73C7-84211                            | XL                   | PO/CSPE                               | Ţ     | ITT                                                                                            |  |
| TR | 823079 from<br>WBN 74C7-85259                           | XL                   | .PE/CSPE                              |       | Belden                                                                                         |  |

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Sheet No: EEB-63-0016

Revision: 0

ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

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| Reviewed | by: |  |
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Prepared by: \_\_\_\_\_

QA Acceptance: \_\_\_\_\_

| Facility: Browns Ferry Nucl<br>Unit: 1                              | lear Plant                       | SYSTEM COM               | PONENT EVALU       | ATION WORK SH      | IEET (Rev 2)                                | (3)<br>Sheet No. <u>E</u><br>Revisión <i>C</i> | <u>EB-63-0017</u> |
|---------------------------------------------------------------------|----------------------------------|--------------------------|--------------------|--------------------|---------------------------------------------|------------------------------------------------|-------------------|
| Docket: 50-259                                                      |                                  |                          |                    |                    |                                             | Date                                           | -22-80 ·          |
| FOULDWENT DESCOTOTION                                               |                                  | ENVIRONMENT              | <u></u>            | DOCUMEN            | ITATION REF                                 | QUALIFICATION                                  | OUTSTANDING       |
|                                                                     | Parameter                        | Specifi-<br>cation       | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                          | . METROD                                       | 1 I EPIS<br>-     |
| System: 63<br>Plant ID No. Attachment A                             | Operating.<br>Time               | Attachment A             | l Year ·           | (1)                | Attachment<br>C.3                           | Engineering<br>Analysis                        | None              |
| Component Cable WVA-1<br>2/c, #18, PE<br>Manufacturer: Attachment B | Temperature<br>(°F)              | 153                      | 203                | (4)                | IPCEA S-61-402<br>par 3.9 and<br>Appendix D | Attachment C.2                                 | None              |
| Nodel Number: N/A                                                   | Pressure<br>(PSIA)               | 15.0                     | N/A                | (4)                | N/A                                         | N/A                                            | None              |
| Function:<br>Signal/Instrumentation                                 | Relative<br>Humidity (%)         | 100                      | 100                | (4)                | IPCEA S-61-402<br>par 3.9,<br>3.7.3, 6.7    | Standard<br>Material<br>Requirement            | · .<br>None       |
| Category: Attachment A                                              | Chemical<br>Spray                | N/A                      | N/A                | (4)                | N/A                                         | N/A                                            | None              |
| Service: Attachment A                                               | Radiation<br>(RAD)               | 3.1x10 <sup>4</sup>      | 4x10 <sup>7</sup>  | (4)                | NUREG-0588<br>Naterial<br>List              | Generic<br>Material '<br>Tests                 | None              |
| Location: 14                                                        | Aging                            | N/A                      | 20 years           | (2)                | Attachment C.1                              | Oper. Experience                               | None              |
| Flood Level Elev: 552'<br>Above Flood Level: Yes $\times$<br>No     | Submergence                      | N/A                      | N/A                | (4)                | N/A                                         | . N/A                                          | ,<br>None         |
| Notes: (1) See Section 2                                            | 2.4 in 79-018 r                  | eport.                   |                    | •                  |                                             | ** Prepared by: Z                              | 1. mills          |
| (2) See Section 4<br>(3) All notes and                              | 1.2 in 79-018<br>i other informa | report.<br>tion not on t | these              | · · ·              | • • •                                       | Reviewed by:                                   | 7 Wagner          |
| (4) See Section 3                                                   | 3.0 and/or Appen                 | ndix B in 79-            | -018 report.       | : ``,              | · · ·                                       | QA Acceptance:                                 |                   |
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Attachment A

| System: 63<br>Unit: 1           |      |                   | E        | EB <u>63-0017</u>     |   |
|---------------------------------|------|-------------------|----------|-----------------------|---|
| Component: Cable<br>Mark: WVA-1 | ť    | 2/c, \$18         |          |                       |   |
| <u>Plant I. D. No.</u>          | Room | Function/Service  | Category | <u>Operating Time</u> | • |
| 1A1470                          | 14   | Stdby Liquid Temp | A        | l Year ·              |   |

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## EEB 63-0017

Rev O

# CATTACHMENT B

Mark WVA-1

| •  | <u>Contract No</u> .                                    | <u>Type</u> .                                 | Manufacturer                                                                                   |
|----|---------------------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------|
| Þ  | 68C7-61986<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE | Continental Wire & Cable<br>Rockbestos<br>Continental Wire & Cable<br>Continental Wire & Cable |
| TR | From SQN<br>73C7-84211                                  | XLPE/CSPE .                                   | ITT                                                                                            |
| TR | 85255 from<br>SQN 72C7-83944                            | XLPE/CSPE                                     | Continental Wire & Cable                                                                       |
| TR | 87049 from<br>SQN 73C7-84211                            | XLPE/CSPE                                     | ITT                                                                                            |
| TR | 86757 from<br>SQN 73C7-84211                            | XLPO/CSPE                                     | ITT                                                                                            |
| TR | 823079 from                                             | XLPE/CSPE                                     | Belden                                                                                         |

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Sheet No: EEB-63-0017

Revision: O

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1942

Coax, Triax, and Signal Cable

Coaxial and Triaxial cable installed at Browns Ferry were purchased in accordance with General Electric Company Specification 22A1181, and the appropriate MIL-C-17 specification. Signal cables, both twisted pair and multiconductor, were purchased in accordance with TVA specifications. Some cable were of cross-linked polyethylene and chloronated polyethylene construction while the same kind of cable furnished under other contracts were of high molecular weight, high density polyethylene/polyvinyl chloride construction and some even polyethylene/polyvinyl chloride construction. It is not possible to make a complete identification by contract as to which circuit and function they serve. Recent reclassification of some functions to lE status has made it almost a certainty that some cables now in a safety category are of polyethylene/polyvinyl construction.

Accordingly, we have examined the 20 HELB temperature profiles and find that only compartments 1, 3, 6, and 9 show profiles which more than briefly surpass the softening temperature of the linear polyethylene. However, owing to the thermal time lag in the cable material and the cable installation including the heat sink of conduit, tray, and shield material, the insulation will not experience the HELB temperature profile until some time has elapsed and the temperature is lower. Further, no load heat rise need be taken into account for these signal cables.

TVA has conducted tests (Chattanooga Central Laboratories Report No. L81-81-6821 dated October 1980, of PE, PVC cables under a temperature profile which envelops all the HELB profiles. Following this exposure, these cables sustained a dielectric test while immersed in water of 660 volts for 5 minutes, 960 volts for 5 minutes, and 220 volts ac for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April, or replaced at the next refueling outage.

For those cables located in compartment 0 (the containment), the service which these cables have seen thus far has exposed them to a gamma radiation dose of  $6.25 \times 10^{\circ}$  rads or more. This is sufficient to have cross-linked the polyethylene and PVC as well. Consequently, the insulation is now in fact a thermoset material and is capable of the same temperature that TVA's cross-linked polyethylene cable has demonstrated and is capable of withstanding the LOCA/SLB and the post-LOCA environment for a year.

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Sheet No: EEB-63-0017

Revision: O

### ATTACHMENT C (Continued)

C.1 (Continued)

Continued operation is justified, and TVA has prepared a LOCA/SLB, thermal aging, and radiation test procedure to be performed by Wyle Laboratories on samples of this cable to demonstrate the validity of this conclusion. Results of this testing program are expected to be available in April 1981.

One cable RG-114A/U has the possibility of being sensitive to pressure changes owing to its partial air dielectric; however, an analysis of this effect has indicated that the change in dielectric constant can be tolerated. Consequently for this cable too, there is justification for continued operation. The compression effect on the dielectric will be likewise tested at Wyle Laboratories along with the other cable tests and results are expected to be available by April 1981.

- C.2 Standard Material Long-Term Overload Temperature Rating
- C.3 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by: \_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

|                                                                     |                                   |                                |                                        |                    |                      | <u> </u>                                                        |                            |
|---------------------------------------------------------------------|-----------------------------------|--------------------------------|----------------------------------------|--------------------|----------------------|-----------------------------------------------------------------|----------------------------|
| 14 .                                                                |                                   | •                              |                                        |                    |                      | •                                                               | $\bigcirc$                 |
| acility: Browns Ferry Nucl<br>Unit: 1<br>Docket: 50-259             | ear Plant                         | SYSTEM COMP                    | ONENT EVALUA                           | ATION WORK SH      | EET (Rev 2)          | (3)<br>Sheet No. <u>E</u><br>Revision <u>C</u><br>Date <u>1</u> | EB-63-0018<br>D<br>D-22-80 |
| EQUIPMENT DESCRIPTION                                               | ·····                             | ENVIROMMENT                    | • •• ••••••••••••••••••••••••••••••••• | DOCUMEN            | TATION REF           | QUALIFICATION<br>METHOD                                         | OUTSTANDING<br>ITEMS       |
|                                                                     | Parameter                         | Specifi-<br>cation             | Qualifi-<br>cation                     | Specifi-<br>cation | Qualifi-<br>cation · |                                                                 |                            |
| System: 63<br>Plant ID No.Attachment A                              | Operating<br>Time                 | Attachment A                   | 1 Year.                                | (1)                | Attachment<br>C.3    | Engineering<br>Analysis                                         | None                       |
| Component Cable WVB<br>3/c, #18, CSPE<br>Manufacturer: Attachment B | Temperature<br>(°F)               | 153                            | 250                                    | (4)                | Attachment C.1       | Generic<br>Simultaneous<br>Test                                 | None                       |
| Model Number: N/A                                                   | Pressure<br>(PSIA)                | 15.0                           | N/A                                    | (4)                | N/A                  | N/A                                                             | None                       |
| Function:<br>Signal/Instrumentation                                 | Relative<br>Humidity (%)          | 100                            | 100                                    | (4)                | Attachment C.1       | Generic<br>Simultaneous<br>Test                                 | None                       |
| Demon: N/A<br>Category: Attachment A                                | Chemical<br>Spřay                 | N/A                            | N/A                                    | (4)                | N/A-                 | N/A                                                             | " None                     |
| Service: Attachment A                                               | Radiation<br>(RAD)                | 3.1x10 <sup>4</sup>            | 5x10 <sup>7</sup>                      | . (4)              | Attachment C.1       | Generic<br>Sequential<br>Test                                   | None                       |
|                                                                     | Aging ·                           | N/A                            | 40 years                               | (2)                | Attachment C.2       | Generic Mat'l Test                                              | • None                     |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X                  | Submergence                       | N/A :                          | N/A                                    | . (4)              | N/A • .              | N/A 1                                                           | None                       |
| otes: (1) See Section 2                                             | .4 in 79-018 re                   | eport.                         |                                        | •                  | -                    | · Prepared by: <u>F</u>                                         | .1. milla                  |
| <ul><li>(2) See Section 4</li><li>(3) All notes and</li></ul>       | .1.2 in 79-018<br>other informat  | report.<br>tion not on t       | hese .                                 | · · ·              | ••••                 | Reviewed by:                                                    | Fill)agner                 |
| sheets are on<br>• (4) See Section 3                                | the attached a<br>.0 and/or Appen | appendix shee<br>dix B in 79-0 | ts.<br>DIB report.                     | : <u> </u>         | •                    | QA Acceptance:                                                  |                            |

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Attachment A

|   | .System: 63                   |        | 2                 | -        | EEB 63-0018    |
|---|-------------------------------|--------|-------------------|----------|----------------|
|   | Unit: 1                       |        |                   |          | Rev <u>Ó</u>   |
|   | Component: Cable<br>Mark: WVB | e<br>J | 3/c, #18          | c.       |                |
| • | <u>Plant I. D. No.</u>        | Room   | Function/Service  | Category | Operating Time |
| ; | 1A1471                        | 14     | Stdby Liquid Temp | A        | l Year         |

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## EEB 63-0018

Rev \_\_\_\_\_

### ATTACHMENT B

Mark WVB

<u>Contract No</u>.

72C7-83849 72C7-74910-2 69C3-64863-1

TR 822675 from WBN 74C7-85259

7307-84211

TR 820907 from 74C7-85259

Type

CSPE/CSPE XLPE/CSPE PE/PVC

XLPE/CSPE

XLPE/CSPE

### Manufacturer

BIW Okonite Rockbestos

Belden Corporation

Belden Corporation

ITT Surp.



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Sheet No.: EEB - 63 - 0018

Revision: \_\_\_\_\_O

### ATTACHMENT C

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Prepared by: \_\_\_\_\_

Reviewed by:

QA Acceptance:

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|-------------------------------------------------------------------------------|---------------------------------|--------------------------------|---------------------|---------------------|-----------------------|-------------------------------------|-----------------------|
| acility: Browns Ferry Nucl<br>nit: 1<br>ocket: 50-259                         | ear Plant                       | SYSTEM COMP                    | ONENT EVALUA        | ATION WORK SH       | EET (Rev 2)           | (3)<br>Sheet No<br>Revision<br>Date | EB-63-0019<br>0-22-80 |
| EQUIPMENT DESCRIPTION                                                         | ·····                           | ENVIRONMENT                    | Qualifi-            | DOCUMEN<br>Specifi- | TATION REF            | QUALIFICATION<br>METHOD             | OUTSTANDING<br>ITEMS  |
|                                                                               | Parameter                       | cation                         | cation              | cation              | cation                | ;                                   |                       |
| ystem: 63<br>lant ID No. Attachment A                                         | Operating<br>Time               | Attachment A                   | l year <sub>.</sub> | (1)                 | Attachment C <i>3</i> | Engineering<br>Analysis and<br>Test | None                  |
| omponent Cable WVB <sup>.</sup><br>3/c, #18, XLPE<br>anufacturer:Attachment B | Temperature<br>(°F)             | 153                            | 385                 | (4)                 | Attachment C.1        | Generic<br>Simultaneous<br>Test     | None ·                |
| odel Number: N/A                                                              | Pressure<br>(PSIA)              | 15.0                           | N/A                 | (4)                 | N/A                   | N/Ą                                 | None                  |
| unction:<br>Signal/Instrumentation ·                                          | Relative<br>Humidity <b>(%)</b> | 100                            | 100                 | (4)                 | Attachment C.1        | Generic<br>Simultaneous<br>Test     | None                  |
| Demon: N/A<br>Demon: N/A<br>ategory:Attachment A                              | Chemical<br>Spray               | N/A                            | N/A                 | (4)                 | N/A                   | N/A                                 | None                  |
| ervice: Attachment A                                                          | Radiation<br>(RAD)              | 3,1x10 <sup>4</sup>            | 2x10 <sup>8</sup>   | (4)                 | Attachment C.1        | Generic<br>Sequential .<br>Test     | None                  |
| ocation: 14                                                                   | Aging                           | N/A                            | 40 years            | (2)                 | Attachment C.2        | Generic Mat'l Test                  | None                  |
| lood Level Elev: 552'<br>bove Flood Level: Yes $X$<br>No                      | Submergence                     | N/A                            | N/A                 | (4)                 | N/A                   | N/A                                 | ,<br>None             |
| otes: (1) See Section 2                                                       | .4 in 79-018 re                 | eport.                         |                     | •                   |                       | Prepared by: K                      | L. mills              |
| <ul><li>(2) See Section 4</li><li>(3) All notes and shorts are an</li></ul>   | 1.2 in 79-01B<br>other informat | report.<br>tion not on t       | hese                | · ·                 |                       | Reviewed by:                        | 7-12/20/20/80         |
| • (4) See Section 3                                                           | .0 and/or Apper                 | appendix shee<br>idix B in 79- | 01B report.         | : x                 | ŕ.                    | QA Acceptance: _                    |                       |

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Attacnment A

| System: 63      |        | ,                 | ¥        | EEB <u>63-0019</u> | - |
|-----------------|--------|-------------------|----------|--------------------|---|
| Unit: 1         | o '    | 2/0 /119          |          | Rev                | - |
| Mark: WVB       | e<br>v | 570, 210          | •        | • • •              |   |
| Plant I. D. No. | Room   | Function/Service  | Category | Operating Time     |   |
| . 1A1471        | 14     | Stdby Liquid Temp | A        | · 1 Year           |   |

# EEB 63-0019

Rev O

# ATTACHMENT B

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Mark WVB

|    | Contract No.                               | Туре                             | Manufacturer                 |
|----|--------------------------------------------|----------------------------------|------------------------------|
|    | 72C7-83849<br>72C7-74910-2<br>69C3-64863-1 | CSPE/CSPE<br>XLPE/CSPE<br>PE/PVC | BIW<br>Okonite<br>Rockbestos |
| TR | 822675 from<br>WBN 74C7-85259              | XLPE/CSPE                        | Belden Corporation           |
| TR | 820907 from<br>74C7-85259                  | XLPE/CSPE                        | Belden Corporation           |
|    | 73C7-84211                                 | •                                | ITT Surp.                    |

Sheet No: EEB-63-00/9

Revision: 0

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Reviewed by:   |  |
|----------------|--|
| Prepared by:   |  |
| QA Acceptance: |  |



| ENVIRONMENT<br>Specifi-<br>cation<br>Attachment A<br>re<br>153 | Qualifi-<br>cation<br>1 Year .<br>203<br>N/A                                           | DOCUMEN<br>Specifi-<br>cation<br>(1)<br>(4)                                                                                   | TATION REF<br>Qualifi-<br>cation<br>Attachment<br>C.3<br>IPCEA S-61-402<br>par 3.9 and<br>Appendix D | QUALIFICATION<br>METHOD<br>Engineering<br>Analysis<br>Attachment C.2 | OUTSTANDING<br>ITEMS<br>None<br>None                   |
|----------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------------|
| Specifi-<br>cation<br>Attachment A<br>re 153                   | Qualifi-<br>cation<br>1 Year .<br>203<br>N/A                                           | Specifi-<br>cation<br>(1)<br>(4)                                                                                              | Qualifi-<br>cation<br>Attachment<br>C.3<br>IPCEA S-61-402<br>par 3.9 and<br>Appendix D               | Engineering<br>Analysis<br>Attachment C.2                            | None                                                   |
| Attachment A<br>7e                                             | , .<br>1 Year .<br>203<br>N/A                                                          | (1)<br>(4)                                                                                                                    | Attachment<br>C.3<br>IPCEA S-61-402<br>par 3.9 and<br>Appendix D                                     | Engineering<br>Analysis<br>Attachment C.2                            | None<br>None                                           |
| <sup>re</sup> <u>153</u><br>15.0                               | 203<br>N/A                                                                             | (4)                                                                                                                           | IPCEA S-61-402<br>par 3.9 and<br>Appendix D                                                          | .AttachmentC.2                                                       | None                                                   |
| 15.0                                                           | N/A                                                                                    |                                                                                                                               | N/A                                                                                                  | ·.                                                                   | • •                                                    |
|                                                                |                                                                                        | (4)                                                                                                                           | N/A                                                                                                  | N/A                                                                  | None                                                   |
| %) 100                                                         | 100                                                                                    | (4)                                                                                                                           | IPCEA S-61-402<br>par 3.9,<br>3.7.3, 6.7                                                             | Standard<br>Material<br>Requirement                                  | None                                                   |
| . N/A                                                          | N/A                                                                                    | (4)                                                                                                                           | N/A                                                                                                  | N/A                                                                  | 'None                                                  |
| 3.1x10 <sup>4</sup>                                            | 4x10 <sup>7</sup>                                                                      | .(4)                                                                                                                          | NUREG-0588<br>Material<br>List                                                                       | Generic<br>Material<br>Tests                                         | None                                                   |
| N/A                                                            | 20 years                                                                               | (2)                                                                                                                           | Attachment C.1                                                                                       | Oper. Experience                                                     | None                                                   |
| ce N/A                                                         | N/A ,                                                                                  | (4)                                                                                                                           |                                                                                                      | N/A                                                                  | None                                                   |
|                                                                | 100         N/A         3.1×10 <sup>4</sup> N/A         ce       N/A         B report. | 100     100       N/A     N/A       3.1x10 <sup>4</sup> 4x10 <sup>7</sup> N/A     20 years       ce     N/A       N/A     N/A | $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$                                               | $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$               | $\begin{array}{c c c c c c c c c c c c c c c c c c c $ |

(3) All notes and other information not on these sheets are on the attached appendix sheets.

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(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:



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| System: 63                         |                   |          | EEB <u>63-0020</u> |
|------------------------------------|-------------------|----------|--------------------|
| Unit: 1                            |                   |          | Rev O              |
| Component: Cable<br>Mark: WVB ~    | 3/c, #18          |          | •                  |
| <u>Plant I. D. No.</u> <u>Room</u> | Function/Service  | Category | Operating Time     |
| 1A1471 14                          | Stdby Liquid Temp | A        | l Year             |

## EEB 63-0020

Rev <u>O</u>

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ITT Surp.

# ATTACHMENT B

## Mark WVB

|    | <u>Contract No</u> .                       | Туре                             | <u>Manufacturer</u>          |
|----|--------------------------------------------|----------------------------------|------------------------------|
|    | 72C7-83849<br>72C7-74910-2<br>69C3-64863-1 | CSPE/CSPE<br>XLPE/CSPE<br>PE/PVC | BIW<br>Okonite<br>Rockbestos |
| TR | 822675 from<br>WBN 74C7-85259              | XLPE/CSPE                        | Belden Corporation           |
| TR | 820907 from<br>74C7-85259                  | XLPE/CSPE                        | Belden Corporation           |

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Sheet No: EEB- 63-0020

Revision: 0

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1942

110

Coax, Triax, and Signal Cable

Coaxial and Triaxial cable installed at Browns Ferry were purchased in accordance with General Electric Company Specification 22A1181, and the appropriate MIL-C-17 specification. Signal cables, both twisted pair and multiconductor, were purchased in accordance with TVA specifications. Some cable were of cross-linked polyethylene and chloronated polyethylene construction while the same kind of cable furnished under other contracts were of high molecular weight, high density polyethylene/polyvinyl chloride construction and some even polyethylene/polyvinyl chloride construction. It is not possible to make a complete identification by contract as to which circuit and function they serve. Recent reclassification of some functions to 1E status has made it almost a certainty that some cables now in a safety category are of polyethylene/polyvinyl construction.

Accordingly, we have examined the 20 HELB temperature profiles and find that only compartments 1, 3, 6, and 9 show profiles which more than briefly surpass the softening temperature of the linear polyethylene. However, owing to the thermal time lag in the cable material and the cable installation including the heat sink of conduit, tray, and shield material, the insulation will not experience the HELB temperature profile until some time has elapsed and the temperature is lower. Further, no load heat rise need be taken into account for these signal cables.

TVA has conducted tests (Chattanooga Central Laboratories Report No. L81-81-6821 dated October 1980, of PE, PVC cables under a temperature profile which envelops all the HELB profiles. Following this exposure, these cables sustained a dielectric test while immersed in water of 660 volts for 5 minutes, 960 volts for 5 minutes, and 220 volts ac for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April, or replaced at the next refueling outage.

For those cables located in compartment 0 (the containment), the service which these cables have seen thus far has exposed them to a gamma radiation dose of  $6.25 \times 10^{\circ}$  rads or more. This is sufficient to have cross-linked the polyethylene and PVC as well. Consequently, the insulation is now in fact a thermoset material and is capable of the same temperature that TVA's cross-linked polyethylene cable has demonstrated and is capable of withstanding the LOCA/SLB and the post-LOCA environment for a year.

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Sheet No: EEB-63-0020

Revision: O

### ATTACHMENT C (Continued)

C.1 (Continued)

Continued operation is justified, and TVA has prepared a LOCA/SLB, thermal aging, and radiation test procedure to be performed by Wyle Laboratories on samples of this cable to demonstrate the validity of this conclusion. Results of this testing program are expected to be available in April 1981.

One cable RG-114A/U has the possibility of being sensitive to pressure changes owing to its partial air dielectric; however, an analysis of this effect has indicated that the change in dielectric constant can be tolerated. Consequently for this cable too, there is justification for continued operation. The compression effect on the dielectric will be likewise tested at Wyle Laboratories along with the other cable tests and results are expected to be available by April 1981.

- C.2 Standard Material Long-Term Overload Temperature Rating
- C.3 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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| Facility: Browns Ferry Nucl<br>Unit: 2<br>Docket: 50-260         | lear Plant .                       | System comp                    | ONENT EVALU/<br>-  | TION WORK SH       | IEET (Rev 2)                    | (3)<br>Sheet No. <u>EE</u><br>Revision <u>O</u><br>Date <u>10</u> | B-63-0021  |
|------------------------------------------------------------------|------------------------------------|--------------------------------|--------------------|--------------------|---------------------------------|-------------------------------------------------------------------|------------|
|                                                                  |                                    | ENVIRONMENT                    |                    | DOCUMEN            | ITATION REF                     | QUALIFICATION                                                     | OUTSTANDIN |
| EQUIPMENT DESCRIPTION                                            | Parameter                          | Specifi-<br>cation             | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation              | METROD                                                            | 11010      |
| System: 63<br>Plant ID No. Attachment A                          | Operating<br>Time                  | Attachment A                   | l Year .           | (1)                | Attachment<br>C.4               | Engineering<br>Analysis                                           | None       |
| Component Cable WCA<br>1/c, #14, PN<br>Manufacturer:Attachment B | Temperature<br>(°F) .              | 174                            | 153                | (4)                | Attachments<br>C.1 and C.2      | Attachment C.3                                                    | None · ·   |
| Model Number: N/A                                                | Pressure<br>(PSIA)                 | 15.0                           |                    | (4)                | N/A                             | N/A                                                               | None       |
| Accuracy: Poold: N/A                                             | Relative<br>Humidity (%)           | 100                            | 100                | (4)                | par 3.9, 3.7.3<br>6.7           | Material<br>Requirement                                           | None       |
| Demon: N/A<br>Category: Attachment A                             | Chemical<br>Spray                  | N/A                            | N/A                | (4)                | N/A                             | N/A                                                               | None       |
| Service: Attachment A                                            | Radiation<br>(RAD)                 | 3.1x10 <sup>4</sup>            | 4x10 <sup>7</sup>  | . (4)              | NUREG-0588<br>Materials<br>List | Generic<br>Material<br>Test                                       | None       |
| Location: 14                                                     | Aging                              | N/A                            | 20_years           | (2)                | - Attachment C,2                | Oper, Experience                                                  | None       |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X               | Submergence                        | N/A                            | N/A                | (4)                | N/A                             | . N/A                                                             | None       |
| Notes: (1) See Section 2                                         | 2.4 in 79-01B r                    | eport.                         |                    | •                  |                                 | · Prepared by: <u>P</u>                                           | 1. mills   |
| (2) See Section 4<br>(3) All notes and                           | 1.1.2 in 79-01B<br>d other informa | report.<br>tion not on 1       | these              | • •                | • • •                           | Reviewed by:                                                      | Hilagm     |
| (4) See Section 3                                                | n the attached<br>3.0 and/or Appe  | appendix snee<br>ndix B in 79- | 01B report.        |                    |                                 | QA Acceptance:                                                    | ·····      |

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| System: 63             |         | •                   |          | EEB <u>63-0021</u> |
|------------------------|---------|---------------------|----------|--------------------|
|                        |         | •                   |          | Rev                |
| Mark: WCA              | Le<br>' | 1/c, \$14, PN       |          |                    |
| <u>Plant I. D. No.</u> | Room    | Function/Service    | Category | Operating Time     |
| 2PL5103                | 14      | SLC Storage Tank    | Α.       | l Year             |
| 2PL5102                | 14      | Tank Heater Control | A        | l Year             |
|                        |         |                     |          |                    |



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# EEB <u>63-0021</u>

Rev O

## ATTACHMENT B

Mark WCA

Type

PN

PN PN

PN

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PN

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<u>Contract No.</u> 72C7-75128 72X7-74885-1 73C7-84528 67C3-91618 72C7-75328-1 70C7-54179-1 TR 822378) Sequoyah 822639) 72C7-75228-1 822915) 72C7-75228-1 <u>Manufacturer</u> Plastic Wire & Cable Corp Brand-Rex Plastic Wire & Cable Corp Brand-Rex Brand-Rex Brand-Rex

Plastic Wire & Cable Corp

Plastic Wire & Cable Corp

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| Sheet No.:_ | EEB- 63-0021 |
|-------------|--------------|
| Revision    | 0            |

### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

38

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121 C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

| <b>C.4</b> | The post-HELB conditions are less | than the normal cable rating and, |
|------------|-----------------------------------|-----------------------------------|
|            | in our judgment, the cables could | operate satisfactorily for a      |
|            | post-accident of a year.          |                                   |

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:

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(3) SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Facility: Browns Ferry Nuclear Plant Sheet No. EE6-63-0022 Unit: 2 Revision 0 Docket: 50-260 Date 10-22-80 ENVIRONMENT DOCUMENTATION REF QUALIFICATION OUTSTANDING EQUIPMENT DESCRIPTION ITEMS METHOD Specifi-Qualifi-Specifi- · Qualifi-Parameter cation cation cation cation System: 63 Operating Attachment A 1 year . Attachment C.3 Engineering None Plant ID No. Attachment A Time Analysis and (1)Test Component Cable WDF 2.5 Generic 1/c, #4, CPJ Simultaneous Temperature (°F) Manufacturer: Attachment B 325 Attachment C. 1 Test None 174 (4) ٠. Pressure Model Number: N/A (PSIA)(4)N/A N/Å None . N/A 15.0 Function: Control/Power Generic Relative Simultaneous Humidity (%) 100 (4) Attachment C.11 Test None 100 Accuracy: Req<sup>1</sup>d: N/A Chemical Demon: N/A Spray Category: Attachment A N/A None N/A N/A N/A (4) Service: Attachment A Generic Radiation Attachment C.1 Sequential  $3.1 \times 10^4$ 6.9x10<sup>7</sup> (RAD) (4) None Location: 14 Aging N/A 40 years (2) Attachment C. 2Generic Mat'l Test None Flood Level Elev: 552' N/A None Above Flood Level: Yes  $\times$  Submergence N/A N/A N/A (4) No Prepared by: R.L. Mills Notes: See Section 2.4 in 79-01B report. (1)

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these
  - sheets are on the attached appendix sheets.

See Section 3.0 and/or Appendix B in 79-01B report. (4)

QA Acceptance:

Reviewed by:



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Attachment A

EEB 63-0022 System: Unit: 63 2 Rev O Component: Mark: 1/c, #4, CPJ Cable WDF ١ 1. Plant I. D. No. Function/Service Category **Operating Time** Room 2PL5100 14 Tnk Heater Supply 1 Year A



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# EEB 63-0022

Rev <u>O</u>

# ATTACHMENT B Mark WDF

| Contract No. |  |
|--------------|--|
| 6707-91619   |  |
| 7107-54180-1 |  |
| 72C7-75328-3 |  |

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Type CPJ CPJ CPJ CPJ

# Manufacturer

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General Cable Corp Phelps Dodge Cable Wire Rome

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Sheet No.: EEB- 63-0022

Revision: 0

### ATTACHMENT C

C.1 Wyle Laboratory Report No. 43854-3.

- C.2 NUREG-0588 Material List.
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering 'judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Prepared by: R. L. Mills / DA

Reviewed by: \_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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| Facility: Browns Ferry Nucl<br>Unit: 2<br>Docket: 50-260          | ear Plant                       | SYSTEM COMP         | ONENT EVALUA        | TION WORK SH       | EET (Rev 2)        | (3)<br>Sheet No. <u>EE</u><br>Revision <u>O</u><br>Date <u>10</u> - | B-63-0023                             |
|-------------------------------------------------------------------|---------------------------------|---------------------|---------------------|--------------------|--------------------|---------------------------------------------------------------------|---------------------------------------|
| FOULPMENT DESCRIPTION                                             |                                 | ENVIRONMENT         |                     | DOCUMEN            | ITATION REF        | QUALIFICATION                                                       | OUTSTANDING                           |
|                                                                   | Parameter                       | Specifi-<br>cation  | Qualifi-<br>cation  | Specifi-<br>cation | Qualifi-<br>cation | HE MOD                                                              | 11645                                 |
| System: 63<br>Plant ID No. Attachment A                           | Operating<br>Time               | Attachment A        | l year .            | . (1)              | Attachment C.3     | Engincering<br>Analysis and<br>Test                                 | None                                  |
| Component Cable WDG<br>1/c, #2, CPJ<br>Manufacturer: Attachment B | Temperature                     | 153                 | 325                 |                    | Attachment C.1     | Generic<br>Simultaneous<br>Test                                     | None                                  |
| Model Number: N/A                                                 | (F)<br>Pressure<br>(PSIA)       | 15.0                | N/A                 | (4)                | N/A                | N/A                                                                 | • • • • • • • • • • • • • • • • • • • |
| Function: Control/Power                                           | Relative<br>Humidity <b>(%)</b> | 100                 | 100                 | . (4)              | Attachment C.1     | Generic<br>Simultaneous<br>Test                                     | None                                  |
| Demon: N/A<br>Category: Attachment A                              | Chemical<br>Spray               | N/A                 | N/A                 | (4)                | N/A                | N/A                                                                 | None                                  |
| Service: Attachment A                                             | Radiation<br>(RAD)              | 3.1x10 <sup>4</sup> | 6.9x10 <sup>7</sup> | (4)                | Attachment C.1     | Generic<br>Sequential<br>Test                                       | None                                  |
|                                                                   | Aging                           | N/A                 | 40 years            | (2)                | Attachment C.2     | Generic Mat'l Test                                                  | None                                  |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No          | Submergence                     | N/A                 | N/A                 | (4)                | N/A                | N/A                                                                 | ,<br>None                             |

Notes: (1) See Section 2.4 in 79-01B report.

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- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: R.Z. Mills

Reviewed by:

QA Acceptance:

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Attachment A

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| System: 63                |                |                  |                 | EEB <u>63-002</u> | 3 |
|---------------------------|----------------|------------------|-----------------|-------------------|---|
| Unit: 2                   |                |                  |                 | Rev O             |   |
| Component: Ca<br>Mark: WI | able<br>)G · . | 1/c, #2, CPJ     |                 |                   |   |
| <u>Plant I. D. No</u>     | . Room         | Function/Service | <u>Category</u> | Operating Time    |   |
| 2PL754                    | 14             | Pmp Supply       | А               | 1 Year            |   |
| 2PL769                    | 14 .           | Pmp Supply       | A               | 1 Year            | • |

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# EEB <u>63-0023</u>

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# ATTACHMENT BRevOMark WDGMark WDGContract No.Type67C7-91619<br/>71C7-54180-1CPJ<br/>CPJ67E<br/>CPJGeneral Cable Corp<br/>Phelps Dodge86150XFR BeilefonteCPJPlastic Wire & Cable Corp

CPJ

PXJ PXJ

72C7-75328-3 78K5-824443-2 72C7-75533-1 Rome GE Essex

Sheet No.: EEB- 63-0023

Revision: 0\_\_\_\_\_

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### ATTACHMENT C

C.1 Wyle Laboratory Report No. 43854-3.

C.2 NUREG-0588 Material List.

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C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Prepared by: R. L. Mills 10TH

Reviewed by: \_\_\_\_\_

QA Acceptance:\_\_\_\_\_



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(3) SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Facility: Browns Ferry Nüclear Plant Sheet No. FFB-63-0024 Unit: Revision 0 Docket: 50-260 Date 10-22-80 QUALIFICATION OUTSTANDING ENVIRONMENT DOCUMENTATION REF METHOD ITEMS EQUIPMENT DESCRIPTION Qualifi-Qualifi-Specifi-Specification cation cation cation Parameter System: 63 Engineering Operating None Attachment A Attachment 1 Year C.4 Plant ID No. Attachment A Analysis Time (1)Component Cable WGB 2/c, #12, PNJ Attachments Temperature (°F) Manufacturer: Attachment B C.1 and C.2. None · · 153 (4)Attachment C.3 199 • Pressure Model Number: N/A (PSIA) (4) N/A None · N/A 15.0 N/A Function: Control/Power IPCEA S-61-402 Standard par 3.9, 3.7.3 Material Relative Reauirement Humidity (%) 6.7 None (4) 100 100 Accuracy: Req<sup>1</sup>d: N/A Demon: N/A Chemical Spray Category: Attachment A (4) N/A N/A N/A None N/A Service: Attachment A NUREG-0588 Generic Radiation **Materials** Material  $3.1 \times 10^4$ 4x107 (4)Test (RAD) List None Location: 12 (2)Attachment C.2 Oper. Experience None N/A Aging 20 years Flood Level Elev: 552' Above Flocd Level: Yes X \*Submergence N/A N/A N/A N/A None (4): No Prepared by: R.L. Mille Notes: See Section 2.4 in 79-01B report. (1)(2) See Section 4.1.2 in 79-01B report. Reviewed by: & Flikan (3) All notes and other information not on these sheets are on the attached appendix sheets. QA Acceptance: (4) See Section 3.0 and/or Appendix B in 79-01B report.



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Attachment A

| Sy<br>Ui | /stem: 63<br>nit: 2         |      |                  |                 | EEB <u>63-0024</u><br>Rev O |
|----------|-----------------------------|------|------------------|-----------------|-----------------------------|
| Co<br>Ma | omponent: Cable<br>ark: WGB | ¢.   | 2/c, ∉12, PNJ    |                 |                             |
| <u>P</u> | lant I. D. No.              | Room | Function/Service | <u>Category</u> | Operating Time              |
| 2P       | 1.790                       | 12   | Injection Flow   | A               | 1 Year                      |
|          |                             |      | • •              |                 |                             |

621: 63-0024

Rev O

# ATTACHMENT B

Mark NGB

Contract No.

<u>Type</u>

Manufacturer

6/03 90915 7307-84528 7587-86150-1 7585-86506-1 7407-85069-1 7007-54179-2 7187-54761-1 7207-54872 7007-54179-1 PJJ PJJ PJJ PJJ PJJ PNJ PNJ PNJ PNJ

Practickex Rome Cable Cyprus American Insulated Wire Rome Plastic Wire & Cable Corp General Cable Plastic Wire & Cable Corp Brand-Rex

Sheet No.: EEB-63-0024

Revision: 0

### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121° C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

| C.4 | The post-HELB condit | ions are less | s than the norma | <pre>l cable rating and,</pre> |
|-----|----------------------|---------------|------------------|--------------------------------|
|     | in our judgment, the | cables could  | i operate satisf | actorily for a                 |
|     | post-accident of a y | ear.          |                  |                                |

Prepared by:\_\_\_\_\_\_ Reviewed by:\_\_\_\_\_ QA Acceptance:\_\_!\_\_\_\_

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| Facility: Browns Ferry Nucl<br>Unit: 2                                         | ear Plant .                                      | SYSTEM COMP                               | ONENT EVALUA       | TION WORK SH       | EET (Rev 2)                            | (3)<br>Sheet No. <u>FF</u><br>Revision <u>O</u> | B-63-0025       |
|--------------------------------------------------------------------------------|--------------------------------------------------|-------------------------------------------|--------------------|--------------------|----------------------------------------|-------------------------------------------------|-----------------|
| Docket: 50-260                                                                 |                                                  |                                           | -                  |                    |                                        | Date 10                                         | -22-80          |
| FOUTDWENT DESCOTOTION                                                          |                                                  | ENVIRONMENT                               |                    | DOCUMEN            | TATION REF                             | QUALIFICATION                                   | OUTSTANDING     |
| EQUIPMENT DESCRIPTION                                                          | Parameter                                        | Specifi-<br>cation                        | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                     |                                                 |                 |
| System: 63<br>Plant ID No. Attachment A                                        | Operating<br>Time                                | Attachment A                              | l Year .           | (1)                | Attachment<br>C.4                      | Engineering<br>Analysis                         | None            |
| Component Cable WGB<br>2/c, #12, PNJ<br>Manufacturer:Attachment B              | Temperature<br>(°F)                              | 153                                       | 153                | - · (4)            | Attachments<br>C.1 and C.2             | Attachment C.3                                  | None · ·        |
| Model Number: N/A                                                              | Pressure<br>(PSIA)                               | 15.0                                      | N/A                | (4)                | N/A                                    | N/A                                             | None            |
| Accuracy: Poold: N/A                                                           | Relative<br>Humidity (%)                         | 100                                       | 100                | (4)                | par 3.9, 3.7.3                         | Material<br>Requirement                         | . None          |
| Demon: N/A<br>Category: Attachment A                                           | Chemical<br>Spray                                | N/A                                       | N/A                | (4)                | N/A                                    | N/A                                             | None            |
| Service: Attachment A                                                          | Radiation<br>(RAD).                              | 3.1x10 <sup>4</sup>                       | ^ 4x107            | . (4)              | NUREG-0588<br>Materials<br>List        | Generic<br>Material<br>Test                     | None            |
| Location: 14                                                                   | Aging                                            | N/A                                       | 20 years           | (2)                | Attachment C.2                         | Oper. Experience                                | None            |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X                             | Submergence                                      | N/A                                       | N/A .              | (4)                | N/A                                    | . N/A                                           | None            |
| Notes: (1) See Section 2                                                       | 2.4 in 79-01B r                                  | eport.                                    |                    | `.                 | •                                      | · Prepared by: 🗶                                | 1. mills        |
| <ul> <li>(2) See Section 4</li> <li>(3) All notes and sheets are of</li> </ul> | 1.2 in 79-01B<br>d other informa<br>the attached | report.<br>tion not on t<br>appendix shee | these              |                    | `````````````````````````````````````` | Reviewed by:                                    | Fullgren 1/2 /8 |

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(4) See Section 3.0 and/or Appendix B in 79-01B report.

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QA Acceptance:

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Attachment A

| System: 63                  |            |                  |          | EEB 63-0025    |
|-----------------------------|------------|------------------|----------|----------------|
| Unit: 2                     |            |                  |          | Rey O          |
| Component: Cab<br>Mark: WGE | ble<br>5 ¢ | 2/c, #12, PNJ    |          |                |
| <u>Plant I. D. No.</u>      | Room       | Function/Service | Category | Operating Time |
| 2PL2175                     | 14         | Trace Heater     | А        | 1 Year         |
| 2PL2182                     | 14         | Heater           | A        | l Year         |
| 2PL2187                     | 14         | Trace Heater     | A        | 1 Year         |
| 2PL2194                     | 14         | Heater           | A        | l Year         |



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ELE 63-0025

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Rev O

# ATTACHMENT B

# Mark WGB

Type

253

PJJ

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рјј

pnj

Pnj Pnj

PNJ

| Contract               | <u>но</u> . |
|------------------------|-------------|
| 0700-0464<br>7307-8452 |             |
| 75K7-8615              | 50-1        |
| 7585-8650              | 16-1        |

7407-85059-1

7007-54179-2

71X7-54761-1 72C7-54872

70C7-54179-1

C sed-lex Rome Cable Cyprus American Insulated Wire Rome Plastic Wire & Cable Corp General Cable Plastic Wire & Cable Corp Brand-Rex

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Manufacturer

Revision: 0

### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of 75° C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121° C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

| <b>C.4</b> | 4 The post-HELB conditions are less than the normal | il cable rating and, |
|------------|-----------------------------------------------------|----------------------|
|            | in our judgment, the cables could operate satisf    | actorily for a       |
|            | post-accident of a year.                            |                      |

Prepared by:\_\_\_\_\_

Reviewed by:

QA Acceptance:\_\_\_\_

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| Facility: Browns Ferry Nucl<br>Unit: 2<br>Docket: 50-260                            | ear Plant                                                                 | SYSTEM COMP                                         | ONENT EVALUA       | TION WORK SH       | IEET (Rev 2)                            | (3)<br>Sheet No. <u>EEI</u><br>Revision <u>O</u><br>Date <u>IO</u> | 3-63-0026           |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------|--------------------|--------------------|-----------------------------------------|--------------------------------------------------------------------|---------------------|
| EQUIDENT DECODIDITION                                                               | ENVIRONMENT                                                               |                                                     |                    | DOCUMENTATION REF  |                                         | QUALIFICATION                                                      | OUTSTANDING         |
| EQUIFMENT DESCRIPTION                                                               | Parameter                                                                 | Specifi-<br>.cation                                 | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                      | METROD .                                                           | I I EPis            |
| System: 63<br>Plant ID No. Attachment A                                             | Operating<br>Time                                                         | Attachment A                                        | 1 Year             | (1)                | Attachment<br>°C.4                      | Engineering<br>Analysis                                            | None                |
| Component Cable WGD<br>4/c, #12, PNJ<br>Manufacturer:Attachment B                   | Temperature<br>(°F)                                                       | 174                                                 | 153                | (4)                | Attachments<br>C.1 and C.2              | Attachment C.3                                                     | None .              |
| Model Number: N/A                                                                   | Pressure<br>(PSIA)                                                        | 15.0                                                | N/4                | (4)                | N/A                                     | · .<br>N/A                                                         | None                |
| Function: Control/Power                                                             | Relative<br>Humidity (%)                                                  | 100                                                 | 100                | (4)                | IPCEA S-61-402<br>par 3.9, 3.7.3<br>6.7 | Standard<br>Material<br>Requirement                                | None                |
| Category: Attachment A                                                              | Chemical<br>Spray                                                         | N/A                                                 | N/A                | (4)                | N/A                                     | N/A                                                                | 'None               |
| Service: Attachment A                                                               | Radiation<br>(RAD)                                                        | 3.1×10 <sup>4</sup>                                 | 4x10 <sup>7</sup>  | (4)                | NUREG-0588<br>Materials<br>List         | Generic<br>Material<br>Test                                        | None                |
| Location: <sup>14</sup>                                                             | Aging                                                                     | N/A                                                 | 20 years           | (2)                | Attachment C.2                          | Oper, Experience                                                   | None                |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No                            | Submergence                                                               | N/A                                                 | N/A                | (4)                | N/A                                     | . N/A                                                              | None                |
| Notes: (1) See Section 2<br>(2) See Section 4<br>(3) All notes and<br>sheets are or | 2.4 in 79-018 rd<br>.1.2 in 79-018<br>I other informate<br>the attached a | eport.<br>report.<br>tion not on t<br>appendix shee | hese               |                    | • • •                                   | Prepared by: <u>Reviewed</u> by: <u>Reviewed</u>                   | L. Mill<br>7 Wagner |

(4) See Section 3.0 and/or Appendix B in 79-01B report.

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QA Acceptance:

Attachment A

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| System: 63                      |                                            | EEB <u>63-0026</u> |                       |
|---------------------------------|--------------------------------------------|--------------------|-----------------------|
| Unit: 2                         |                                            | 2                  | Rev                   |
| Component: Cable<br>Mark: WGD v | 4/c, #12, PNJ                              | Υ.                 | •                     |
| Plant I. D. No. Room            | Function/Service                           | <u>Category</u>    | <u>Operating Time</u> |
| 2PL758 14                       | Stby Liquid Control<br>Stby Liquid Control | A<br>A             | l Year<br>l Year      |
| 226/75 , 14 .                   | ocoy bridged concros                       | ••                 |                       |
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## EEB <u>63-0026</u>

Rev O

#### ATTACHMENT B



<u>Contract.No</u>. 73C7-84528 67C3-91618 72C7-75228-1 72C7-54762-2 74C7-85069

70C7-54179-1

<u>Type</u> PJJ PNJ PJJ PNJ PJJ PNJ

Manufacturer

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Rome Cable Plastic Wire & Cable Corp Plastic Wire & Cable Corp Plastic Wire & Cabel Corp Rome Brand-Rex



| Sheet No. | : | EEB- | 63 | -026 |
|-----------|---|------|----|------|
|-----------|---|------|----|------|

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

**3**8

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

| Facility: Browns Ferry'Nữcl<br>Unit: 2<br>Docket: 50-260                                                       | ear Plant                                                                                | SYSTEM COMP                                                         | ONENT EVALUA                          | TION WORK SH       | EET (Rev 2)                     | (3)<br>Sheet No. El<br>Revisión <u>C</u><br>Date Id | <u>B-63-0027</u>       |
|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------|--------------------|---------------------------------|-----------------------------------------------------|------------------------|
| FOULDNENT DESCRIPTION                                                                                          |                                                                                          | ENVIRONMENT                                                         | · · · · · · · · · · · · · · · · · · · | DOCUMEN            | TATION REF                      | QUALIFICATION                                       | OUTSTANDING            |
| EQUIFMENT DESCRIPTION                                                                                          | Parameter                                                                                | Specifi-<br>cation                                                  | Qualifi-<br>cation                    | Specifi-<br>cation | Qualifi-<br>cation              | METROD                                              | 11665                  |
| System: 63<br>Plant ID No. Attachment A                                                                        | Operating<br>Time                                                                        | Attachment A                                                        | ] Year.                               | (1)                | 'Attachment<br>C.4              | Engineering<br>Analysis.                            | None                   |
| Component Cable WGG<br>7/c, #12, PNJ<br>Manufacturer:Attachment B                                              | Temperature<br>(°F) .                                                                    | 174                                                                 | ,<br>153                              | (4)                | Attachments<br>C.1 and C.2      | Attachment C.3                                      | None                   |
| Model Number: N/A                                                                                              | Pressure<br>(PSIA)                                                                       | 15.0                                                                | N/A                                   | (4)                | N/A                             | N/A                                                 | None                   |
| Accuracy: Reg'd: N/A                                                                                           | Relative<br>Humidity (%)                                                                 | 100                                                                 | 100                                   | (4)                | par 3.9, 3.7.3<br>6.7           | Standard<br>Naterial<br>Requirement                 | None                   |
| Demon: N/A<br>Category: Attachment A                                                                           | Chemical<br>Spray                                                                        | N/A                                                                 | N/A                                   | (4)                | N/A                             | N/A                                                 | None                   |
| Service: Attachment A                                                                                          | Radiation<br>(RAD)                                                                       | 3.1x10 <sup>4</sup>                                                 | 4x107                                 | . (4)              | NUREG-0588<br>Materials<br>List | Generic<br>Material<br>Test                         | None                   |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X                                                             | <u>Aging</u><br>Submergence                                                              | N/A<br>N/A                                                          | 20 years                              | (2)                | Attachment C.2                  | <u>Oper, Experience</u>                             | None None              |
| No<br>Notes: (T) See Section 2<br>(2) See Section 4<br>(3) All notes and<br>sheets are on<br>(4) See Section 3 | 4 in 79-018 rd<br>.1.2 in 79-018<br>other information<br>the attached<br>.0 and/or Apper | port.<br>report.<br>tion not on t<br>appendix shee<br>dix B in 79-0 | hese<br>ts.<br>018 report.            | 1(4)<br>``         |                                 | Prepared by: Z<br>Reviewed by: S<br>QA Acceptance;  | 2.1. mills<br>+ Wagner |
| e e sons en la                                                                                                 | 4                                                                                        |                                                                     | •                                     | -                  |                                 | л — — — — — — — — — — — — — — — — — — —             |                        |

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Attachment A

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|   | System: 63<br>Unit: 2<br>Component: Cable<br>Mark: WGG | ÷    | 7/3, ∦12, PNJ                                    |          | EEB <u>63-002</u><br>Rev <u>0</u> . | .7 |
|---|--------------------------------------------------------|------|--------------------------------------------------|----------|-------------------------------------|----|
| • | <u>Plant I. D. No.</u>                                 | Room | Function/Service                                 | Category | <u>Operating Time</u>               |    |
|   | 2PL755<br>2PL770                                       | 14 · | Stdby Lqid Pmp 2A Cont<br>Stdby Lgid Pmp 2A Cont | A<br>A   | 1 Year<br>1 Year                    | ۰. |

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## EEB 63-0027

Rev O

# ATTACHMENT B

MarkWGG

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<u>Contract No</u>. 67C3-91618 71X7-54761-1 70C7-54179-1 72C7-75328-2 69C7-64923 Туре

PNJ PNJ PNJ PNJ

PNJ

Manufacturer

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Plastic Wire & Cable Corp General Cable Brand-Rex Tamaqua Rockbestos

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Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

38

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of 75°C continuous, 95°C (203°F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

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C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_

Reviewed by:\_\_\_\_

QA Acceptance:

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Attachment A

| System: 63                    |      |                     | •               | EEB 63-0028    |
|-------------------------------|------|---------------------|-----------------|----------------|
| Unit: 2                       |      | ,                   |                 | Rev _          |
| Component: Cable<br>Mark: WHG | ۲.   | 5/c, #14, PNJ       |                 | <i>,</i> 、     |
| <u>Plant I. D. No.</u>        | Room | Function/Service    | <u>Category</u> | Operating Time |
| 2PL5101                       | 14   | Tank Heater Control | A,              | l Year         |





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# EEB 63-0028

Rev O

## ATTACHMENT B

Mark WHG

<u>Contract No.</u> 67C3-91618 72C7-75328-2 70C7-54179-1

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<u>Type</u>

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PNJ PNJ PNJ Manufacturer

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Plastic Wire & Cable Tamaqua Brand-Rex

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Sheet No.: EEB- 63-0018

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous,  $95^{\circ}$  C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

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C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:

Reviewed by:

QA Acceptance:\_\_\_\_\_

| 14                                                                                                        | · ·                                               | ^                                         |                           | -                  |                    | · · · · · · · · · · · · · · · · · · ·                             |                                       |
|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------|-------------------------------------------|---------------------------|--------------------|--------------------|-------------------------------------------------------------------|---------------------------------------|
| acility: Browns Ferry Nucl<br>nit: 2<br>ocket: 50- <u>2</u> 60                                            | ear Plant                                         | SYSTEM COMP                               | ONENT EVALUA              | TION WORK SHE      | ET (Rev 2)         | (3)<br>Sheet No. <u>EE</u><br>Revisión <u>O</u><br>Date <u>IC</u> | B-63-0029                             |
| FOULDMENT DESCRIPTION                                                                                     | •                                                 | ENVIRORMENT                               |                           | DOCUMENT           | TATION REF         | QUALIFICATION<br>METHOD                                           | OUTSTANDING<br>ITEMS                  |
|                                                                                                           | Parameter                                         | Specifi-                                  | Qualifi-<br>cation        | Specifi-<br>cation | Qualifi-<br>cation |                                                                   | · · · · · · · · · · · · · · · · · · · |
| ystem: 63<br>lant ID No.Attachment A                                                                      | Operating<br>Time                                 | Attachment A                              | 1 Year.                   | (1)                | Attachment<br>C.3  | Engineering<br>Analysis                                           | None                                  |
| Component Cable WVA<br>2/c, #16, CSPE                                                                     | Temperature                                       |                                           |                           |                    |                    | Generic<br>Simultaneous                                           | · ·.                                  |
| anufacturer: Attachment B                                                                                 | (°F)                                              | <u>174</u> .                              | 250                       | (4)                | Attachment C.I     | Test                                                              | None ·                                |
| odel Number: N/A                                                                                          | Pressure<br>(PSIA)                                | 15.0                                      | N/A                       | · (4)              | • N/A              | N/A                                                               | None                                  |
| unction:<br>Signal/Instrumentation                                                                        | Relative<br>Humidity (%)                          | 100                                       | 100                       | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test                                   | None .                                |
| Accuracy: Req'd: N/A<br>Demon: N/A<br>Category: Attachment A                                              | Chemical<br>Spray                                 | N/A                                       | N/A                       | (4)                | <br>N/A            | N/A                                                               | " None                                |
| Service: Attachment A                                                                                     | Radiation<br>(RAD)                                | 3.1x10 <sup>4</sup>                       | 5x10 <sup>7</sup>         | . (4)              | Attachment C.1     | Géneric<br>Sequential<br>Test                                     | None                                  |
| ocation: 14                                                                                               | Aging                                             | N/A                                       | '40 years                 | (2)                | Attachment C.2     | Generic Mat'l Test                                                | . None                                |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No                                                  | Submergence                                       | N/A                                       | N/A                       | (4)                | N/A                | N/A                                                               | None ·                                |
| Notes: (1) See Section 2                                                                                  | 2.4 in 79-01B r                                   | eport.                                    |                           |                    | . •                | Prepared by: K                                                    | 1. millo                              |
| <ul> <li>(2) See Section 4</li> <li>(3) All notes and sheets are or</li> <li>(A) See Section 3</li> </ul> | .1.2 in 79-01B<br>i other informa<br>the attached | report.<br>tion not on t<br>appendix shee | hese<br>ts.<br>018 report | •••                |                    | Reviewed by: <u>A</u><br>QA Acceptance:                           | HI) agrin                             |
| (7) 366 3661011 3                                                                                         |                                                   |                                           |                           | · · ·              | •                  | ••                                                                |                                       |

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Attachment A

| ·System: 63                   |              | •                                            | •        | EEB <u>63-0029</u> |
|-------------------------------|--------------|----------------------------------------------|----------|--------------------|
| Unit: 2.                      |              |                                              |          | Rev O              |
| Component: Cable<br>Mark: WVA | v            | 2/c, Ø16                                     |          | · · ·              |
| Plant I. D. No.               | Room         | Function/Service                             | Category | Operating Time     |
| 2R986<br>2R985                | 14 ·<br>14 · | Stdby Lqid Tnk Level<br>Stdby Lqid Tnk Level | A<br>A   | 1 Year<br>1 Year   |

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#### EEB <u>63-0029</u>

Rev O

# ATTACHMENT B

Mark WVA

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Type

FRXLPE/CSPE

FRXLPE/CSPE

PE/PVC

XLPE/CSPE

FREP/CPE

FREP/CPE

<u>Contract No</u>. 77K5-823265 72C7-83944 69C3-64863-1 72C7-74910-1

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TR 822676 from SQN 76K5-87232

TR 827773 from BLN FREP/CPE 78K5-824447

TR 826953 from BLN 78K5-824447

> 77K5-820991 73C7-84211

Manufacturer

Rockbestos Continental Wire & Cable Rockbestos Continental Wire & Cable

Continental Wire & Cable

Anaconda

Anaconda 🐪

Boston Ins. Wire ITT

Sheet No .: EEB - 63 - 0029

Revision: Ø

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

14C

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

C.2 NUREG-0588 Material List

C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Prepared | by: | • |
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| Reviewed | by: | • |

QA Acceptance:



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See Section 2.4 in 79-01B report. lotes: (1)

- See Section 4.1.2 in 79-01B report. (2)
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- See Section 3.0 and/or Appendix B in 79-01B report. (4)

Reviewed by:

QA Acceptance:



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Attachment A

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|   | System: 63                    |            |                                              |          | EEB <u>63-0030</u> | - |
|---|-------------------------------|------------|----------------------------------------------|----------|--------------------|---|
|   | Unit: 2                       |            |                                              |          | Rev _O             |   |
|   | Component: Cable<br>Mark: WVA | v          | 2/c, #16                                     |          |                    |   |
| • | <u>Plant I. D. No.</u>        | Room       | Function/Service                             | Category | Operating Time     |   |
| • | 2R986<br>2R985                | 14<br>14 . | Stdby Lqid Tnk Level<br>Stdby Lqid Tnk Level | A<br>A   | l Year<br>l Year   |   |



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# EEB <u>63-0030</u>

Rev \_O\_\_\_\_

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# ATTACHMENT B

### Mark WVA

| •  | <u>Contract No</u> .                                      | Туре                                              |     | Manufacturer                                                                     |
|----|-----------------------------------------------------------|---------------------------------------------------|-----|----------------------------------------------------------------------------------|
|    | 77K5-823265<br>72C7-83944<br>69C3-64863-1<br>72C7-74910-1 | FRXLPE/CSPE<br>FRXLPE/CSPE<br>PE/PVC<br>XLPE/CSPE | :   | Rockbestos<br>Continental Wire & Cable<br>Rockbestos<br>Continental Wire & Cable |
| TR | 822676 from SQN<br>76K5-87232                             | FREP/CPE                                          |     | Continental Wire & Cable                                                         |
| TR | 827773 from BLN<br>78K5-824447                            | FREP/CPE                                          |     | Anaconda-                                                                        |
| TR | 826953 from BLN<br>78K5-824447                            | FREP/CPE                                          | . • | Anaconda .                                                                       |
|    | 77K5-820991<br>73C7-84211                                 |                                                   | ١   | Boston Ins. Wire<br>ITT                                                          |



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Sheet No: EEB-63-0030

Revision: 0

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Reviewed | by: | مخاذ الداعية المجرد بالمربولين بمحتمدهم المدارسين ويو |
|----------|-----|-------------------------------------------------------|
| ,        |     |                                                       |
| Prepared | by: |                                                       |
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QA Acceptance:



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| Facility: Browns Ferry Nucl<br>Jnit: 2<br>Docket: 50-260          | ear Plant .              | SYSTEM COMP         | ONENT EVALUA       | ATION WORK SH      | EET (Rev 2)                                 | (3) <sup>™</sup><br>Sheet NoE<br>Revision<br>Date | EB-63-0031<br>)<br>0-22-80 |
|-------------------------------------------------------------------|--------------------------|---------------------|--------------------|--------------------|---------------------------------------------|---------------------------------------------------|----------------------------|
| EQUIPMENT DESCRIPTION                                             | ENVIRONMENT              |                     | DOCUMENTATION REF  |                    | QUALIFICATION                               | OUTSTANDING                                       |                            |
|                                                                   | Parameter                | Specifi-<br>cation  | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                          | METHOD                                            |                            |
| System: 63<br>Plant ID No. Attachment A                           | Operating<br>Time        | Attachment A        | l Year             | · (1)              | Attachment<br>C.3                           | Engineering<br>Analysis                           | None                       |
| Component Cable WVA<br>2/c, #16, PE<br>fanufacturer: Attachment B | Temperature              | 174                 | 203                | (4)                | IPCEA S-61-402<br>par 3.9 and<br>Appendix D | Attachment C.2                                    | None .                     |
| Number: N/A                                                       | Pressure<br>(PSIA)       | 15.0                | N/A                | (4)                | N/A                                         | N∕A                                               | None                       |
| Function:<br>Signal/Instrumentation                               | Relative<br>Humidity (%) | 100                 | 100                | (4)                | IPCEA S-61-402<br>par 3.9,<br>3.7.3, 6.7    | Standard<br>Material<br>Requirement               | None                       |
| Accuracy: Req'd: N/A<br>Demon: N/A<br>Lategory: Attachment A      | Chemical<br>Spray        | ·<br>N/A            | N/A                | (4)                | <br>N/A ·                                   | N/A                                               | ·None                      |
| ervice: Attachment A                                              | Radiation<br>(RAD)       | 3.1x10 <sup>4</sup> | 4x107              | . (4)              | NUREG-0588<br>Material<br>List              | Generic<br>Material<br>Tests                      | None                       |
| .ocation: 14                                                      | Aging                    | N/A                 | 20 years           | (2)                | Attachment C.1                              | Oper. Experience                                  | None                       |
| ilood Level Elev: 552'<br>bove Flood Level: Yes ×                 | Submergence              | N/A                 | N/A                | (4)                | N/A                                         | . N/A                                             | None                       |

.otes: (1) See Section 2.4 in 79-01B report.

- (2) · See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: <u>R.J. Mills</u>

· (opr/90 Reviewad by:

QA Acceptance:

Attachment A

| System: 63                    |          |                                              |          | EEB <u>63-0031</u>    |
|-------------------------------|----------|----------------------------------------------|----------|-----------------------|
| Unit: 2                       |          |                                              | •        | Rev O                 |
| Component: Cable<br>Mark: WVA | 2<br>v   | 2/c, #16                                     |          | •                     |
| <u>Plant I. D. No.</u>        | Room     | Function/Service                             | Category | <u>Operating Time</u> |
| 2R986<br>2R985                | 14<br>14 | Stdby Lqid Tnk Level<br>Stdby Lqid Tnk Level | A<br>A   | l Year<br>l Year      |
|                               |          | •                                            |          |                       |



### EEB 63-0031

Rev \_O

#### ATTACHMENT B

Mark WVA

Type

FRXLPE/CSPE

FRXLPE/CSPE

PE/PVC

XLPE/CSPE

FREP/CPE

FREP/CPE

FREP/CPE

<u>Contract No</u>. 77K5-823265 72C7-83944 69C3-64863-1 72C7-74910-1

TR 822676 from SQN 76K5-87232

TR 827773 from BLN 78K5-824447

TR 826953 from BLN 78K5-824447

> 77K5-820991 73C7-84211

#### Manufacturer

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Rockbestos : Continental Wire & Cable Rockbestos Continental Wire & Cable

Continental Wire & Cable

Anaconda

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Anaconda

Boston Ins. Wire ITT
Sheet No: EEB-63-0031

Revision: O

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1942

110

#### Coax, Triax, and Signal Cable

Coaxial and Triaxial cable installed at Browns Ferry were purchased in accordance with General Electric Company Specification 22A1181, and the appropriate MIL-C-17 specification. Signal cables, both twisted pair and multiconductor, were purchased in accordance with TVA specifications. Some cable were of cross-linked polyethylene and chloronated polyethylene construction while the same kind of cable furnished under other contracts were of high molecular weight, high density polyethylene/polyvinyl chloride construction and some even polyethylene/polyvinyl chloride construction. It is not possible to make a complete identification by contract as to which circuit and function they serve. Recent reclassification of some functions to 1E status has made it almost a certainty that some cables now in a safety category are of polyethylene/polyvinyl construction.

Accordingly, we have examined the 20 HELB temperature profiles and find that only compartments 1, 3, 6, and 9 show profiles which more than briefly surpass the softening temperature of the linear polyethylene. However, owing to the thermal time lag in the cable material and the cable installation including the heat sink of conduit, tray, and shield material, the insulation will not experience the HELB temperature profile until some time has elapsed and the temperature is lower. Further, no load heat rise need be taken into account for these signal cables.

TVA has conducted tests (Chattanooga Central Laboratories Report No. L81-81-6821 dated October 1980, of PE, PVC cables under a temperature profile which envelops all the HELB profiles. Following this exposure, these cables sustained a dielectric test while immersed in water of 660 volts for 5 minutes, 960 volts for 5 minutes, and 220 volts ac for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April, or replaced at the next refueling outage.

For those cables located in compartment 0 (the containment), the service which these cables have seen thus far has exposed them to a gamma radiation dose of  $6.25 \times 10^{\circ}$  rads or more. This is sufficient to have cross-linked the polyethylene and PVC as well. Consequently, the insulation is now in fact a thermoset material and is capable of the same temperature that TVA's cross-linked polyethylene cable has demonstrated and is capable of withstanding the LOCA/SLB and the post-LOCA environment for a year.

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Sheet No: EEB-63-003/

Revision: 0

#### ATTACHMENT C (Continued)

#### C.1 (Continued)

Continued operation is justified, and TVA has prepared a LOCA/SLB, thermal aging, and radiation test procedure to be performed by Wyle Laboratories on samples of this cable to demonstrate the validity of this conclusion. Results of this testing program are expected to be available in April 1981.

One cable RG-114A/U has the possibility of being sensitive to pressure changes owing to its partial air dielectric; however, an analysis of this effect has indicated that the change in dielectric constant can. be tolerated. Consequently for this cable too, there is justification for continued operation. The compression effect on the dielectric will be likewise tested at Wyle Laboratories along with the other cable tests and results are expected to be available by April 1981.

- C.2 Standard Material Long-Term Overload Temperature Rating
- C.3 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by: Reviewed by:

QA Acceptance:\_\_\_\_\_

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(3) SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) EEB-63-0032 Sheet No. Facility: Browns Ferry Nuclear Plant Revision 0 Unit: 10-22-80 Date bocket: 50-260 OUTSTANDING QUALIFICATION DOCUMENTATION REF ENVIRONMENT ITEMS METHOD EQUIPMENT DESCRIPTION Qualifi-Specifi-Qualifi-Specification cation · cation cation Parameter System: 63 Operating Attachment A Engineering None Attachment 1 Year. Plant ID No. Attachment A Analysis Time C.3 (1)Component Cable UVA-1 Generic 2/c, #18, CSPE Simultaneous Temperature (°F) None Test Manufacturer: Attachment B Attachment C 250 199 (4)N/A None N/A N/A Pressure Model Number: N/A (PSIA) (4) 15.0 Function: Generic Signal/Instrumentation Relative Simultaneous Attachment C.1 Humidity (%) 100 (4). 100 None Test Accuracy: Reg'd: N/A Demon: N/A Chemical . Spray Category: Attachment A None (4) N/A. N/A N/A N/A Service: Attachment A Generic Radiation Sequential · 5x10<sup>7</sup> 3.1x10<sup>4</sup> Attachment C. (4)None (RAD) Test 12 Generic Mat'l Test None location: Attachment C.2 40 years  $(2)^{-}$ N/A Aging "lood Level Elev: 552' N/A None N/A Above Flood Level: - Yes X Submergence N/A. N/A (4<sup>'</sup> · · · · No Prepared by: R.L. mills See Section 2.4 in 79-01B report. \otes: (1)(2)See Section 4.1.2 in 79-01B report. Reviewed by (3) All notes and other information not on these sheets are on the attached appendix sheets. **OA** Acceptance See Section 3.0 and/or Appendix B in 79-01B report. (4)

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Attachment A

·System: 63 Unit: 2

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EEB 63-0032

, Rev. <u>O</u>

Component: Cable Mark: WVA-1 : 2/c, #18

| <u>Plant I. D. No.</u> | Room | Function/Service | Category   | <u>Operating Time</u> |
|------------------------|------|------------------|------------|-----------------------|
| 2A1479                 | ]2   | Injection Flow   | <b>A</b> • | l Year                |

## EEB 63-0032

Rev O

# ATTACHMENT B

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<u>,</u> A

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Mark WVA-1

| •    | <u>Contract No</u> .                                    |          | Туре                                          |   |    | Manufacturer                                                                                   |   |
|------|---------------------------------------------------------|----------|-----------------------------------------------|---|----|------------------------------------------------------------------------------------------------|---|
|      | 68C7-61986<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 | •,       | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE |   |    | Continental Wire & Cable<br>Rockbestos<br>Continental Wire & Cable<br>Continental Wire & Cable |   |
| TR   | From SQN<br>73C7-84211                                  |          | XLPE/CSPE                                     |   |    | ITT                                                                                            | • |
| TR   | 85255 from<br>SQN 72C7-83944                            | <b>1</b> | XLPE/CSPE                                     |   | •  | Continental Wire & Cable                                                                       |   |
| , TR | 87049 from<br>SQN 73C7-84211                            |          | XLPE/CSPE                                     | • | ,  | ITT                                                                                            |   |
| TR   | 86757 from<br>SQN 73C7-84211                            |          | XLP0/CSPE                                     |   |    | ITT .                                                                                          |   |
| TR   | 823079 from<br>WBN 74C7-85259                           |          | XLPE/CSPE                                     |   | ×. | Belden .                                                                                       |   |
|      |                                                         |          |                                               |   |    |                                                                                                |   |

Sheet No.: EEB-63-0032

Revision: O

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Hyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Prepared  | by:   |  |
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| Reviewed  | by:   |  |
| OA Accept | ance: |  |



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| Facility: Browns Ferry Nucl<br>Jnit: 2<br>Docket: 50-260                           | ear Plant .                            | SYSTEM COMP                    | ONENT EVALUA       | ATION WORK SH      | EET (Rev 2)        | (3)<br>Sheet No<br>Revision<br>Date | EB-63-0033<br>D<br>0-22-80 |
|------------------------------------------------------------------------------------|----------------------------------------|--------------------------------|--------------------|--------------------|--------------------|-------------------------------------|----------------------------|
| FOULPMENT DESCRIPTION                                                              | ······································ | ENVIRONMENT                    |                    | DOCUMEN            | TATION REF         | QUALIFICATION                       | OUTSTANDING                |
|                                                                                    | Parameter                              | Specifi-<br>cation             | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation | METHOD                              |                            |
| System: 63<br>Plant ID No. Attachment A                                            | Operating<br>Time                      | Attachment A                   | l year             | (1)                | Attachment C3      | Engineering<br>Analysis and<br>Test | None                       |
| Component Cable UVA-1<br>2/c, #18, XLPE <sup>*</sup><br>Manufacturer: Attachment B | Temperature<br>(°F)                    | 199                            | 385                | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test     | None                       |
| Adel Number: N/A                                                                   | Pressure<br>(PSIA)                     | 15.0                           | N/A                | (4)                | N/A                | N/A                                 | None                       |
| Function:<br>Signal/Instrumentation                                                | Relative<br>Humidity (%)               | 100                            | 100                | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test     | <br>None                   |
| Demon: N/A<br>Category:Attachment A                                                | Chemical<br>Spray                      | N/A                            | N/A -              | (4)                |                    | N/A                                 | None                       |
| Service: Attachment A                                                              | Radiation<br>(RAD)                     | 3.1x10 <sup>4</sup>            | 2x10 <sup>8</sup>  | (4)                | Attachment C.1     | Generic<br>Sequential<br>Test       | None                       |
|                                                                                    | Aging                                  | N/A                            | 40 years           | (2)                | Attachment C.2     | Generic Mat'l Test                  | None                       |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X                                 | Submergence                            | N/A                            | N/A                | (4)                | ' N/A              | N/A                                 | None                       |
| lotes: (1) See Section 2                                                           | .4 in 79-018 re                        | eport.                         |                    | . •                |                    | Prepared by: <u>K</u>               | .L. millo                  |
| <ul><li>(2) See Section 4</li><li>(3) All notes and</li></ul>                      | .1.2 in 79-01B<br>I other informat     | report.<br>tion not on t       | hese .             | · · · ·            | •                  | Reviewed by: &                      | Hlagner 1/50               |
| <ul> <li>sheets are or</li> <li>(4) See Section 3</li> </ul>                       | the attached a to the and/or Apper     | appendix shee<br>1dix B in 79- | ts.<br>018 report. | : ``.              |                    | QA Acceptance:                      |                            |

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Attachment A ....

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EEB 63-0033

Component: Cable Mark: WVA-1 ℃

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63 2、

System: Unit:

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2/c, #18

| • | <u>Plant I. D. No.</u> | Room | Function/Service | Category | Operating Time |
|---|------------------------|------|------------------|----------|----------------|
| • | 2A1479                 | ]2   | Injection Flow   | Α.       | 1 Year         |

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## EEB <u>63-0033</u>

Rev O

#### C ATTACHMENT B

Mark WVA-1

|    | <u>Contract No</u> .                                    |          | Type                                          | <b>x</b> | Manufà                                                  | <u>turer</u>                                 |   |
|----|---------------------------------------------------------|----------|-----------------------------------------------|----------|---------------------------------------------------------|----------------------------------------------|---|
|    | 68C7-61986<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 |          | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE | •        | Continental<br>Rockbestos<br>Continental<br>Continental | Wire & Cable<br>Wire & Cable<br>Wire & Cable | • |
| TR | From SQN<br>73C7-84211                                  |          | XLPE/CSPE                                     | •.       | <u>и</u> т.                                             |                                              | • |
| TR | 85255 from<br>SQN 72C7-83944                            | <b>!</b> | XLPE/CSPE                                     | •        | Continental                                             | Wire & Cable                                 | • |
| TR | 87049 from<br>SQN 73C7-84211                            |          | XLPE/CSPE                                     | · • `    | ITT                                                     |                                              |   |
| TR | 86757 from<br>SQN 73C7-84211                            | *        | XLPO/CSPE                                     |          | ITT                                                     | · · ·                                        | • |
| TR | 823079 from<br>WBN 74C7-85259                           |          | XLPE/CSPE                                     | ,        | Belden                                                  | •                                            | ٠ |

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Sheet No: EEB 63- 00.33

Revision: 0

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

130

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Reviewed by:   |            |
|----------------|------------|
| Prepared by:   | o <b>ʻ</b> |
| QA Acceptance: |            |

| 1                                                                   |                            | •                   |                    |                    |                                             | ••                                           | :           |
|---------------------------------------------------------------------|----------------------------|---------------------|--------------------|--------------------|---------------------------------------------|----------------------------------------------|-------------|
| Facility: Browns Ferry Nuc<br>Unit: 2<br>Docket: 50-260             | lear Plant                 | SYSTEM COMP         | PONENT EVALUA      | ATION WORK SH      | HEET (Rev 2)                                | (3)<br>Sheet No. EE<br>Revision O<br>Date Ic | B-63-0034   |
| EQUIDENT DESCRIPTION                                                |                            | ENVIRONMENT         |                    | DOCUMEN            | TATION REF                                  | QUALIFICATION                                | OUTSTANDING |
|                                                                     | Parameter                  | Specifi-<br>cation  | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                          | ME INUD                                      | 11645       |
| System: 63<br>Plant ID No. Attachment A                             | Operating<br>Time          | Attachment A        | l Year             | • (1)              | Attachment<br>C.3                           | Engineering<br>Analysis                      | None<br>•   |
| Component Cable WVA-1<br>2/c, #18, PE<br>Manufacturer: Attachment B | Temperature<br>(°F)        | 199                 | 203                | (4)                | IPCEA S-61-402<br>par 3.9 and<br>Appendix D | Attachment C.2                               | None .      |
| Model Number: N/A                                                   | Pressure<br>(PSIA)         | 15.0                | N/A                | (4)                | N/A                                         | N/Ą                                          | None        |
| Function:<br>Signal/Instrumentation                                 | Relative ·<br>Humidity (%) | 100                 | 100                | (4)                | IPCEA S-61-402<br>par 3.9,<br>3.7.3, 6.7    | Standard<br>Material<br>Requirement          | None        |
| Category: Attachment A                                              | Chemical<br>Spray          | N/A                 | N/A                | (4)                | Ń/A                                         | N/A                                          | None        |
| Service: Attachment A                                               | Radiation<br>(RAD)         | 3.1x10 <sup>4</sup> | 4x10 <sup>7</sup>  | (4)                | NUREG-0588<br>Material<br>List              | Generic<br>Material<br>Tests                 | None        |
| LOCATION: 14                                                        | • • • •                    | 1                   |                    | 1                  | او محسباء محدها                             | Onen Evnemienee                              | "Nono       |

20 years

N/A

(2)

(4)

Notes: (1) See Section 2.4 in 79-01B report.

No

(2) See Section 4.1.2 in 79-01B report.

Aging

(3) All notes and other information not on these sheets are on the attached appendix sheets.

Submergence

(4) See Section 3.0 and/or Appendix B in 79-01B report.

N/A

N/A.

Prepared by: K. I. Mill

6/22/2 Reviewed by

QA Acceptance:

Oper. Experience

N/A

Attachment C.1

N/A

None

None

Location:

Flood Level Elev: 552'

Above Flood Level: Yes X

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Attachment A

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EEB <u>63-0034</u> .System: Unit: 63 2 Rev O Cable WVA-1 2/c, #18 Component: Mark: ٩. Operating Time Plant I. D. No. Function/Service Category Room 1 Year Injection Flow ]2 2A1479 Α

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## EEB 63-0034

Rev O

# ATTACHMENT B

Mark WVA-1

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|    | <u>Contract No</u> .                                     |     | Type                                          | •   |   | Manufacturer                                                                                   | •  |
|----|----------------------------------------------------------|-----|-----------------------------------------------|-----|---|------------------------------------------------------------------------------------------------|----|
| _  | 68C7-61986<br>78K5-824171<br>72C7-83944<br>•72C7-74910-1 | . • | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE | •   | • | Continental Wire & Cable<br>Rockbestos<br>Continental Wire & Cable<br>Continental Wire & Cable |    |
| TR | From SQN<br>73C7-84211                                   |     | XLPE/CSPE                                     |     | • | ITT                                                                                            | N. |
| TR | 85255 from<br>SQN 72C7-83944                             | ð   | XLPE/CSPE                                     | 5   |   | Continental Wire & Cable                                                                       |    |
| TR | 87049 from<br>SQN 73C7-84211                             |     | XLPE/CSPE                                     | • ' | • | Ш                                                                                              |    |
| TR | 86757 from<br>SQN 73C7-84211                             | •   | XLPO/CSPE                                     |     |   | ITT                                                                                            | •  |
| TR | 823079 from<br>WBN 74C7-85259                            |     | XLPE/CSPE                                     |     |   | Belden                                                                                         |    |

Sheet No: EEB-63-0034

Revision: O

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1942

#### Coax, Triax, and Signal Cable

Coaxial and Triaxial cable installed at Browns Ferry were purchased in accordance with General Electric Company Specification 22A1181, and the appropriate MIL-C-17 specification. Signal cables, both twisted pair and multiconductor, were purchased in accordance with TVA specifications. Some cable were of cross-linked polyethylene and chloronated polyethylene construction while the same kind of cable furnished under other contracts were of high molecular weight, high density polyethylene/polyvinyl chloride construction and some even polyethylene/polyvinyl chloride construction. It is not possible to make a complete identification by contract as to which circuit and function they serve. Recent reclassification of some functions to 1E status has made it almost a certainty that some cables now in a safety category are of polyethylene/polyvinyl construction.

Accordingly, we have examined the 20 HELB temperature profiles and find that only compartments 1, 3, 6, and 9 show profiles which more than briefly surpass the softening temperature of the linear polyethylene. However, owing to the thermal time lag in the cable material and the cable installation including the heat sink of conduit, tray, and shield material, the insulation will not experience the HELB temperature profile until some time has elapsed and the temperature is lower. Further, no load heat rise need be taken into account for these signal cables.

TVA has conducted tests (Chattanooga Central Laboratories Report No. L81-81-6821 dated October 1980, of PE, PVC cables under a temperature profile which envelops all the HELB profiles. Following this exposure, these cables sustained a dielectric test while immersed in water of 660 volts for 5 minutes, 960 volts for 5 minutes, and 220 volts ac for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April, or replaced at the next refueling outage.

For those cables located in compartment 0 (the containment), the service which these cables have seen thus far has exposed them to a gamma radiation dose of  $6.25 \times 10^{\circ}$  rads or more. This is sufficient to have cross-linked the polyethylene and PVC as well. Consequently, the insulation is now in fact a thermoset material and is capable of the same temperature that TVA's cross-linked polyethylene cable has demonstrated and is capable of withstanding the LOCA/SLB and the post-LOCA environment for a year.

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Sheet No: EEB-63-0034

Revision: 0

#### ATTACHMENT C (Continued)

#### C.1 (Continued)

Continued operation is justified, and TVA has prepared a LOCA/SLB, thermal aging, and radiation test procedure to be performed by Wyle Laboratories on samples of this cable to demonstrate the validity of this conclusion. Results of this testing program are expected to be available in April 1981.

One cable RG-114A/U has the possibility of being sensitive to pressure changes owing to its partial air dielectric; however, an analysis of this effect has indicated that the change in dielectric constant can be tolerated. Consequently for this cable too, there is justification for continued operation. The compression effect on the dielectric will be likewise tested at Wyle Laboratories along with the other cable tests and results are expected to be available by April 1981.

- C.2 Standard Material Long-Term Overload Temperature Rating
- C.3 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

| Prepared by:   |   | r |
|----------------|---|---|
| Reviewed by:   |   |   |
| NA Acceptance: | • |   |

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|-------------------------------------|-------------------------------------|--------------------------------|--------------------|--------------------|----------------|-----------------------|-------------|
| ··· ·                               | - 4                                 |                                |                    |                    | • * *<br>•     |                       | -           |
|                                     |                                     |                                |                    |                    |                |                       |             |
| 14 `                                | *                                   |                                |                    |                    |                | •                     |             |
|                                     | • • • • •                           | · .                            | _                  |                    |                |                       | •           |
| Facility: Browns Ferrý Nucl         | ear Plant                           | SYSTEM COMP                    | ONENT EVALUA       | TION WORK SH       | EET (Rev 2)    | (3)<br>Sheet No. EE   | B-63-0035   |
| Unit: 2                             |                                     | •                              | .:                 | •                  | ,              | Revision O            | 22 80       |
|                                     | ······                              | ENVIRONMENT                    |                    | DOCUMEN            | TATION REF     | OUALIFICATION ·I      | OUTSTANDI   |
| EQUIPMENT DESCRIPTION :             |                                     |                                |                    | 0                  | 0              | METHOD                | ITEMS       |
| -                                   | Parameter                           | Specifi-<br>cation             | Qualiti-<br>cation | Specifi-<br>cation | cation         | · · · .               |             |
| System: 63                          | Operating                           | Attachment A                   | 1.V                |                    | Attachmont     | Fraineering           | None        |
| Plant ID No. Attachment A           | Time                                |                                | i Tear.            | ())                | C.3            | Analysis              |             |
| Component Cable WVA-1               | A                                   |                                | •<br>•             | · (1)              |                |                       | 4           |
| 2/c, #18, CSPE                      | Tomoonstant                         | · ·                            |                    | •                  |                | Simultaneous          |             |
| Manufacturer: Attachment B          | ( <sup>C</sup> F)                   | 174                            | 250                | (4)                | Attachment C.1 | Test                  | None        |
|                                     | Pressure                            |                                | N/A                |                    | N/A            | N/A                   | · .<br>None |
| Nodel Number: N/A                   | (PSIA)                              | 15.0                           |                    | (4)                |                | ,,,,                  | . '         |
| Function:<br>Signal/Instrumentation | Polativo                            |                                |                    |                    |                | Generic               |             |
|                                     | Humidity (%)                        | 100                            | 100                | (4)                | Attachment C.1 | Test                  | None 、      |
| Accuracy: Req'd: N/A<br>Demon: N/A  | Chemical                            |                                |                    |                    | · ·            |                       |             |
| Sategory: Attachment A              | Spray                               | N/A ·                          | N/A                | (4)                | N/A            | N/Á                   | None        |
| Service: Attachment A               |                                     |                                |                    | •                  |                | Generic               |             |
| •                                   | Radiation<br>(RAD)                  | 3.1x10 <sup>4</sup>            | 5x10 <sup>7</sup>  | · (4)              | Attachment C.1 | Sequential · · ·      | . None      |
| cocation: 14                        | Aging                               | N/A                            | '40 years          | (2)                | Attachment C.2 | Generic Mat'l Test    | None        |
| Flood Level Elev: 552'              |                                     |                                |                    | •                  | N/A            | N/0                   | 1<br>None.  |
| Above Flood Level: Yes X<br>No      | Submergence                         | N/A                            | N/A                | (4)                | N/A ,          |                       | HALC.       |
| votes: (1) See Section 2            | 2.4 in 79-01B re                    | eport.                         |                    | •                  | •              | Prepared by: <u>R</u> | L. mills    |
| (2) See Section 4                   | .1.2 in 79-01B                      | report.                        | •                  | . 🔨 🕇              |                | Powers have Cr        | · 10/22     |
| (3) All'notes and                   | l other informat                    | tion not on t                  | hese .             |                    |                | Reviewed by:          | TTL Jagner  |
| (4) See Section 3                   | i the attached a<br>LO and/or Apper | appenaix snee<br>adix B in 79- | 018 report.        |                    | •              | QA Acceptance; _      |             |
|                                     | te and a type                       | ,<br>,                         |                    | · ``               | •              | •                     |             |
|                                     | - • •                               | •                              | •.                 | •                  | •              |                       | • •         |

Attachment A

| System: 63<br>Unit: 2             |      |                   |          | EEB <u>63-0035</u><br>Rev 0 |
|-----------------------------------|------|-------------------|----------|-----------------------------|
| Component: Cable<br>Mark: • WVA-1 | . č  | 2/c, ∦18          | 4        |                             |
| Plant I. D. No.                   | Room | Function/Service  | Category | Operating Time              |
| 2A1470                            | 14   | Stdby Liquid Temp | A        | l Year                      |

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## EEB. 63-0035

Rev O

# CATTACHMENT B

Mark WVA-1

|    | <u>Contract No</u> .                                     |       | Type                                          |   |     | Manufac                                                 | turer                                        | • |
|----|----------------------------------------------------------|-------|-----------------------------------------------|---|-----|---------------------------------------------------------|----------------------------------------------|---|
| ą  | 68C7-61986<br>78K5-824171<br>72C7-83944<br>•72C7-74910-1 | . • • | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE | • |     | Continental<br>Rockbestos<br>Continental<br>Continental | Wire & Cable<br>Wire & Cable<br>Wire & Cable |   |
| TR | From SQN<br>73C7-84211                                   |       | XLPE/CSPE                                     | - | • • | ITT                                                     |                                              |   |
| TR | 85255 from<br>SQN 72C7-83944                             | · 1   | XLPE/CSPE                                     |   | •   | Continental                                             | Wire & Cable,                                | • |
| TR | 87049 from<br>SQN 73C7-84211                             | ,     | XLPE/CSPE                                     |   | •   | ITT                                                     | •                                            |   |
| TR | 86757 from<br>SQN 73C7-84211                             |       | XLPO/CSPE                                     |   |     | ITT                                                     |                                              | • |
| TR | 823079 from<br>WBN 74C7-85259                            |       | XLPE/CSPE                                     |   |     | Belden                                                  |                                              |   |

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Sheet No.: EEB-63-0035

Revision: \_\_\_\_O

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Prepared by:   |  |  |  |  |  |
|----------------|--|--|--|--|--|
| Reviewed by:   |  |  |  |  |  |
| QA Acceptance: |  |  |  |  |  |

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- See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- See Section 3.0 and/or Appendix B in 79-01B report. (4)

QA Acceptance

Reviewed by

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Attachment A

EEB <u>63-0036</u> System: 63 Unit: 2 Rev <u>O</u> · Component: Cable Mark: WVA-1 2/c, ∅18 . v

| • | Plant I. D. No. | Room | Function/Service  | Category | Operating Time |
|---|-----------------|------|-------------------|----------|----------------|
|   | 2A1470          | 14   | Stdby Liquid Temp | A        | l Year .       |
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## EEB <u>63-0036</u>

Rev O

### ATTACHMENT B

Mark WVA-1

|    | Contract No.                                            |   | <u>Type</u>                                   | Manufacturer                                                                                   |
|----|---------------------------------------------------------|---|-----------------------------------------------|------------------------------------------------------------------------------------------------|
|    | 68C7-61986<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 |   | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE | Continental Wire & Cable<br>Rockbestos<br>Continental Wire & Cable<br>Continental Wire & Cable |
| TR | From SQN<br>73C7-84211                                  |   | XLPE/CSPE                                     | ITT .                                                                                          |
| TR | 85255 from<br>SQN 72C7-83944                            | ł | XLPE/CSPE                                     | Continental Wire & Cable                                                                       |
| TR | 87049 from<br>SQN 73C7-84211                            |   | XLPE/CSPE .                                   |                                                                                                |
| TR | 86757 from<br>SQN 73C7-84211                            |   | XLPO/CSPE                                     | . TTT                                                                                          |
| TR | 823079 f <u>rom</u><br>WBN 74C7-85259                   |   | .XLPE/CSPE                                    | Belden                                                                                         |

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Sheet No: EEB-62-00 36

Revision: 0

### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Reviewed by: \_\_\_\_\_

QA Acceptance: \_\_\_\_\_



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Facility: Browns Ferry Nuclear Plant SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Unit: 2 Docket: 50-260

Date 10-22-80 DOCUMENTATION REF OUTSTANDING ENVIRONMENT QUALIFICATION . EQUIPMENT DESCRIPTION METHOD ITEMS • 2 Specifi-Oualifi-Specifi-Oualifi-.`, Parameter cation. cation cation cation System: 63 Operating Attachment A 1 Year Engineering None Attachment Plant ID No. Attachment A Time C.3 Analysis (1) Component Cable WVA-1 . IPCEA S-61-402 2/c, No. 18, PE par 3.9 and None Temperature Appendix D Manufacturer: Attachment B 203 Attachment C.2 (4) $(^{0}F)$ 174 ٠. • . • • Pressure Model Number: N/A N/A N/A None N/A (PSIA)(4) 15.0 IPCEA S-61-402 Standard Function: Signal/Instrumentation Relative par 3.9, Material Requirement None Humidity (%) 100 100 (4) 3.7.3, 6.7 Accuracy: Reg'd: N/A Demon: N/A Chemical Spray . Category: Attachment A (4) N/A -N/A N/A 'None N/A NUREG-0588 Service: Attachment A Generic llateria] Radiation Material  $3.1 \times 10^4$ 4x107 (RAD) List (4) None Tests Location: 14 Oper. Experience 'None Attachment C.1  $(2)^{*}$ N/A 20 years Aging Flood Level Elev: 552' Above Flood Level: Yes  $\times$ Submergence N/A N/A N/A None N/A  $(4)^{'}$ No

Notes: (1) See Section 2.4 in 79-01B report.

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: <u>*K.L.Mills*</u> Reviewed by: <u>*Q.Fulegnum*</u>

QA Acceptance

(3)

Revision

Sheet No. EEB 63-0037

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Attachment A

·System: 63 Unit: 2

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Component: Cable Mark: WVA-1 🗸

2/c, #18

| EEB <u>63-0037</u> |   |
|--------------------|---|
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| Kev O.             | • |

| • | <u>Plant I. D. No.</u> | Room | Function/Service  | Category | Operating Time |
|---|------------------------|------|-------------------|----------|----------------|
| • | 2A1470 .               | 14   | Stdby Liquid Temp | A        | l Year         |
| _ |                        |      | · · · · · · ·     |          |                |

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# EEB <u>63-0037</u>

Rev \_O\_\_\_\_

# ATTACHMENT B'

Mark WVA-1

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| ,  | Contract No.                                              | <u>`Туре</u>                                  | Manufacturer                                                                                   |
|----|-----------------------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------|
|    | 68C7-61986 .<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 | PE/PYC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE | Continental Wire & Cable<br>Rockbestos<br>Continental Wire & Cable<br>Continental Wire & Cable |
| TR | From SQN<br>73C7-84211                                    | XLPE/CSPE                                     | ITT                                                                                            |
| TR | 85255 from<br>SQN 72C7-83944                              | XLPE/CSPE                                     | Continental Wire & Cable                                                                       |
| TR | 87049 from<br>SQN 73C7-84211                              | XLPE/CSPE                                     | ITT                                                                                            |
| TR | 86757 from<br>SQN 73C7-84211                              | XLPO/CSPE                                     | ITT                                                                                            |
| TR | 823079 from<br>WBN 74C7-85259                             | XLPE/CSPE                                     | Belden                                                                                         |











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Sheet No: EEB-43-003>

Revision: 0

### ATTACHMENT C

C.1 TVA Engineering Report No. 1942

### Coax, Triax, and Signal Cable

Coaxial and Triaxial cable installed at Browns Ferry were purchased in accordance with General Electric Company Specification 22A1181, and the appropriate MIL-C-17 specification. Signal cables, both twisted pair and multiconductor, were purchased in accordance with TVA specifications. Some cable were of cross-linked polyethylene and chloronated polyethylene construction while the same kind of cable furnished under other contracts were of high molecular weight, high density polyethylene/polyvinyl chloride construction and some even polyethylene/polyvinyl chloride construction. It is not possible to make a complete identification by contract as to which circuit and function they serve. Recent reclassification of some functions to 1E status has made it almost a certainty that some cables now in a safety category are of polyethylene/polyvinyl construction.

Accordingly, we have examined the 20 HELB temperature profiles and find that only compartments 1, 3, 6, and 9 show profiles which more than briefly surpass the softening temperature of the linear polyethylene. However, owing to the thermal time lag in the cable material and the cable installation including the heat sink of conduit, tray, and shield material, the insulation will not experience the HELB temperature profile until some time has elapsed and the temperature is lower. Further, no load heat rise need be taken into account for these signal cables.

TVA has conducted tests (Chattanooga Central Laboratories Report No. L&1-81-6821 dated October 1980, of PE, PVC cables under a temperature profile which envelops all the HELB profiles. Following this exposure, these cables sustained a dielectric test while immersed in water of 660 volts for 5 minutes, 960 volts for 5 minutes, and 220 volts ac for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April, or replaced at the next refueling outage.

For those cables located in compartment 0 (the containment), the service which these cables have seen thus far has exposed them to a gamma radiation dose of  $6.25 \times 10^{\circ}$  rads or more. This is sufficient to have cross-linked the polyethylene and PVC as well. Consequently, the insulation is now in fact a thermoset material and is capable of the same temperature that TVA's cross-linked polyethylene cable has demonstrated and is capable of withstanding the LOCA/SLB and the post-LOCA environment for a year.

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Sheet No: EEB-63-003>

Revision: 0

### ATTACHMENT C (Continued)

### C.1 (Continued)

Continued operation is justified, and TVA has prepared a LOCA/SLB, thermal aging, and radiation test procedure to be performed by Wyle Laboratories on samples of this cable to demonstrate the validity of this conclusion. Results of this testing program are expected to be available in April 1981.

One cable RG-114A/U has the possibility of being sensitive to pressure changes owing to its partial air dielectric; however, an analysis of this effect has indicated that the change in dielectric constant can be tolerated. Consequently for this cable too, there is justification for continued operation. The compression effect on the dielectric will be likewise tested at Wyle Laboratories along with the other cable tests and results are expected to be available by April 1981.

- C.2 Standard Material Long-Term Overload Temperature Rating
- C.3 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by: Reviewed by: QA Acceptance:

**J**1C

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|--------------------------------------------------------------------------------|--------------------------------|-------------------------------------------------|------------------------------|--------------------|--------------------|---------------------------------------------------------------------|------------------|
| 14                                                                             | •                              |                                                 |                              |                    |                    | . <i>'</i>                                                          |                  |
| acility: Browns Ferry Nucl<br>Init: 2<br>Jocket: 50-260                        | ear Plant .                    | SYSTEM COMP                                     | ONENT EVALUA                 | TION WORK SHE      | ET (Rev 2)         | (3)<br>Sheet No. <u>FEB</u><br>Revision <u>O</u><br>Date <u>10-</u> | 63-0038<br>22-80 |
| EQUIPMENT DESCRIPTION                                                          |                                | ENVIRONMENT                                     |                              | DOCUMENT           | TATION REF         | METHOD                                                              | ITEMS            |
|                                                                                | Parameter                      | Specifi-<br>cation                              | Qualifi-<br>cation           | Specifi-<br>cation | Qualifi-<br>cation |                                                                     |                  |
| ystem: 63<br>Tant ID No. Attachment A                                          | Operating<br>Time              | Attachment A                                    | l Year.                      | (1)                | Attachment<br>C.3  | Engineering<br>Analysis                                             | None             |
| omponent Cable WVB<br>3/c, No. 18, CSPE                                        | Temperature                    | 174                                             | 250                          | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test                                     | None             |
| odel Number: N/A                                                               | (°F)<br>Pressure<br>(PSIA) .   | 15.0                                            | N/A                          | ·(4)               | - N/A              | N/A                                                                 | None             |
| unction:<br>Signal/Instrumentation                                             | Relative ·<br>Humidity (%)     | 100                                             | 100                          | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test                                     | None             |
| ccuracy: Req'd: N/A<br>Demon: N/A<br>Category: Attachment A                    | Chemical<br>Spray              | N/A                                             | N/A                          | (4)                | · .<br>N/A         | ^ N/A                                                               | · None           |
| ervice: Attachment A                                                           | Radiation<br>(RAD)             | $3.1 \times 10^4$                               | 5x10 <sup>7</sup>            | . (4)              | Attachment C.1     | Generic<br>Sequential<br>Test                                       | None             |
| ocation: 14                                                                    | Aging                          | N/A                                             | 40 years                     | (2)                | Attachment C.2     | Generic Mat'l Test                                                  | • None           |
| lood Level Elev: 552'<br>bove Flood Level: Yes $	imes$<br>No                   | Submergence                    | N/A.                                            | N/A                          | (4)                | N/A                | N/A                                                                 | None             |
| Notes: (1) See Section 2                                                       | 2.4 in 79-01B respectively.    | eport.                                          | • .                          | · · ·              | •                  | Prepared by: $\underline{\mathcal{R}}$                              | 1. mill          |
| <ul> <li>(3) All notes and sheets are on</li> <li>(4) See Section 3</li> </ul> | the attached a .0 and/or Apper | tion not on t<br>appendix shee<br>ndix B in 79- | these<br>ets.<br>OlB report. |                    |                    | Reviewed by:                                                        | Hagner"          |
| •                                                                              | • • •                          | · · ·                                           | •                            |                    | •                  | •                                                                   | *:<br>*:         |

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Attachment A

.System: 63 Unit: 2

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Component: Cable Mark: WVB v 3/c, '#18

EEB <u>63-0038</u>

Rev O

Plant I. D. No.RoomFunction/ServiceCategoryOperating Time2A147114Stdby Liquid Temp, A1 Year

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### EEB <u>63-0038</u>

Rev O

### ATTACHMENT B

Mark WVB

Contract No.

## Туре

CSPE/CSPE

XLPE/CSPE

XLPE/CSPE

XLPE/CSPE

PE/PVC

### Manufacturer

72C7-83849 72C7-74910-2 69C3-64863-1

TR 822675 from WBN 74C7-85259

TR 820907 from 74C7-85259

73C7-84211

BIW Okonite Rockbestos

Belden Corporation

Belden Corporation

ITT Surp.

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Sheet No.: EEB-63-0038

Revision: O

### ATTACHMENT C

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

14C

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

|   | Prepared by:   | <u> </u> |
|---|----------------|----------|
|   | Reviewed by:   |          |
| • | QA Acceptance: |          |
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| Facility: Browns Ferry Nucl<br>Jnit: 2<br>Nocket: 50-260                   | ear Plant                          | SYSTEM COMP            | ONENT EVALUA       | TION WORK SH       | IEET (Rev 2)       | (3)<br>Sheet No. <u>EEB 6</u><br>Revision <u>O</u><br>Date <u>10-</u> 2 | 3-0039            |
|----------------------------------------------------------------------------|------------------------------------|------------------------|--------------------|--------------------|--------------------|-------------------------------------------------------------------------|-------------------|
|                                                                            |                                    | ENVIRONMENT            |                    | DOCUMEN            | TATION REF .       | QUALIFICATION                                                           | OUTSTANDING       |
| EQUIPMENT DESCRIPTION                                                      | Parameter -                        | Specifi-<br>cation     | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation | METHOD -                                                                | -                 |
| System: 63<br>Plant ID No. Attachment A                                    | Operating<br>Time                  | Attachment A           | l year             | (1)                | Attachment C3      | Engineering<br>Analysis and<br>Test                                     | None<br>          |
| Component Cable WVB<br>3/c, No. 18, XLPE<br>fanufacturer:Attachment B      | Temperature<br>(°F)                | 174                    | 385                | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test                                         | None <sup>-</sup> |
| Kodel Number: N/A                                                          | Pressure<br>(PSIA)                 | 15.0                   | N/A                | (4)                | N/A                | N/A                                                                     | None              |
| Function:<br>Signal/Instrumentation                                        | Relative<br>Humidity (%)           | 100                    | 100                | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test                                         | None              |
| Ccuracy: Reg'd: N/A<br>Demon: N/A<br>Category:Attachment A                 | Chemical<br>Spray                  | N/A                    | N/A                | (4)                | N/A                | . N/A                                                                   | None              |
| service: Attachment A                                                      | Radiation<br>(RAD)                 | $3.1 \times 10^4$      | 2x10 <sup>8</sup>  | . (4)              | Attachment C.1     | Generic<br>Sequential<br>Test                                           | None              |
| .ecation: 14                                                               | Aging                              | N/A                    | 40 years           | (2)                | Attachment C.2     | Generic Mat'l Test                                                      | None None         |
| Flood Level Elev: 552'<br>Sove Flood Level: Yes X<br>No                    | Submergence                        | N/A                    | N/A                | (4)                | . N/A              | N/A                                                                     | ,<br>None         |
| lotes: (1) See Section                                                     | 2.4 in 79-018 r                    | eport.                 | e.                 | •                  |                    | * Prepared by: 🗶                                                        | 1 mills           |
| <ul><li>(2) See Section 4</li><li>(3) All notes an sheets are of</li></ul> | A.l.2 in 79-01B<br>d other informa | report.<br>tion not on | these              |                    |                    | Reviewed by:                                                            | Hulagner 1/24/8   |
| Succes ale v                                                               | n and assublica                    | whenery and            |                    |                    |                    | 04 4                                                                    |                   |

(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

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Attachment A

EEB <u>63-0039</u> . Rev <u>O</u>

Component: Mark: Cable WVB v

System: 63 Unit: 2

`3/c, 'Ø18

| <u>Plant I. D. No.</u> | Room | Function/Service  | Category | Operating Tim |
|------------------------|------|-------------------|----------|---------------|
| 2A1471                 | 14   | Stdby Liquid Temp | A        | 1 Year        |
|                        |      |                   | •        |               |

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# EEB <u>63-0039</u>

Rev O

# ATTACHMENT B

Mark WVB

|    | <u>Contract No</u> .                       | Туре                             | Manufacturer                 |
|----|--------------------------------------------|----------------------------------|------------------------------|
|    | 72C7-83849<br>72C7-74910-2<br>69C3-64863-1 | CSPE/CSPE<br>XLPE/CSPE<br>PE/PVC | BIW<br>Okonite<br>Rockbestos |
| TR | 822675 from<br>WBN 74C7-85259              | XLPE/CSPĘ                        | Belden Corporation           |
| TR | 820907 from<br>74C7-85259                  | XLPE/CSPE                        | Belden Corporation           |
|    | 73C7-84211                                 | •                                | ITT Surp.                    |

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Sheet No: EEB- 43-0039

Revision: 0

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SL8 tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Reviewed by:   |
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| Prepared by:   |
| QA Acceptance: |

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| Facility: Browns Ferry Nucl<br>Unit: 2                               | ear Plant                | SYSTEM COMP           | ONENT EVALUA       | ATION WORK SH      | EET (Rev 2)                                 | (3)<br>Sheet No. <u>EEB</u><br>Revision O | 63-0040     |
|----------------------------------------------------------------------|--------------------------|-----------------------|--------------------|--------------------|---------------------------------------------|-------------------------------------------|-------------|
| Docket: 50-260                                                       | •. •                     | ••                    |                    |                    |                                             | Date                                      | 22-80       |
| CONTRACT DECODIDITION                                                | •                        | ENVIRONMENT           |                    | DOCUMEN            | TATION REF                                  | QUALIFICATION                             | OUTSTANDING |
| EQUIPMENT DESCRIPTION                                                | Parameter                | Specifi-<br>cation    | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                          |                                           | -           |
| System: 63<br>Plant ID No. Attachment A                              | Operating<br>Time        | Attachment A          | l Year ·           | (1)                | Attachment<br>C.3                           | Engineering<br>Analysis                   | None -      |
| Component Cable WVB<br>3/c, No. 18, PE<br>Manufacturer: Attachment B | Temperature              | 174 .                 | 203                | (4)                | IPCEA S-61-402<br>par 3.9 and<br>Appendix D | Attachment C.2                            | None .      |
| Model Number: N/A                                                    | Pressure<br>(PSIA)       | 15.0                  | N/A '              | (4)                | N/A                                         | <br>N∕Ą                                   | • .<br>None |
| Function:<br>Signal/Instrumentation                                  | Relative<br>Humidity (%) | 100                   | 100                | (4)                | IPCEA S-61-402<br>par 3.9,<br>3.7.3, 6.7    | Standard<br>Material<br>Requirement       | None        |
| Accuracy: Req'd: N/A<br>Demon: N/A<br>Category: Attachment A         | Chemical<br>Spray        | N/A                   | N/A                | (4)                | N/A .                                       | N/A                                       | None        |
| Service: Attachment A                                                | Radiation<br>(RAD)       | 3.1 x 10 <sup>4</sup> | 4x107              | . (4)              | NUREG-0588<br>Material<br>List              | Generic<br>Material<br>Tests              | None.       |
| Location: 14                                                         | Aging                    | N/A                   | 20 years           | $\cdot$ (2)        | Attachment C.1                              | Oper. Experience                          | None        |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No             | Submergence              | N/A                   | N/A                | (4)                | N/A                                         | N/A                                       | None        |

Notes: (1) See Section 2.4 in 79-01B report.

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: <u>R.I. Mills</u>

1422/9 Reviewed by:

QA Acceptance:

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Attachment A

EEB 63-0040 System: 63 Unit: 2 Rev O Component: Mark: Cable WVB 3/c, ∉18 ۱, Plant I. D. No. Function/Service Category **Operating Time** Room

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2A1471

14

Stdby Liquid Temp

. 1 Year



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# EEB <u>63-0040</u> Rev <u>0</u>

# ATTACHMENT B

Mark WVB

|     | <u>Contract No</u> .                       | Туре                               | Manufacturer                 |
|-----|--------------------------------------------|------------------------------------|------------------------------|
|     | 72C7-83849<br>72C7-74910-2<br>69C3-64863-1 | . CSPE/CSPE<br>XLPE/CSPE<br>PE/PVC | BIW<br>Okonite<br>Rockbestos |
| TR. | 822675 from<br>WBN 74C7-85259              | XLPE/CSPE                          | Belden Corporation           |
| TR  | 820907 from<br>74C7-85259                  | XLPE/CSPE                          | Belden Corporation           |
|     | 73C7-84211                                 | •                                  | ITT Surp.                    |

Sheet No: EEB-63-0040

Revision: 0

### ATTACHMENT C

C.1 TVA Engineering Report No. 1942

### Coax, Triax, and Signal Cable

Coaxial and Triaxial cable installed at Browns Ferry were purchased in accordance with General Electric Company Specification 22A1181, and the appropriate MIL-C-17 specification. Signal cables, both twisted pair and multiconductor, were purchased in accordance with TVA specifications. Some cable were of cross-linked polyethylene and chloronated polyethylene construction while the same kind of cable furnished under other contracts were of high molecular weight, high density polyethylene/polyvinyl chloride construction and some even polyethylene/polyvinyl chloride construction. It is not possible to make a complete identification by contract as to which circuit and function they serve. Recent reclassification of some functions to 1E status has made it almost a certainty that some cables now in a safety category are of polyethylene/polyvinyl construction.

Accordingly, we have examined the 20 HELB temperature profiles and find that only compartments 1, 3, 6, and 9 show profiles which more than briefly surpass the softening temperature of the linear polyethylene. However, owing to the thermal time lag in the cable material and the cable installation including the heat sink of conduit, tray, and shield material, the insulation will not experience the HELB temperature profile until some time has elapsed and the temperature is lower. Further, no load heat rise need be taken into account for these signal cables.

TVA has conducted tests (Chattanooga Central Laboratories Report No. L81-81-6821 dated October 1980, of PE, PVC cables under a temperature profile which envelops all the HELB profiles. Following this exposure, these cables sustained a dielectric test while immersed in water of 660 volts for 5 minutes, 960 volts for 5 minutes, and 220 volts ac for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April, or replaced at the next refueling outage.

For those cables located in compartment 0 (the containment), the service which these cables have seen thus far has exposed them to a gamma radiation dose of  $6.25 \times 10^{\circ}$  rads or more. This is sufficient to have cross-linked the polyethylene and PVC as well. Consequently, the insulation is now in fact a thermoset material and is capable of the same temperature that TVA's cross-linked polyethylene cable has demonstrated and is capable of withstanding the LOCA/SLB and the post-LOCA environment for a year.

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Sheet No: EEB-63-0040

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:

Revision: 0

### ATTACHMENT C (Continued)

### C.1 (Continued)

Continued operation is justified, and TVA has prepared a LOCA/SLB, thermal aging, and radiation test procedure to be performed by Wyle Laboratories on samples of this cable to demonstrate the validity of this conclusion. Results of this testing program are expected to be available in April 1981.

One cable RG-114A/U has the possibility of being sensitive to pressure changes owing to its partial air dielectric; however, an analysis of this effect has indicated that the change in dielectric constant can be tolerated. Consequently for this cable too, there is justification for continued operation. The compression effect on the dielectric will be likewise tested at Wyle Laboratories along with the other cable tests and results are expected to be available by April 1981.

- C.2 Standard Material Long-Term Overload Temperature Rating
- C.3 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

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|---------------------------------------------------------------------|---------------------|--------------------|--------------------|--------------------|------------------------------|---------------------------------------------------------------------|-------------------------|
| Facility: Browns' Ferry Nuc<br>Unit: 3<br>Docket: 50-296            | lear Plant .        | SYSTEM COMP        | ONENT EVALU/       | NTION WORK SH      | HEET (Rev 2)                 | (3)<br>Sheet No. <u>EEB</u><br>Revision <u>O</u><br>Date <u>10-</u> | <u>63-004]</u><br>22-80 |
| FOULDMENT DESCRIPTION                                               |                     | ENVIRONMENT        |                    | DOCUMEN            | TATION REF                   | QUALIFICATION                                                       | OUTSTANDING             |
|                                                                     | Parameter           | Specifi-<br>cation | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation           | METRUD                                                              | 11542                   |
| System: 63<br>Plant ID No. Attachment A                             | Operating<br>Time   | Attachment A       | l Year             | (1)                | Attachment<br>C.4            | Engineering<br>Analysis                                             | None                    |
| Component Cable WCA<br>1/c, No. 14, PN<br>Manufacturer:Attachment B | Temperature<br>(°F) | 174                | 153                | (4)                | Attachments<br>C.1 and C.2 . | Attacliment C.3                                                     | None ·                  |
| Model Number: N/A                                                   | Pressure<br>(PSIA)  | 15.0               | N/A                | (4)                | N/A                          | N/A                                                                 | None                    |

| Accumpants Bacids M/A                             | Relative<br>Humidity (%) | 100                   | 100               | (4) ·  | IPCEA S-61-402<br>par 3.9, 3.7.3<br>6.7 | Standard<br>Material<br>Requirement | None |
|---------------------------------------------------|--------------------------|-----------------------|-------------------|--------|-----------------------------------------|-------------------------------------|------|
| Demon: N/A                                        | Chemical                 | •                     |                   |        | Ţ                                       |                                     |      |
| Category: Attachment A                            | Spray                    | N/A                   | N/A               | (4)    | N/A                                     | N/A                                 | None |
| Service: Attachment A                             | Radiation<br>(RAD)       | 3.1 x 10 <sup>4</sup> | 4x10 <sup>7</sup> | · (л)  | NUREG-0588<br>Materials                 | Generic<br>Material<br>Test         | None |
| Location: 14                                      | Aging                    | N/A                   | 20 years          | (2)    | Attachment C.2                          | Oper, Experience                    | None |
| Flood Level Elev: 552<br>Above Flood Level: Yes X | Submergence              | N/A                   | N/A               | ( ^) * | N/A                                     | . N/A                               | None |

(4)

Notes: See Section 2.4 in 79-01B report. (1)

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- See Section 4.1.2 in 79-01B report. (2)
- (3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report. Prepared by: R.2 Reviewed by:

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QA Acceptance

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Attachment A

EEB <u>63-0041</u>

Rev O

| System: | 63 |  |
|---------|----|--|
| Unit:   | 3  |  |

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'Component: Cable Mark: WCA

1/c, ∄14, PN

| <u>Plant I. D. No.</u> | Room      | Function/Service                       | Category | Operating Time   |
|------------------------|-----------|----------------------------------------|----------|------------------|
| 3PL5103<br>3PL5102     | 14.<br>14 | SLC Storage Tank<br>TNK Heater Control | A<br>. A | 1 Year<br>1 Year |
| •                      |           | •                                      |          |                  |



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## EEB <u>63-0041</u>

### Rev <u>O</u> .

## ATTACHMENT B

Mark WCA

Туре

PN PN PN

PN PN: PN

PN

<u>Contract No</u>.

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|   | 72C7-75128<br>72X7-74885-1                       |   |
|---|--------------------------------------------------|---|
|   | 73C7-84528<br>67C3-91618                         |   |
| R | 72C7-75328-1<br>70C7-54179-1<br>822378) Sequovah |   |
| ı | 822639) 72C7-75228-1<br>822915) 72C7-83874-1     | • |

Plastic Wire & Cable Corp Brand-Rex Plastic Wire & Cable Corp Brand-Rex Brand-Rex Brand-Rex

Manufacturer

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Plastic Wire & Cable Corp Plastic Wire & Cable Corp •

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Revision: \_\_\_\_\_O

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

80

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of 75° C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C:3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

| <b>C.4</b> | The post-HELB conditions are less than the normal cable rating and, |
|------------|---------------------------------------------------------------------|
|            | in our judgment, the cables could operate satisfactorily for a      |
|            | post-accident of a year.                                            |

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:

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| Facility: Browns Ferry Nucl<br>Unit: 3<br>Docket: 50-296             | ear Plant                         | SYSTEM COMP        | ONENT EVALUA        | TION WORK SH                           | IEET (Rev 2)   | (3)<br>Sheet No. <u>EEB</u><br>Revision <u>O</u><br>Date 10-7 | 63-0042<br>22-80 |
|----------------------------------------------------------------------|-----------------------------------|--------------------|---------------------|----------------------------------------|----------------|---------------------------------------------------------------|------------------|
| FOULDMENT DESCOLDTION                                                |                                   | ENVIRONMENT        |                     | DOCUMEN                                | TATION REF     | QUALIFICATION                                                 | OUTSTANDING      |
| EQUIPMENT DESCRIPTION                                                | Parameter                         | Specifi-<br>cation | Qualifi-<br>cation  | Specifi-<br>cation                     | Qualifi-       | METRUD                                                        | 11043            |
| System: <sub>63</sub><br>Plant ID No. Attachment A                   | Operating<br>Time                 | Attachment A       | l year .            | · (1)                                  | Attachment C.3 | Engineering<br>Analysis and<br>Test                           | None             |
| Component Cable WDF<br>1/c, No. 4, CPJ<br>Manufacturer: Attachment B | Temperature<br>(°F)               | -174               | 325                 | - · · ·<br>(4)                         | Attachment C.1 | Generic<br>Simultaneous<br>Test                               | None -           |
| Model Number: N/A                                                    | Pressure<br>(PSIA)                | 15.0               | N/A                 | (4)                                    | N/A            | N/A                                                           | None .           |
| Function: Control/Power                                              | Relative<br>Humidity <b>(%)</b>   | 100                | 100 _               | (4)                                    | Attachment C.1 | Generic<br>Simultaneous<br>Test                               | None             |
| Demon: N/A<br>Detegory: Attachment A                                 | Chemical<br>Spray                 | N/A                | N/A                 | (4)                                    | N/A            | N/A                                                           | • None           |
| Service: Attachment A                                                | Radiation<br>(RAD)                | $3.1 \times 10^4$  | 6.9x10 <sup>7</sup> | . (4)                                  | Attachment C.1 | Generic<br>Sequential<br>Test                                 | None             |
| Location: 14                                                         | Aging                             | N/A                | <u>40 years</u>     | (2)                                    | Attachment C.2 | Generic Mat'l Test                                            | None             |
| Flood Level Elev: 552'<br>Above Flood Level: Yes ╳<br>No             | Submergence                       | N/A                | N/A                 | (4)                                    | N/A            | N/A                                                           | None             |
| Notes: (1) See Section 2<br>(2) See Section 4                        | .4 in 79-01B re<br>.1.2 in 79-01B | eport.<br>report.  |                     | ······································ |                | Prepared by: <u>R</u>                                         | 1. mills         |

(3) All notes and other information not on these sheets are on the attached appendix sheets.

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(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

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Attachment A

EEB 63-0042

Rev <u>O</u> .

System: 63 Unit: 3

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Component: Cable Mark: WDF

1/c, #14, CPJ

| <u>Plant I. D. No.</u> | Room | Function/Service  | Category | Operating Time |
|------------------------|------|-------------------|----------|----------------|
| 3PL5100 `              | 14 . | TNK Heater Supply | A        | 1 Year         |
| • :                    |      | •                 | •        | •              |

## EEB 63-0042

Rev O

## ATTACHMENT B Mark WDF

## Contract No.

67C7-91619 71C7-54180-1 72C7-75328-3 <u>Type</u> CPJ CPJ CPJ CPJ

## Manufacturer

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General Cable Corp Phelps Dodge Cable Wire. Rome



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Sheet No.: EEB- 63-0042

Revision: 0

#### ATTACHMENT C

- C.1 Wyle Laboratory Report No. 43854-3.
- C.2 NUREG-0588 Material List.
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Prepared by: R.L. Mills / DSH

Reviewed by: \_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)

Revisión O

Sheet No. EEB 63-0043

Facility: Browns Ferry Nuclear Plant . Unit: 3 Docket: 50-296

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Date 10-22-80 ENVIRONMENT DOCUMENTATION REF QUALIFICATION OUTSTANDING EQUIPMENT DESCRIPTION ITEMS METHOD Specifi-Oualifi-Specifi-Qualification cation cation cation Parameter System: 63 Operating Attachment A 1 year . Attachment C.3 Engineering None Plant ID No. Attachment A Time Analysis and (1)Test Cable WDG Component Generic 1/c, No. 2, CPJ Simultaneous Temperature 153 Manufacturer: Attachment B None Attachment C.1 Test 325 (4)(<sup>0</sup>F) Pressure Model Number: N/A (PSIA)15.0 (4) None N/A N/A N/A Function: Control/Power Generic Relative Simultaneous Humidity (%) Attachment C.1 Test (4) None 100 100 Req'd: N/A Accuracy: Demon: N/A Chemical Spray Category: Attachment A None N/A N/A (4) N/A N/A Service: Attachment A Generic Radiation Sequential Test  $3.1 \times 10^4$ 6.9x107 Attachment C.1 (RAD) (4) None Location: 14 (2) N/A 40 years Attachment C.2Generic Mat'l Test Aging None Flood Level Elev: 552' N/A N/A None Above Flood Level: Yes 🗙 Submergence N/A N/A (4) No

Notes: (1) See Section 2.4 in 79-01B report.

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: <u>R.1. Milla</u>

Reviewed by:

QA Acceptance

Attachment A

System: 63 Unit: 3

Component: Cable Mark: WDG · 1/c, #2, CPJ

| <u>Plant I. D. No.</u> | Room | Function/Service | Category | Operating Time |
|------------------------|------|------------------|----------|----------------|
| 3PL754                 | 14   | Pmp Supply       | A        | l Year         |
| 3PL769                 | 14   | Pmp Supply       | A        | l Year:        |

· EEB 63-0043

Rev

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|-----------------------------------------------|-------------------|------------------------------------|
|                                               | ATTACHHENT B      | .Rev                               |
|                                               | Mark WDG          | •                                  |
| <u>Contract No</u> .                          | Туре              | Manufacturer                       |
| 67C7-91619<br>71C7-54180-1                    | СРЈ<br>СРЈ        | General Cable Corp<br>Phelps Dodge |
| 86150 XFR Bellefonte                          | Срј               | Plastic Wire & Cable Corp          |
| 72C7-75328-3<br>78K5-824443-2<br>72C7-75533-1 | CPJ<br>PXJ<br>PXJ | Rome<br>GE<br>Essex                |

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Sheet No.: EEB- 63-0043

Revision: 0

#### ATTACHMENT C

- C.1 Wyle Laboratory Report No. 43854-3.
- C.2 NUREG-0588 Material List.
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Prepared by: R. L. Mills / 1074

Reviewed by: \_\_\_\_\_

QA Acceptance:

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| Facility: Brownś Feřry Nucle<br>Init: 3<br>Docket: 50-296            | ear Plant .                      | SYSTEM COMPO       | DNENT EVALUA       | TION WORK SH       | EET (Rev 2)                             | (3)<br>Sheet No. <u>FEB (</u><br>Revision <u>O</u><br>Date <u>10-2</u> | 53-0044<br>2-80                       |
|----------------------------------------------------------------------|----------------------------------|--------------------|--------------------|--------------------|-----------------------------------------|------------------------------------------------------------------------|---------------------------------------|
| FOULPMENT DESCRIPTION                                                |                                  | ENVIRONMENT        |                    | DOCUMENTATION REF  |                                         | METHOD                                                                 | UUISIANUIN<br>ITEMS                   |
|                                                                      | Parameter                        | Specifi-<br>cation | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                      |                                                                        | · · · · · · · · · · · · · · · · · · · |
| System: <sup>63</sup><br>Plant ID No. Attachment A                   | Operating<br>Time                | Attachment A       | 1 Year -           | (1)                | Attachment<br>C.4                       | Engineering<br>Analysis                                                | None<br>•                             |
| Component Cable WGB<br>2/c, No. 12, PNJ<br>Manufacturer:Attachment B | Temperature<br>( <sup>O</sup> F) | 199                | 153                | (4)                | Attachments<br>C.1 and C.2              | Attachment C.3                                                         | None                                  |
| Model Number: N/A                                                    | Pressure<br>(PSIA)               | 15.0               | N/A                | (4)                | N/A                                     | N/A                                                                    | None                                  |
| Function: Control/Power                                              | Relative<br>Humidity (%)         | 100                | `<br>`<br>100      | (4)                | IPCEA S-61-402<br>par 3.9, 3.7.3<br>6.7 | Standard<br>Material<br>Requirement                                    | None                                  |
| Accuracy: Req'd: N/A<br>Demon: N/A<br>Category: Attachment A         | Chemical<br>Spray                | N/A                | N/A                | (4)                | N/A                                     | N/A                                                                    | None                                  |
| Service: Attachment A                                                | Radiation<br>(RAD)               | $3.1 \times 10^4$  | 4x10 <sup>7</sup>  | (4)                | NUREG-0588<br>Materials<br>List         | Generic<br>Material<br>Test                                            | None                                  |
| Location: 12                                                         | Aging                            | N/A                | 20 years           | (2)                | Attachment C.2                          | Oper, Experience                                                       | None                                  |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X                   | Submergence                      | N/A                | N/A                | (4).               | N/A                                     | . N/A                                                                  | None                                  |

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sheets are on the attached appendix sheets.

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(4) See Section 3.0 and/or Appendix B in 79-01B report.

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Attachment A

EEB <u>63-0044</u>

Rev O

System: 63 Unit: 3

Component: Cable Mark: WGB 2/c, ∜12, PNJ

| <u>Plant I. D. No.</u> | Room | Function/Service | Category | <u>Operating Time</u> |
|------------------------|------|------------------|----------|-----------------------|
| 3PL790                 | 12   | Injection Flow   | A        | l Year                |
|                        |      |                  |          |                       |

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Rev O

## ATTACHUENT B

## Mark WGB

Contract No.

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## <u>Type</u>

## Manufacturer

Brand-Rez. 2.4 0+13+9151.0 7307-84528 Rome Cable PJJ Cyprus American Insulated Wire PJJ 75K7-86150-1 PJJ 75K5-86506-1 Rome PJJ 74C7-85069-1 Plastic Wire & Cable Corp General Cable Plastic Wire & Cable Corp Brand-Rex PIIJ 7007-54179-2 71X7-54761-1 72C7-54872 70C7-54179-1 ٩ PNJ PNJ PNJ



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| Sheet | No. | : <u>EE</u> | 3-6- | <u>3-004</u> # |
|-------|-----|-------------|------|----------------|
|-------|-----|-------------|------|----------------|

Revision: 0

#### ATTACHMENT C

C.] IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of  $121^{\circ}$  C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

- C.3 Temperature Qualification Method
  - C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

| C.4 | The post-HELB conditions are less than the normal cable rating and, |
|-----|---------------------------------------------------------------------|
|     | in our judgment, the cables could operate satisfactorily for a      |
|     | post-accident of a year.                                            |

| Prepared by:   |   |
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| Reviewed by:   |   |
| QA Acceptance: | [ |

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| Facility: Browns Ferry Nucl<br>Unit: 3<br>Docket: 50-296             | ear Plant                          | SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) |                    |                    | (3)<br>Sheet No. <u>EEB</u><br>Revision <u>0</u><br>Date <u>10-</u> | B 63-0045                           |              |
|----------------------------------------------------------------------|------------------------------------|------------------------------------------------|--------------------|--------------------|---------------------------------------------------------------------|-------------------------------------|--------------|
|                                                                      | ENVIRONMENT                        |                                                |                    | DOCUMENTATION REF  |                                                                     | QUALIFICATION                       | OUTSTANDING  |
| EQUIPMENT DESCRIPTION                                                | Parameter                          | Specifi-<br>cation                             | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                                                  |                                     |              |
| System: 63<br>Plant ID No. Attachment A                              | Operating<br>Time                  | Attachment A                                   | 1 Year .           | (1)                | Attachment<br>C.4                                                   | Engineering<br>Analysis             | None         |
| Component Cable WGB<br>2/c, No. 12, PNJ<br>Manufacturer:Attachment B | Temperature                        | 153                                            | 153                | (4)                | Attachments<br>C.1 and C.2                                          | Attachment C.3                      | None -       |
| Model Number: N/A                                                    | (F)<br>Pressure<br>(PSIA)          | 15.0                                           | N/A                | (4)                | N/A                                                                 | N/A                                 | None         |
| Function: Control/Power                                              | Relative<br>Humidity (%)           | 100                                            | 100                | (4)                | 1PCEA S-61-402<br>par 3.9, 3.7.3<br>6.7                             | Standard<br>Material<br>Requirement | None         |
| Category: Attachment A                                               | Chemical<br>Spray                  | N/A                                            | N/A                | (4)                | N/A                                                                 | N/A                                 | ' None       |
| Service: Attachment A                                                | Radiation<br>(RAD)                 | 3.1 × 10 <sup>4</sup>                          | 4x10 <sup>7</sup>  | . (4)              | NUREG-0588<br>Materials<br>List                                     | Generic<br>Material<br>Test         | None         |
| Location: 14                                                         | Aging                              | N/A                                            | 20 years           | (2)                | Attachment C.2                                                      | Oper. Experience                    | None         |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No             | Submergence                        | N/A                                            | N/A                | (4)                | N/A                                                                 | . N/A                               | None         |
| Notes: (1) See Section (2) See Section (4)                           | 2.4 in 79-018 r<br>4.1.2 in 79-018 | eport.<br>report.                              | •                  |                    | · · ·                                                               | Prepared by: Z<br>Reviewed by: A    | Hubgen 1/2/8 |

- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- See Section 3.0 and/or Appendix B in 79-01B report. (4)

QA Acceptance:

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Attachment A

System: 63 Unit: 3

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Component: Cable, 2/c, #12, PNJ Mark: WGB

EEB <u>63-0045</u> Rev O

Plant I. D. No. Function/Service Category Operating Time Room 3PL2175 3PL3182 14 Ă Trace Heater 1 Year 14 Heater × 3PL2187 3PL2194 14 Trace, Heater ļ. 14 Heater ٧



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1111 63-0045 Rev O

## ATTACHMENT B

## Mark WGB

Contract No.

## Type

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PJJ

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PNJ

PNJ

PhJ

PNJ

## Mani.facturer

 0:03-8410

 73C7-84528

 75K7-86150-1

 75K5-86506-1

 74C7-85069-1

 70C7-54179-2

 71X7-54761-1

 72C7-54872

 70C7-54179-1

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Brand-P&x Rome Cable Cyprus American Insulated Wire Rome Plastic Wire & Cable Corp General Cable Plastic Wire & Cable Corp Brand-Rex

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Sheet No.: <u>EEB-63-004</u>5

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous,  $95^{\circ}$  C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121° C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

- C.3 Temperature Qualification Method
  - C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by: \_\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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| Facility: Browns Ferry Nucl<br>Unit: 3<br>Docket: 50-296     | ear Plant                          | SYSTEM COMP                   | ONENT EVALUA<br>-   | TION WORK SH       | EET (Rev 2)                             | (3)<br>Sheet No. <u>EEB</u><br>Revision <u>O</u><br>Date <u>10-</u> 2 | <u>63-0046</u><br>22-80 · |
|--------------------------------------------------------------|------------------------------------|-------------------------------|---------------------|--------------------|-----------------------------------------|-----------------------------------------------------------------------|---------------------------|
|                                                              | ENVIRONMENT                        |                               |                     | DOCUMENTATION REF  |                                         | QUALIFICATION                                                         | OUTSTANDING               |
| EQUIPMENT DESCRIPTION                                        | Parameter                          | Specifi-<br>cation            | Qualifi-<br>cation  | Specifi-<br>cation | Qualifi-<br>cation                      |                                                                       |                           |
| System: <sup>63</sup><br>Plant ID No. Attachment A           | Operating<br>Time                  | Attachment A                  | 1 Year .            | .'<br>(1)          | Attachment<br>C.4                       | Engineering<br>Analysis                                               | None                      |
| Component Cable WGD<br>4/c, No. 12, PNJ                      |                                    |                               |                     | •                  | Attachmonte                             | ·                                                                     |                           |
| Manufacturer:Attachment B                                    | Temperature<br>(°F)                | 174                           | 153                 | (4)                | C.1 and C.2                             | Attachment C.3                                                        | None ·                    |
| Model Number: N/A                                            | Pressure<br>(PSIA)                 | 15.0                          | N/A                 | (4)                | N/A                                     | N/A                                                                   | None                      |
| Function: Control/Power                                      | Relative<br>Humidity (%)           | 100                           | 100                 | (4)                | IPCEA S-61-402<br>par 3.9, 3.7.3<br>6.7 | Standard<br>Material<br>Recuirement                                   | None                      |
| Accuracy: Req'd: N/A<br>Demon: N/A<br>Category: Attachment A | Chemical<br>Spray                  | N/A                           | N/A                 | (4)                | N/A                                     | N/A                                                                   | 'None                     |
| Service: Attachment A                                        | Radiation<br>(RAD)                 | $3.1 \times 10^4$             | 4x10 <sup>7</sup>   | (4)                | NUREG-0588<br>Materials<br>List         | Generic<br>Material<br>Test                                           | None                      |
| Location: 14                                                 | Aging                              | N/A                           | 20 years            | (2)                | Attachment C.2                          | Oper, Experience                                                      | None                      |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X           | Submergence                        | N/A                           | N/A                 | (4)                | N/A                                     | . N/A                                                                 | - None                    |
| Notes: (1) See Section :                                     | 2.4 in 79-01B r                    | eport.                        |                     | •                  |                                         | · Prepared by: <u>R</u>                                               | 1. mills                  |
| (2) See Section (<br>(3) All notes an                        | 1.1.2 in 79-01B<br>d other informa | report.<br>tion not on t      | :<br>these          | · · ·              | •                                       | Reviewed by:                                                          | Hughu 10/22/00            |
| <ul> <li>sheets are of</li> <li>(4) See Section 3</li> </ul> | n the attached<br>3.0 and/or Appe  | appendix she<br>ndix B in 79- | ets.<br>018 report. |                    |                                         | QA Acceptance:                                                        |                           |

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Attachment A

System: 63 Unit: <sup>3</sup>

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Component: Cable Mark: WGD

4/c, 112, PNJ

| <u>Plant I. D. No.</u> | Room | Function/Service     | Category | Operating Time |
|------------------------|------|----------------------|----------|----------------|
| 3PL758                 | 14 . | Stdby Liquid Control | ' -<br>A | 1 Year         |
| 3PL773                 | 14   | Stdby Liquid Control | A        | 1 Year         |
|                        |      | •                    |          | Α              |

EEB 63-0046

Rev <u>'O</u>

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## EEB 63-0046

Rev O

## ATTACHMENT B

Mark WGD

<u>Contract No</u>. 73C7-84528 67C3-91618 72C7-75228-1 72C7-54762-2 74C7-85069 70C7-54179-1

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Type PJJ PNJ PJJ PJJ PJJ PNJ PNJ

### Manufacturer

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Rome Cable Plastic Wire & Cable Corp Plastic Wire & Cable Corp Plastic Wire & Cabel Corp Rome Brand-Rex



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Sheet No.: \_\_\_\_\_\_\_ EEB- 63-0046

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

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This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_\_\_

Reviewed by:

QA Acceptance:\_\_\_\_\_

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See Section 2.4 in 79-018 report. Notes: (1)

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

**OA** Acceptance:

Reviewed by

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Attachment A

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| System: 63<br>Unit: 3          |           | · · · · · · · · · · · · · · · · · · ·                          | EEB <u>63-0047</u> |
|--------------------------------|-----------|----------------------------------------------------------------|--------------------|
| Component: Cable,<br>Nark: WGG | , 7/c, #1 | 2, PNJ                                                         |                    |
| <u>Plant I. D. No.</u>         | Room      | Function/Service Category                                      | Operating Time     |
| 3PL755<br>3PL770               | 14<br>14  | Standby Liquid Pump 2A Cont A<br>Standby Liquid Pump 2B Cont A | ] Year<br>] Year   |

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## EEB 63-0047

Rev \_O\_

## ATTACHMENT B

## Mark WGG

Contract No. 67C3-91618 71X7-54761-1 70C7-54179-1 72C7-75328-2 69C7-64923

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PNJ PNJ PNJ PNJ PNJ

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<u>Manufacturer</u> Plastic Wire & Cable Corp General Cable Brand-Rex Tamaqua Rockbestos

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| Sneet NO.: LEB- 63-009 | 47 | <i>'</i> +' | 004 | -0 | 3. | . L | EEB | : | No. | Sheet |
|------------------------|----|-------------|-----|----|----|-----|-----|---|-----|-------|
|------------------------|----|-------------|-----|----|----|-----|-----|---|-----|-------|

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

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This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous,  $95^{\circ}$  C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121° C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

- C.3 Temperature Qualification Method
  - C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_\_\_\_ Reviewed by:\_\_\_\_\_\_ QA Acceptance:\_\_\_\_\_

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Facility: Browns Ferry Nuclear Plant

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Unit: 3

Docket: 50-296



SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3) Sheet No. <u>EEB 63-0048</u> Revision O

Revision O Date 10-22-80 ť\*

| FOULDMENT DESCRIPTION                                                           | ENVIRONMENT              |                    |                    | DOCUMENTATION REF  |                                         | QUALIFICATION<br>METHOD             | OUTSTANDING |  |
|---------------------------------------------------------------------------------|--------------------------|--------------------|--------------------|--------------------|-----------------------------------------|-------------------------------------|-------------|--|
|                                                                                 | Parameter -              | Specifi-<br>cation | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                      | 121100                              | 11010       |  |
| System: 63<br>Plant ID No. Attachment A                                         | Operating<br>Time        | Attachment A       | l Year <u>.</u>    | (1)                | Attachment<br>C.4                       | Engineering<br>Analysis 1           | None        |  |
| Component Cable <sub>WHG</sub><br>5/c, No. 14, PNJ<br>Manufacturer:Attachment B | Temperature<br>(°F)      | 174                | 153                | (4)                | Attachments<br>C.1 and C.2              | Attachment C.3                      | None        |  |
| Model Number: N/A                                                               | Pressure<br>(PSIA)       | 15.0               | N/A                | (4)                | N/A                                     | N/A                                 | None        |  |
| Function: Control/Power                                                         | Relative<br>Humidity (%) | 100                | 100                | `(4)               | IPCEA S-61-402<br>par 3.9, 3.7.3<br>6.7 | Standard<br>Material<br>Requirement | None        |  |
| Category: Attachment A                                                          | Chemical<br>Spray        | N/A                | N/A                | (4)                | N/A                                     | ``N/A                               | None        |  |
| Service: Attachment A                                                           | Radiation<br>(RAD)       | $3.1 \times 10^4$  | 4x10 <sup>7</sup>  | . (4)              | NUREG-0588<br>Materials<br>List         | Generic<br>Material<br>Test         | None        |  |
| Location: 14                                                                    | Aging ·                  | N/A                | 20 years           | (2)                | Attachment C.2                          | Oper. Experience                    | None        |  |
| Flood Level Elev: 552'<br>Above Flood Level: Yes $\times$<br>No                 | Submergence              | N/A                | N/A                | (4)                | N/A                                     | . N/A                               | None        |  |

Notes: (1) See Section 2.4 in 79-018 report.

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

Reviewed by:

Prepared by: R.L. Miel

Attachment A

System: 63 Unit: 3

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Component: Cable Mark: WHG

5/c, #14, PNJ

| <u>Plant</u> | Ι. | D. | No. | Room |  |
|--------------|----|----|-----|------|--|
| 3PL51        | 01 |    |     | 14   |  |

| unc | tion/Se | ervice  |  |
|-----|---------|---------|--|
| Ink | Heater  | Control |  |
|     | •       | •       |  |

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Rev

**Operating** Time

1 Year

Category

A

## EEB \_63-0048

Rev \_\_\_\_\_

## ATTACHMENT B

Mark WHG

<u>Contract No</u>. 67C3-91618 72C7-75328-2 70C7-54179-1

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<u>Type</u> PNJ PNJ PNJ <u>Manufacturer</u> Plastic Wire & Cable Tamaqua Brand-Rex

Sheet No.: \_\_\_\_\_\_ EEB- 63-0048

Revision: <u>0</u>

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D '

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous,  $95^{\circ}$  C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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| acility: Browns Ferry Nucl<br>Init: 3<br>Docket: 50-296                | ear Plant                | SYSTEM COMP           | ONENT EVALUA       | TION WORK SH       | EET (Rev 2)           | (3)<br>Sheet No. <u>EEB 6</u><br>Revision <u>O</u><br>Date <u>10-2</u> | 2-80        |
|------------------------------------------------------------------------|--------------------------|-----------------------|--------------------|--------------------|-----------------------|------------------------------------------------------------------------|-------------|
| FOULDHENT DESCOLOTION                                                  |                          | ENVIRONMENT           | ·. ]               | DOCUMEN            | TATION REF            | QUALIFICATION                                                          | OUTSTANDING |
| EQUIPMENT DESCRIPTION ;                                                | Parameter                | Specifi-<br>cation    | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation -  | METROD                                                                 |             |
| System: 63<br>Plant ID No.Attachment A                                 | Operating<br>Time        | Attachment A          | 1 Year             | (1)                | . Attachment<br>. C.3 | Engineering<br>Analysis                                                | None<br>•   |
| Component Cable WVA<br>2/c, No. 16, CSPE<br>Manufacturer: Attachment B | Temperature<br>(°F)      | 174                   | -<br>250           | (4)                | Attachment C.         | Generic<br>Simultaneous<br>Test                                        | None ·      |
| odel Number: N/A                                                       | Pressure<br>(PSIA)       |                       | N/A                | (4)                | N/A                   | N/A                                                                    | None        |
| Function:<br>Signal/Instrumentation                                    | Relative<br>Humidity (%) | 100                   | 100 .              | (4)                | Attachment C.1        | Generic<br>Simultaneous<br>Test                                        | None        |
| Demon: N/A<br>Category: Attachment A                                   | Chemical<br>Spray        | N/A ·                 | N/A                | (4)                | N/A                   | N/A                                                                    | "None       |
| Service: Attachment A                                                  | Radiation<br>(RAD)       | 3.1 x 10 <sup>4</sup> | 5x10 <sup>7</sup>  | (4)                | Attachment C.1        | Generic<br>Sequential<br>Test                                          | None        |
| .ocation: 14                                                           | Aging                    | N/A                   | 40 years           | (2) ·              | Attachment C.2        | Generic Mat'l Test                                                     | None        |
| Flood Level Elev: 552<br>Above Flood Level: Yes X<br>No                | Submergence              | N/A                   | N/A                | (4) <sup>.</sup> . | N/A .                 | N/A                                                                    | None        |

Notes: (1) See Section 2.4 in 79-01B report.

(2) See Section 4.1.2 in 79-01B report.

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: R.L. Mills

Reviewed by:

QA Acceptance:



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Attachment A

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|                              |            |                                                |          | EEB <u>63-0049</u> |
|------------------------------|------------|------------------------------------------------|----------|--------------------|
| System: 63<br>Unit: 3        | •          |                                                |          | Rev O              |
| Component: Cabl<br>Mark: WVA | .e<br>,    | 2/c, .≇16<br>;                                 |          |                    |
| <u>Plant I. D. No.</u>       | Room       | Function/Service                               | Category | Operating Time     |
| 3R986<br>3R985               | 14 ·<br>14 | Stdby Lqid Tnk Level<br>Stdby Lqid Tnk Level . | A<br>A   | l Year '<br>l Year |

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## EEB 63-0049

Rev O

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#### ATTACHMENT B

Mark WVA

Contract No.

Type

FRXLPE/CSPE

FRXLPE/CSPE

PE/PVC'

XLPE/CSPE

FREP/CPE

FREP/CPE

FREP/CPE

77K5-823265 72C7-83944 69C3-64863-1 : 72C7-74910-1

- TR 822676 from SQN 76K5-87232
- TR 827773 from BLN 78K5-824447
- TR 826953 from BLN 78K5-824447

77K5-820991 73C7-84211

Manufacturer

Rockbestos Continental Wire & Cable Rockbestos Continental Wire & Cable

Continental Wire & Cable

Anaconda

Anaconda

Boston Ins. Wire

Sheet No.: EEB-63-0049

Revision:

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Prepared by:   |
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| Reviewed by:   |
| QA Acceptance: |

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Facility: Browns Ferry Nuclear Plant Jnit: 3 Jocket: 50-296

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SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3) Sheet No. <u>EEB 63-0050</u> Revision <u>O</u> Date <u>10-22-80</u>

| FOUTOMENT DESCOTOTION                                                 | ENVIRONMENT              |                    |                     | DOCUMEN            | TATION REF         | QUALIFICATION<br>METHOD             | OUTSTANDING                           |
|-----------------------------------------------------------------------|--------------------------|--------------------|---------------------|--------------------|--------------------|-------------------------------------|---------------------------------------|
|                                                                       | Parameter                | Specifi-<br>cation | Qualifi-<br>cation  | Specifi-<br>cation | Qualifi-<br>cation |                                     | · · · · · · · · · · · · · · · · · · · |
| System: 63<br>Plant ID No. Attachment A                               | Operating<br>Time        | Attachment A       | l year <sub>.</sub> | (1)                | Attachment C.3     | Engineering<br>Analysis and<br>Test | None                                  |
| Component Cable WVA<br>2/c, No. 16, XLPE<br>fanufacturer:Attachment B | Temperature<br>(°F)      | 174                | 385                 | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test     | None .                                |
| fodel Number: N/A                                                     | Pressure<br>(PSIA)       | 15.0               | N/A                 | (4)                | N/A                | N/A                                 | None                                  |
| Function:<br>Signal/Instrumentation                                   | Rélative<br>Humidity (%) | 100                | 100                 | . (4)              | Attachment C.1     | Generic<br>Simultaneous<br>Test     | None                                  |
| Demon: N/A<br>Detegory:Attachment A                                   | Chemical<br>Spray        | N/A                | N/A                 | (4)                | N/A                | N/A                                 | None                                  |
| Service: Attachment A                                                 | Radiation<br>(RAD)       | $3.1 \times 10^4$  | 2x10 <sup>8</sup>   | . (4)              | Attachment C.1     | Generic<br>Sequential<br>Test       | None                                  |
| _ocation: 14                                                          | Aging                    | N/A                | 40 years            | (2)                | Attachment C.2     | Generic Mat'l Test                  | None                                  |
| Flood Level Elev: 552'<br>Above Flood Level: Yes ×<br>No              | Submergence              | N/A                | N/A                 | (4)                | N/A                | N/A                                 | None                                  |
| Notes: (1) See Section 2                                              | 2.4 in 79-018 r          | eport.             |                     | •                  |                    | Prepared by: 🔀                      | L. Mills                              |

(2) See Section 4.1.2 in 79-01B report.

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Reviewed by:

QA Acceptance:

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Attachment A

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| •                       |                |                                              | EEB <u>63-0050</u> |                       |          |
|-------------------------|----------------|----------------------------------------------|--------------------|-----------------------|----------|
| System: 63<br>Unit: 3   |                |                                              |                    | Rev <u>o</u>          | •        |
| Component: C<br>Nark: W | able<br>VA     | 2/c, <b>\$</b> 16                            |                    |                       | . ``     |
| <u>Plant I. D. N</u>    | o. <u>Room</u> | Function/Service                             | Category           | <u>Operating Time</u> | ,<br>_ • |
| 3R986<br>3R985          | 14 .<br>14     | Stdby Lqid Tnk Level<br>Stdby Lqid Tnk Level | A<br>A             | l Year •<br>l Year    |          |

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### \* EEB <u>63-0050</u>

Rev O

#### ATTACHMENT B

#### Mark WVA

Manufacturer Contract No. Туре Rockbestos FRXLPE/CSPE 77K5-823265 Continental Wire & Cable 72C7-83944 FRXLPE/CSPE Rockbestos PE/PVC 69C3-64863-1 Continental Wire & Cable 72C7-74910-1 XLPE/CSPE Continental Wire & Cable TR 822676 from SQN FREP/CPE 76K5-87232 Anaconda FREP/CPE TR 827773 from BLN 78K5-824447 1 •Anaconda FREP/CPE TR 826953 from BLN 78K5-824447 Boston Ins. Wire 77K5-820991 . ITT 7307-84211

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Sheet No: EEB-63-0050

Revision: 0

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Reviewed by:   |  |
|----------------|--|
| Prepared by:   |  |
| QA Acceptance: |  |

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| Facility: Browns Ferry Nuc <sup>®</sup><br>Unit: 3<br>Docket: 50-296   | SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) |                       |                    |                    | (3)<br>Sheet No. <u>EEB 63-0051</u><br>Revision <u>O</u><br>Date <u>10-22-80</u> |                                     |             |
|------------------------------------------------------------------------|------------------------------------------------|-----------------------|--------------------|--------------------|----------------------------------------------------------------------------------|-------------------------------------|-------------|
| FOULPMENT DESCRIPTION                                                  | •                                              | ENVIRONMENT           | 4                  | DOCUMEN            | TATION REF -                                                                     | QUALIFICATION<br>METHOD             | OUTSTANDING |
|                                                                        | Parameter                                      | Specifi-<br>cation    | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                                                               |                                     |             |
| System: <sub>63</sub><br>Plant ID No. Attachment A                     | Operating<br>Time                              | Attachment.A          | l Year             | (1)                | Attachment<br>C.3                                                                | Engineering<br>Analysis             | None        |
| Component Cable / WVA<br>2/c, No. 16, PE<br>Manufacturer: Attachment B | Temperature                                    | 174                   | 203                | (4)                | IPCEA S-61-402<br>par 3.9 and<br>Appendix D                                      | Attachment C.2                      | None        |
| Model Number: N/A                                                      | Pressure<br>(PSIA).                            | 15.0                  | N/A                | (4)                | N/A                                                                              | ·<br>N/A                            | None        |
| Function:<br>Signal/Instrumentation                                    | Relative ·<br>Humidity (%)                     | 100                   | 100                | (4)                | IPCEA S-61-402<br>par 3.9,<br>3.7.3, 6.7                                         | Standard<br>Material<br>Requirement | None        |
| Accuracy: Req'd: N/A<br>Demon: N/A<br>Category: Attachment A           | Chemical<br>Spray                              | N/A                   | N/A                | (4)                | N/A                                                                              | N/A                                 | ·None       |
| Service: Attachment A                                                  | Radiation<br>(RAD)                             | 3.1 x 10 <sup>4</sup> | 4x107              | . (4)              | NUREG-0588<br>Haterial<br>List                                                   | Generic<br>Material<br>Tests        | None        |
| Location: 14                                                           | Aging                                          | N/A                   | 20 years           | (2)                | Attachment C.1                                                                   | Oper. Experience                    | None        |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No               | Submergence                                    | N/A.                  | N/A                | (4)                | N/A                                                                              | . N/A                               | None        |
| Notes: (1) See Section 2                                               | 2.4 in 79-018 re                               | eport.                |                    | •                  | • •                                                                              | Prepared by: 7                      | 2. L. mille |

See Section 2.4 in 79-01B report. votes: (1)

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- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance;

Reviewed by:

#### Attachment A

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 System: 63
 EEB <u>63-0051</u>

 Unit: 3
 Rev <u>0</u>

 Component: Cable
 2/c, #16

 Mark:
 WVA

| Plant I. D. No. | Room | Function/Service        | Category | Operating Time |
|-----------------|------|-------------------------|----------|----------------|
| 3R986           | 14   | Stdby Lqid Tnk Level    | A        | l Year •       |
| 3R985           | 14   | Stdby Lqid Tnk. Level . | Α,       | l Year         |

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## EEB <u>63-0051</u>

Rev \_O\_\_\_\_

## ATTACHMENT B

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## Mark WVA

|                                                           | <u>Contract No.</u>            | Туре                                              | Manufacturer                                                                     |
|-----------------------------------------------------------|--------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------|
| 77K5-823265<br>72C7-83944<br>69C3-64863-1<br>72C7-74910-1 |                                | FRXLPE/CSPE<br>FRXLPE/CSPE<br>PE/PVC<br>XLPE/CSPE | Rockbestos<br>Continental Wire & Cable<br>Rockbestos<br>Continental Wire &.Cable |
| FR                                                        | 822676 from SQN<br>76K5-87232  | FREP/CPE                                          | Continental Wire & Cable                                                         |
| FR                                                        | 827773 from BLN<br>78K5-824447 | FREP/CPE                                          | Anaconda                                                                         |
| ĨR                                                        | 826953 from BLN<br>78K5-824447 | FREP/CPE                                          | Anaconda                                                                         |
|                                                           | 77K5-820991<br>73C7-84211      | •                                                 | Boston Ins. Wire<br>ITT                                                          |

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Sheet No: EEB-63-0051

Revision: 0

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1942

110

#### Coax, Triax, and Signal Cable

Coaxial and Triaxial cable installed at Browns Ferry were purchased in accordance with General Electric Company Specification 22A1181, and the appropriate MIL-C-17 specification. Signal cables, both twisted pair and multiconductor, were purchased in accordance with TVA specifications. Some cable were of cross-linked polyethylene and chloronated polyethylene construction while the same kind of cable furnished under other contracts were of high molecular weight, high density polyethylene/polyvinyl chloride construction and some even polyethylene/polyvinyl chloride construction. It is not possible to make a complete identification by contract as to which circuit and function they serve. Recent reclassification of some functions to 1E status has made it almost a certainty that some cables now in a safety category are of polyethylene/polyvinyl construction.

Accordingly, we have examined the 20 HELB temperature profiles and find that only compartments 1, 3, 6, and 9 show profiles which more than briefly surpass the softening temperature of the linear polyethylene. However, owing to the thermal time lag in the cable material and the cable installation including the heat sink of conduit, tray, and shield material, the insulation will not experience the HELB temperature profile until some time has elapsed and the temperature is lower. Further, no load heat rise need be taken into account for these signal cables.

TVA has conducted tests (Chattanooga Central Laboratories Report No. L81-81-6821 dated October 1980, of PE, PVC cables under a temperature profile which envelops all the HELB profiles. Following this exposure, these cables sustained a dielectric test while immersed in water of 660 volts for 5 minutes, 960 volts for 5 minutes, and 220 volts ac for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April, or replaced at the next refueling outage.

For those cables located in compartment 0 (the containment), the service which these cables have seen thus far has exposed them to a gamma radiation dose of  $6.25 \times 10^{\circ}$  rads or more. This is sufficient to have cross-linked the polyethylene and PVC as well. Consequently, the insulation is now in fact a thermoset material and is capable of the same temperature that TVA's cross-linked polyethylene cable has demonstrated and is capable of withstanding the LOCA/SLB and the post-LOCA environment for a year.

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Sheet No: EEB- 63-0051

Revision: 0

## ATTACHMENT C (Continued)

# C.1 (Continued)

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Continued operation is justified, and TVA has prepared a LOCA/SLB, thermal aging, and radiation test procedure to be performed by Wyle Laboratories on samples of this cable to demonstrate the validity of this conclusion. Results of this testing program are expected to be available in April 1981.

One cable RG-114A/U has the possibility of being sensitive to pressure changes owing to its partial air dielectric; however, an analysis of this effect has indicated that the change in dielectric constant can be tolerated. Consequently for this cable too, there is justification for continued operation. The compression effect on the dielectric will be likewise tested at Wyle Laboratories along with the other cable tests and results are expected to be available by April 1981.

- C.2 Standard Material Long-Term Overload Temperature Rating
- C.3 The post-HELB conditions are less than the normal cable rating and, . in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by: Reviewed by:\_\_\_\_\_

QA Acceptance:



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|--------------------------------------------------------------------------|------------------------------------|--------------------------------|--------------------|--------------------|--------------------|------------------------------------------------------------------------|-----------------------|
|                                                                          |                                    | s                              |                    |                    |                    | _ <b>*</b>                                                             |                       |
| 14                                                                       | -                                  |                                | ب<br>در<br>۲       | •                  |                    |                                                                        | •)                    |
| Facility: Browns Ferry Nucl<br>Unit: 3<br>Docket: 50-296                 | ear Plant                          | SYSTEM COMP                    | ONENT EVALUA       | TION WORK SH       | EET (Rev 2)        | (3)<br>Sheet No. <u>EEB 6</u><br>Revision <u>O</u><br>Date <u>10-2</u> | <u>3-0052</u><br>Z-80 |
|                                                                          |                                    | ENVIRONMENT                    |                    | DOCUMEN            | TATION REF         | QUALIFICATION                                                          | OUTSTANDING           |
| EQUIPMENT DESCRIPTION                                                    | Parameter                          | Specifi-<br>cation             | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation | METROD , .                                                             |                       |
| System: <sup>63</sup><br>Plant ID No. Attachment A                       | Operating<br>Time                  | Attachment A                   | l Year.            | (1)                | Attachment<br>C.3  | Engineering<br>Analysis                                                | None                  |
| Component Cable WVA-1<br>2/c, No. 18, CSPE<br>Manufacturer: Attachment B | Temperature<br>(°F)                | 199                            | 250                | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test                                        | None                  |
| Nodel Number: N/A                                                        | Pressure<br>(PSIA)                 | 15.0                           | N/A                | (4)                | N/A                | N/A                                                                    | None                  |
| Function:<br>Signal/Instrumentation                                      | Relative<br>Humidity (%)           | 100                            | 100                | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test                                        | None                  |
| Accuracy: Req'd: N/A<br>. Demon: N/A<br>Category: Attachment A           | Chemical<br>Spray                  | N/A                            | N/A                | (4)                | · .<br>N/A         | N/A                                                                    | None                  |
| Service: Attachment A                                                    | Radiation<br>(RAD)                 | $3.1 \times 10^4$              | 5x10 <sup>7</sup>  | . (4)              | Attachment C.1     | Generic<br>Sequential<br>Test                                          | None                  |
| ocation: 12                                                              | Aging                              | N/A                            | 40 years           | (2)                | Attachment C.2     | Generic Mat'l Test                                                     | * None                |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No                 | Submergence                        | N/A                            | N/A                | (4)                | N/A <sup>°</sup>   | . N/A                                                                  | None                  |
| Notes: (1) See Section 2                                                 | .4 in 79-01B re                    | eport.                         |                    | •                  | ••                 | · Prepared by: <u>R</u>                                                | 1. mill               |
| (2) See Section 4<br>(3) All notes and                                   | .1.2 in 79-01B<br>I other informat | report.<br>tion not on t       | :hese              | · • •              |                    | Reviewed by: &                                                         | Fulagner              |
| sheets are or<br>(4) See Section 3                                       | the attached a<br>.0 and/or Apper  | appendix shee<br>ndix B in 79- | olb report.        | :                  | •                  | QA Acceptance: _                                                       | · · · ·               |
| sheets are or<br>(4) See Section 3                                       | the attached a to and/or Apper     | appendix shee<br>ndix B in 79- | ts.<br>OlB report. | : ´ ` ``<br>·. ``  | •                  | QA Acceptance: _                                                       | ·····                 |

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Attachment A

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| •                               | t                | =               | EEB <u>63-0052</u> |
|---------------------------------|------------------|-----------------|--------------------|
| System: 63<br>Unit: · 3         |                  | •               | Rev                |
| Component: Cable<br>Mark: WVA-1 | 2/c, ₿18         |                 |                    |
| <u>Plant I. D. No.</u> Room     | Function/Service | <u>Category</u> | Operating Time     |
| 3A1479 12                       | Injection Flow   | A               | l Year             |

# EEB 63-0052

Rev O

# ATTACHMENT B

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Mark WVA-1

|      | Contract No.                                            |   | Туре                                          |   | <u>Manufacturer</u>                                                                            |
|------|---------------------------------------------------------|---|-----------------------------------------------|---|------------------------------------------------------------------------------------------------|
|      | 68C7-61986<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 |   | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE |   | Continental Wire & Cable<br>Rockbestos<br>Continental Wire & Cable<br>Continental Wire & Cable |
| TR   | From SQN /<br>73C7-84211                                |   | XLPE/CSPE                                     |   | ITT                                                                                            |
| TR   | 85255 from<br>SQN 72C7-83944                            | ł | XLPE/CSPE                                     | ` | Continental Wire & Cable                                                                       |
| TR   | 87049 from<br>SQN 73C7-84211                            |   | XLPE/CSPE                                     |   | ITT .                                                                                          |
| TR - | 86757 from<br>SQN 73C7-84211                            |   | XLP0/CSPE                                     |   | ITT                                                                                            |
| TR   | 823079 f <u>rom</u><br>WBN 74C7-85259                   |   | XLPE/CSPE                                     |   | Belden '                                                                                       |

Sheet No.: EEB-63-00.5.2

Revision:

### ATTACHMENT C

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Prepared by:   |
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| Reviewed by:   |
| QA Acceptance: |

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Attachment A

EEB 63-0053

Rev O

System: 63 Unit: 3

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Component: Cable Mark: WVA-1

2/c, 18

| <u>Plant I. D. No.</u> | Room . | Function/Service | <u>Category</u> | Operating Time |
|------------------------|--------|------------------|-----------------|----------------|
| 3A1479                 | 12     | Injection Flow   | A .             | 1 Year         |

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# EEB <u>63-005</u>

Rev O

# ATTACHMENT B

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Mark WVA-1

|    | <u>Contract No</u> .                                    |   | Туре                                          |   | Manufacturer                                                                                   |
|----|---------------------------------------------------------|---|-----------------------------------------------|---|------------------------------------------------------------------------------------------------|
|    | 68C7-61986<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 |   | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE |   | Continental Wire & Cable<br>Rockbestos<br>Continental Wire & Cable<br>Continental Wire & Cable |
| TR | From SQN<br>73C7-84211                                  |   | XLPE/CSPE                                     |   | ITT                                                                                            |
| TR | 85255 from<br>SQN_72C7-83944                            | ¢ | XLPE/CSPE                                     |   | Continental Wire & Cable                                                                       |
| TR | 87049 from<br>SQN 73C7-84211                            |   | XLPE/CSPE                                     | - | <br>Itt                                                                                        |
| TR | 86757 from<br>SQN 73C7-84211                            | • | XLPO/CSPE                                     |   | ТТТ                                                                                            |
| TR | 823079 fr <u>o</u> m<br>WBN 74C7-85259                  | • | XLPE/CSPE                                     |   | Belden                                                                                         |

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Sheet No: EEB-63-000 53

Revision: 0

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

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|----------------|--------------|---|---|
| Reviewed by:   | <br><u> </u> |   |   |
| Prepared by:   | <br>         |   | • |
| OA Acceptance: |              | 1 | * |
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(3) Sheet No. \_\_\_\_EEB\_63-0054 Revision 0

| locket: 50-296                                                         | · · ·                    | 1                  |                    |                    |                                             | Date <u>10-</u>                     | 22-80       |
|------------------------------------------------------------------------|--------------------------|--------------------|--------------------|--------------------|---------------------------------------------|-------------------------------------|-------------|
| FOULDMENT DESCRIPTION                                                  |                          | ENVIRONMENT        |                    | DOCUMEN            | TATION REF                                  | QUALIFICATION<br>METHOD             | OUTSTANDING |
|                                                                        | Parameter                | Specifi=<br>cation | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                          | • ,                                 |             |
| System: 63<br>Plant ID No. Attachment A                                | Operating<br>Time        | Attachment A       | .1 Year            | (1)                | Attachment<br>C.3                           | Engineering<br>Analysis             | None        |
| Component Cable WVA-1<br>2/c, No. 18, PE<br>Manufacturer: Attachment B | Temperature<br>(°F)      | 199                | 203                | (4)                | IPCEA S-61-402<br>par 3.9 and<br>Appendix D | Attachment C.2                      | None .      |
| iodel Number: N/A                                                      | Pressure<br>(PSIA)       | 15.0               | N/A                | (4)                | N/A                                         | N/Ą                                 | None        |
| Function:<br>Signal/Instrumentation                                    | Relative<br>Humidity (%) | 100                | 100 .              | (4)                | IPCEA S-61-402<br>par 3.9,<br>3.7.3, 6.7    | Standard<br>Material<br>Requirement | None        |
| Accuracy: Req'd: N/A<br>Demon: N/A<br>Category: Attachment A           | Chemical<br>Spray .      | N/A -              | N/A                | (4)                | N/A                                         | :<br>N/A                            | None        |
| Service: Attachment A                                                  | Radiation<br>(RAD)       | $3.1 \times 10^4$  | 4x10 <sup>7</sup>  | . (4)              | NUREG-0588<br>Naterial<br>List              | Generic<br>Material<br>Tests        | None        |
| Location: 12                                                           | Aging                    | N/A                | 20 years           | (2)                | Attachment C.1                              | Oper. Experience                    | None        |
| Flood Level Elev: 552'<br>Above Flood Level: Yes ×<br>No               | Submergence              | N/A                | N/A                | (4)                | N/A                                         | . N/A                               | None        |
| Notes: (1) See Section 2                                               | 4 in 79-018 re           | port.              |                    | •                  | •                                           | Prepared by: 🗶                      | .1. mills   |

Votes: See Section 2.4 in 79-018 report. (1)

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- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.

See Section 3.0 and/or Appendix B in 79-01B report. (4)

QA Acceptance:

Reviewed by:

10/22/8



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Attachment A

EEB <u>63-0054</u>

Rev O

Component: Cable Mark: WVA-1

System: 63 Unit: 3

. 2/c, Ø18

| Plant I. D. No. | Room | Function/Service | Category | Operating Time |
|-----------------|------|------------------|----------|----------------|
| 3A1479          | 12   | Injection Flow   | A.,      | l Year         |











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# EEB <u>63-0054</u>

Rev \_\_\_\_\_\_

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# ATTACHMENT B

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Mark WVA-1

|    | <u>Contract No</u> .                                                 |   | Туре                                          |   | Manufacturer                                                                                   |
|----|----------------------------------------------------------------------|---|-----------------------------------------------|---|------------------------------------------------------------------------------------------------|
|    | 68C7-61986 <sup>°</sup><br>78K5-824171<br>72C7-83944<br>72C7-74910-1 | • | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE |   | Continental Wire & Cable<br>Rockbestos<br>Continental Wire & Cable<br>Continental Wire & Cable |
| TR | From SQN<br>73C7-84211                                               | • | XLPE/CSPE                                     | * | ITT . ,                                                                                        |
| TR | 85255 from<br>SQN 72C7-83944                                         | J | XLPE/CSPE                                     | • | Continental Wire & Cable                                                                       |
| TR | 87049 from<br>SQN 73C7-84211                                         |   | XLPE/CSPE                                     | • | ITT                                                                                            |
| TR | 86757 from<br>SQN 73C7-84211                                         |   | XLPO/CSPE                                     |   | ITT                                                                                            |
| TR | 823079 from<br>WBN 74C7-85259                                        |   | XLPE/CSPE                                     |   | Belden .                                                                                       |

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Sheet No: EEB-63-0054

Revision: O

### ATTACHMENT C

#### C.1 TVA Engineering Report No. 1942

#### Coax, Triax, and Signal Cable

Coaxial and Triaxial cable installed at Browns Ferry were purchased in accordance with General Electric Company Specification 22A1181, and the appropriate MIL-C-17 specification. Signal cables, both twisted pair and multiconductor, were purchased in accordance with TVA specifications. Some cable were of cross-linked polyethylene and chloronated polyethylene construction while the same kind of cable furnished under other contracts were of high molecular weight, high density polyethylene/polyvinyl chloride construction and some even polyethylene/polyvinyl chloride construction. It is not possible to make a complete identification by contract as to which circuit and function they serve. Recent reclassification of some functions to 1E status has made it almost a certainty that some cables now in a safety category are of polyethylene/polyvinyl construction.

Accordingly, we have examined the 20 HELB temperature profiles and find that only compartments 1, 3, 6, and 9 show profiles which more than briefly surpass the softening temperature of the linear polyethylene. However, owing to the thermal time lag in the cable material and the cable installation including the heat sink of conduit, tray, and shield material, the insulation will not experience the HELB temperature profile until some time has elapsed and the temperature is lower. Further, no load heat rise need be taken into account for these signal cables.

TVA has conducted tests (Chattanooga Central Laboratories Report No. L81-81-6821 dated October 1980, of PE, PVC cables under a temperature profile which envelops all the HELB profiles. Following this exposure, these cables sustained a dielectric test while immersed in water of 660 volts for 5 minutes, 960 volts for 5 minutes, and 220 volts ac for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April, or replaced at the next refueling outage.

For those cables located in compartment 0 (the containment), the service which these cables have seen thus far has exposed them to a gamma radiation dose of  $6.25 \times 10^{\circ}$  rads or more. This is sufficient to have cross-linked the polyethylene and PVC as well. Consequently, the insulation is now in fact a thermoset material and is capable of the same temperature that TVA's cross-linked polyethylene cable has demonstrated and is capable of withstanding the LOCA/SLB and the post-LOCA environment for a year.



Sheet No: EEB-63-0054

Revision: 0

### ATTACHMENT C (Continued)

### C.1 (Continued)

Continued operation is justified, and TVA has prepared a LOCA/SLB, thermal aging, and radiation test procedure to be performed by Wyle Laboratories on samples of this cable to demonstrate the validity of this conclusion. Results of this testing program are expected to be available in April 1981.

One cable RG-114A/U has the possibility of being sensitive to pressure changes owing to its partial air dielectric; however, an analysis of this effect has indicated that the change in dielectric constant can be tolerated. Consequently for this cable too, there is justification for continued operation. The compression effect on the dielectric will be likewise tested at Wyle Laboratories along with the other cable tests and results are expected to be available by April 1981.

C.2 Standard Material Long-Term Overload Temperature Rating

C.3 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by: Reviewed by: QA Acceptance:\_\_

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| Facility: Browns Ferry Nucl<br>Unit: 3<br>Docket: 50-296                 | ear Plant .              | SYSTEM COMP        | ONENT EVALUA       | TION WORK SH       | EET (Rev 2)             | (3)<br>Sheet No. <u>EEB 6</u><br>Revision <u>0</u><br>Date <u>10-2</u> | 3-0055            |
|--------------------------------------------------------------------------|--------------------------|--------------------|--------------------|--------------------|-------------------------|------------------------------------------------------------------------|-------------------|
|                                                                          |                          | ENVIRONMENT        |                    | DOCUMEN            | TATION REF              | QUALIFICATION                                                          | OUTSTANDING       |
| EQUIPMENT DESCRIPTION                                                    | Parameter                | Specifi-<br>cation | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation -    | HEINOD .                                                               | ····              |
| System: 63<br>Plant ID No. Attachment A                                  | Operating<br>Time .      | Attachment A       | 1 Year             | (1)                | Attachment En<br>C.3 An | gineering<br>alysis                                                    | None<br>•         |
| Component Cable WVA-1<br>2/c, No. 18, CSPE<br>Manufacturer: Attachment B | Temperature              | 174                | 250                | (4)                | Attachment C.1          | Generic<br>Simultaneous<br>Test                                        | None              |
| odel Number: N/A                                                         | Pressure<br>(PSIA)       | . 15.0             | N/A                | (4)                | · N/A                   | N/A                                                                    | None              |
| Function:<br>Signal/Instrumentation                                      | Relative<br>Humidity (%) | 100                | 100                | (4)                | Attachment C.1          | Generic<br>Simultaneous<br>Test                                        | .`<br>None        |
| Accuracy: Req'd: N/A<br>Demon: N/A<br>Category: Attachment A             | Chemical<br>Spray        | N/A                | N/A                | (4)                | N/A                     | N/A ·                                                                  | " None            |
| Service: Attachment A                                                    | Radiation<br>(RAD)       | $3.1 \times 10^4$  | 5x10 <sup>7</sup>  | . (4)              | Attachment C.1          | Generic<br>Sequential<br>Test                                          | None              |
| _ocation: 14                                                             | Aging ·                  | N/A                | 40 years           | (2)                | Attachment C.2          | Generic Mat'l Test                                                     | * None            |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X                       | Submergence              | N/A .              | N/A                | (4)                | N/A                     | N/A                                                                    | None <sup>•</sup> |
| votes: (1) See Section 2                                                 | 2.4 in 79-018 r          | eport.             |                    | •                  | •                       | Prepared by: $\underline{\mathcal{R}}$ .                               | 1. mills          |

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

Reviewed by: ¿

QA Acceptance:

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# Attachment A

EEB 63-0055

System: 63 Unit: 3 Rev O 2/c, **Ø**18 Component: Cable Mark: WVA-1 .

| <u>Plant I. D. No.</u> | Room | Function/Service  | <u>Category</u> | <u>Operating Time</u> |
|------------------------|------|-------------------|-----------------|-----------------------|
| 3A1470                 | 14.  | Stdby Liquid Temp | A               | l Year                |



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# EEB 63-0055

Rev O

# ATTACHMENT B

# Mark WVA-1

| •  | <u>Contract No</u> .                                    |   | Туре                                          | _ | <u>Manufacturer</u>                                                                            |  |  |  |
|----|---------------------------------------------------------|---|-----------------------------------------------|---|------------------------------------------------------------------------------------------------|--|--|--|
|    | 68C7-61986<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 |   | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE | • | Continental Wire & Cable<br>Rockbestos<br>Continental Wire & Cable<br>Continental Wire & Cable |  |  |  |
| TR | From SQN<br>73C7-84211                                  |   | XLPE/CSPE                                     |   | TTT                                                                                            |  |  |  |
| TR | 85255 from<br>SQN 72C7-83944                            | ı | XLPE/CSPE                                     |   | Continental Wire & Cable                                                                       |  |  |  |
| TR | 87049 from<br>SQN 73C7-84211                            |   | XLPE/CSPE                                     | - | ITT ·                                                                                          |  |  |  |
| TR | 86757 from<br>SQN 73C7-84211                            |   | XLPO/CSPE                                     |   | ITT .                                                                                          |  |  |  |
| TR | 823079 from<br>WBN 74C7-85259                           |   | XLPE/CSPE                                     |   | Belden                                                                                         |  |  |  |

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Sheet No.: EEB-63-0055

Revision:

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Prepared | by: | * |  |  |  |  |
|----------|-----|---|--|--|--|--|
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Reviewed by:

QA Acceptance:\_\_\_\_

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Facility: Browns Ferry Nuclear Plant . . Unit: 3 Docket: 50-296

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SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Sho

(3)Sheet No. <u>EEB 63-0056</u>
Revision <u>O</u>
Date <u>10-22-80</u>
QUALIFICATION 1 OUTCOME

| FOULPMENT DESCRIPTION                                                       | ENVIRONMENT                                      |                          |                    | DOCUMENTATION REF  |                    | QUALIFICATION                       | OUTSTANDING   |
|-----------------------------------------------------------------------------|--------------------------------------------------|--------------------------|--------------------|--------------------|--------------------|-------------------------------------|---------------|
|                                                                             | Parameter                                        | Specifi-<br>cation       | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation | ,<br>,                              | . I LING .    |
| System: 63<br>Plant ID No. Attachment A                                     | Operating Time                                   | Attachment A             | l year             | (1)                | Attachment C.3     | Engineering<br>Analysis and<br>Test | None          |
| Component Cable WVA-1<br>2/c, No. 18, XLPE<br>Manufacturer: Attachment B    | Temperature<br>(°F)                              | 174                      | 385 -              | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test     | None          |
| Yodel Number: N/A                                                           | Pressure<br>(PSIA)                               | 15.0                     | N/A                | (4)                | N/A                | N/A-                                | • .<br>None - |
| Function:<br>Signal/Instrumentation                                         | Relative<br>Humidity (%)                         | 100                      | 100                | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test     | None          |
| Demon: N/A<br>Detegory:Attachment A                                         | Chemical<br>Spray                                | N/A                      | N/A                | (4)                | N/A                | N/A                                 | None          |
| Service: Attachment A                                                       | Radiation<br>(RAD)                               | $3.1 \times 10^4$        | 2x10 <sup>8</sup>  | . (4)              | Attachment C.1     | Generic<br>Sequential .<br>Test     | None          |
| _ocation: 14                                                                | Aging -                                          | N/A                      | 40 years           | (2)                | Attachment C.2     | Generic Mat'l Test                  | None          |
| Flood Level Elev: 552'<br>Sove Flood Level: Yes X Submergence               |                                                  | N/A                      | N/A                | (4)                | N/A                | N/A                                 | None          |
| Notes: (1) See Section 2                                                    | .4 in 79-018 re                                  | eport.                   | •                  | ÷                  | * Prepared by: K   | I. mill                             |               |
| <ul><li>(2) See Section 4</li><li>(3) All notes and sheets are on</li></ul> | .1.2 in 79-01B<br>other information the attached | report.<br>tion not on t | these              | •                  |                    | Reviewed by: <u>A</u>               | Hulagner St   |

(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:
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Attachment A

EEB 63-0056

Rev O

System: 63 Unit: 3

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Component: Cable Mark: WVA-1

2/c, #18

| Plant I. D. No. Room |    | Function/Service  | Category | Operating Time |
|----------------------|----|-------------------|----------|----------------|
| 3A1470               | 14 | Stdby Liquid Temp | A        | 1 Year         |

# EEB <u>63-0056</u>

. Rev <u>O</u>\_\_\_\_\_

# ATTACHMENT B

# Mark WVA-1

|    | Contract No.                                            |   | Туре                                          |   | Manufacturer                                                                                   |
|----|---------------------------------------------------------|---|-----------------------------------------------|---|------------------------------------------------------------------------------------------------|
|    | 68C7-61986<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 |   | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE |   | Continental Wire & Cable<br>Rockbestos<br>Continental Wire & Cable<br>Continental Wire & Cable |
| TR | From SQN<br>73C7-84211                                  |   | XLPE/CSPE                                     |   | , ITT                                                                                          |
| TR | 85255 from<br>SQN 72C7-83944                            | • | XLPE/CSPE                                     |   | Continental Wire & Cable                                                                       |
| TR | 87049 from<br>SQN 73C7-84211                            |   | XLPE/CSPE                                     |   | ITT .                                                                                          |
| TR | 86757 from<br>SQN 73C7-84211                            |   | XLP0/CSPE                                     | , | ттт .                                                                                          |
| TR | 823079 f <u>rom</u><br>WBN 74C7-85259                   |   | XLPE/CSPE                                     |   | ,Belden                                                                                        |

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Sheet No: EEB-63-0056

Revision: 0

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Reviewed by:   |  |
|----------------|--|
| Prepared by:   |  |
| QA Acceptance: |  |

130





| Facility: Browns Ferry Nucl<br>Unit: 3                                 | ear Plant                                          | SYSTEM COMP              | ONENT EVALUA       | TION WORK SH       | EET (Rev 2)                                 | (3)<br>Sheet No. <u>EEB</u><br>Revision <u>O</u> | 63-0057     |
|------------------------------------------------------------------------|----------------------------------------------------|--------------------------|--------------------|--------------------|---------------------------------------------|--------------------------------------------------|-------------|
| Docket: 50-296                                                         |                                                    |                          |                    | - boouwew          | TATION DEF                                  | Date <u>10-22-80</u>                             |             |
| EQUIPMENT DESCRIPTION                                                  | •                                                  | ENVIRONMENT              |                    | DOCUMEN            | TATION REF                                  | METHOD                                           | ITEMS       |
|                                                                        | Parameter                                          | Specifi-<br>cation       | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                          | A                                                | ** 5        |
| System: 63<br>Plant ID No. Attachment A                                | Operating<br>Time                                  | Attachment A             | l Year             | (1)                | Attachment<br>C.3                           | Engineering<br>Analysis                          | None        |
| Component Cable WVA-1<br>2/c, No. 18, PE<br>Manufacturer: Attachment B | Temperature<br>(°F)                                | 174 .                    | 203                | (4)                | IPCEA S-61-402<br>par 3.9 and<br>Appendix D | Attachment C.2                                   | None .      |
| Model Number: N/A                                                      | Pressure<br>(PSIA)                                 | 15.0                     | N/A                | (4)                | N/A                                         | N∕A                                              | None        |
| Function:<br>- Signal/Instrumentation                                  | Relative<br>Humidity <sup>.</sup> (%)              | 100                      | 100                | (4)                | IPCEA S-61-402<br>par 3.9,<br>3.7.3, 6.7    | Standard<br>Material<br>Requirement              | None        |
| Category: Attachment A                                                 | Chemical<br>Spray                                  | N/A                      | N/A                | (4)                | • .<br>N/A                                  | N/A                                              | -<br>None   |
| Service: Attachment A                                                  | Radiation<br>^(RAD)                                | $3.1 \times 10^4$        | 4x10 <sup>7</sup>  | . (4)              | NUREG-0588<br>Material<br>List              | Generic<br>Material<br>Tests                     | None        |
| Location: 14                                                           | Aging                                              | N/A                      | 20 years           | (2)                | Attachment C.1                              | Oper. Experience                                 | None        |
| Flood Level Elev: 552'<br>Above Flood Level: Yes $\times$ No           | Submergence                                        | N/A                      | N/A .              | (4)                | N/A                                         | . N/A                                            | None        |
| Notes: (1) See Section 2                                               | .4 in 79-01B r                                     | eport.                   |                    | · · · ·            |                                             | Prepared by: 🗶                                   | . J. mills  |
| (2) See Section 4<br>(3) All notes and<br>sheets are on                | .1.2 in 79-01B<br>l other information the attached | report.<br>tion not on t | these              | . <b>.</b> .       | , ,,<br>, , , , ,                           | Reviewed by: A                                   | 7 Wagner 18 |
| : (4) See Section 3                                                    | .0 and/or Apper                                    | ndix B in 79-            | OlB report.        | : i                | •.                                          | QA Acceptance;                                   | •           |

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Attachment A

EEB 63-0057

System: 63 Unit: 3 Rev Q Component: Cable 2/c, \$18 Mark: WVA-1 ŧ . Plant I. D. No. Function/Service Category Operating Time Room 3A1470 14 Stdby Liquid Temp 1 Year A

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# EEB 63-0057

Rev O

# ATTACHMENT B

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Mark WVA-1

|    | <u>Contract No</u> .                                    | å | <u>Type</u>                                   |                              | Manufacturer                                                                   |
|----|---------------------------------------------------------|---|-----------------------------------------------|------------------------------|--------------------------------------------------------------------------------|
|    | 68C7-61986<br>78K5-824171<br>72C7-83944<br>72C7-74910-1 |   | PE/PVC<br>XLPE/CSPE<br>XLPE/CSPE<br>XLPE/CSPE | Cont<br>Rock<br>Cont<br>Cont | inental Wire & Cable<br>bestos<br>inental Wire & Cable<br>inental Wire & Cable |
| TR | From SQN<br>73C7-84211                                  |   | XLPE/CSPE                                     | ITT                          |                                                                                |
| TR | 85255 from<br>SQN 72C7-83944                            | ı | XLPE/CSPE                                     | Cont                         | inental Wire & Cable                                                           |
| TR | 87049 from<br>SQN 73C7-84211                            |   | XLPE/CSPE                                     | ITT                          | •                                                                              |
| TR | 86757 from<br>SQN 73C7-84211                            |   | XLPO/CSPE                                     | ITT                          | · · ·                                                                          |
| TR | 823079 from<br>WBN 74C7-85259                           |   | XLPE/CSPE                                     | Beld                         | en                                                                             |

Sheet No: EEB-63-0057

Revision: O

## ATTACHMENT C

C.1 TVA Engineering Report No. 1942

110

#### Coax, Triax, and Signal Cable

Coaxial and Triaxial cable installed at Browns Ferry were purchased in accordance with General Electric Company Specification 22All81, and the appropriate MIL-C-17 specification. Signal cables, both twisted pair and multiconductor, were purchased in accordance with TVA specifications. Some cable were of cross-linked polyethylene and chloronated polyethylene construction while the same kind of cable furnished under other contracts were of high molecular weight, high density polyethylene/polyvinyl chloride construction and some even polyethylene/polyvinyl chloride construction. It is not possible to make a complete identification by contract as to which circuit and function they serve. Recent reclassification of some functions to 1E status has made it almost a certainty that some cables now in a safety category are of polyethylene/polyvinyl construction.

Accordingly, we have examined the 20 HELB temperature profiles and find that only compartments 1, 3, 6, and 9 show profiles which more than briefly surpass the softening temperature of the linear polyethylene. However, owing to the thermal time lag in the cable material and the cable installation including the heat sink of conduit, tray, and shield material, the insulation will not experience the HELB temperature profile until some time has elapsed and the temperature is lower. Further, no load heat rise need be taken into account for these signal cables.

TVA has conducted tests (Chattanooga Central Laboratories Report No. L81-81-6821 dated October 1980, of PE, PVC cables under a temperature profile which envelops all the HELB profiles. Following this exposure, these cables sustained a dielectric test while immersed in water of 660 volts for 5 minutes, 960 volts for 5 minutes, and 220 volts ac for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April, or replaced at the next refueling outage.

For those cables located in compartment 0 (the containment), the service which these cables have seen thus far has exposed them to a gamma radiation dose of  $6.25 \times 10^{\circ}$  rads or more. This is sufficient to have cross-linked the polyethylene and PVC as well. Consequently, the insulation is now in fact a thermoset material and is capable of the same temperature that TVA's cross-linked polyethylene cable has demonstrated and is capable of withstanding the LOCA/SLB and the post-LOCA environment for a year.

Sheet No: EEB- 43-0057

Revision:\_0

#### ATTACHMENT C (Continued)

## C.1 (Continued)

Continued operation is justified, and TVA has prepared a LOCA/SLB, thermal aging, and radiation test procedure to be performed by Wyle Laboratories on samples of this cable to demonstrate the validity of this conclusion. Results of this testing program are expected to be available in April 1981.

One cable RG-114A/U has the possibility of being sensitive to pressure changes owing to its partial air dielectric; however, an analysis of this effect has indicated that the change in dielectric constant can be tolerated. Consequently for this cable too, there is justification for continued operation. The compression effect on the dielectric will be likewise tested at Wyle Laboratories along with the other cable tests and results are expected to be available by April 1981.

- C.2 Standard Material Long-Term Overload Temperature Rating
- C.3 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by: Reviewed by:

QA Acceptance:\_\_\_\_

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| Facility: Browns Ferry Nucl<br>Unit: 3<br>Docket: 50-296               | ear Plant                                             | SYSTEM COMP                        | ONENT EVALU       | ATION WORK SH      | EET (Rev 2)           | (3)<br>Sheet No. <u>EEB 6</u><br>Revision <u>O</u><br>Date 10-3 |             |
|------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------|-------------------|--------------------|-----------------------|-----------------------------------------------------------------|-------------|
|                                                                        | ENVIRONMENT                                           |                                    |                   | DOCUMEN            | TATION REF            | QUALIFICATION                                                   | OUTSTANDING |
| EQUIPMENT DESCRIPTION :                                                | Parameter                                             | Specifi-<br>cation                 | Qualifi           | Specifi-<br>cation | Qualifi-<br>cation    |                                                                 | ,           |
| System: 63<br>Plant ID No. Attachment A                                | Operating<br>Time                                     | Attachment A                       | l Year            | . (1)              | Attachment E<br>C.3 A | ngineering<br>nalysis                                           | Ncne -      |
| Component Cable WVB<br>3/c, No. 18, CSPE<br>Manufacturer: Attachment B | Temperature<br>(°F)                                   | 174                                | 250               | (4)                | Attachment C.         | Generic<br>Simultaneous<br>Test                                 | . None ·    |
| Model Number: N/A                                                      | ·<br>Pressure<br>(PSIA)                               | 15.0                               | N/A               | (4)                | N/A                   | N/A                                                             | None        |
| Function:<br>Signal/Instrumentation                                    | Relative<br>Humidity (%)                              | 100                                | 100               | (4)                | Attachment C.1        | Generic<br>Simultaneous<br>Test                                 | None        |
| Couracy: Req'd: N/A<br>Demon: N/A<br>Category: Attachment A            | Chemical<br>Spray                                     | N/A ·                              | N/A               | (4)                | N/A                   | N/A                                                             | "None       |
| Service: Attachment A                                                  | Radiation<br>(RAD)                                    | 3.1 x 10 <sup>4</sup>              | 5x10 <sup>7</sup> | . (4)              | Attachment C.1        | Generic<br>Sequential ·<br>Test                                 | None        |
| ocation: 14                                                            | Aging                                                 | N/A                                | 40 years          | (2)                | Attachment C.2        | Generic Mat'l Test                                              | * None      |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No               | Submergence                                           | N/A                                | N/A               | (4)                | N/A                   | N/A                                                             | ,<br>None   |
| Notes: (1) See Section 2<br>(2) See Section 4<br>(3) All notes and     | .4 in 79-01B r<br>.1.2 in 79-01B<br>other information | eport.<br>report.<br>tion not on t | these             | •                  | · · ·                 | Prepared by: <u>R</u><br>Reviewed by: <u>A</u>                  | 1. mills    |

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- sheets are on the attached appendix sheets.
- (4). See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

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Attachment A

|                               |              |                   |                 | EEB 63-0058    |
|-------------------------------|--------------|-------------------|-----------------|----------------|
| System: 63<br>Unit: 3         |              |                   |                 | Rev            |
| Component: Cable<br>Mark: WVB |              | 3/c, <b>#18</b>   | •               | •              |
| Plant I. D. No.               | <u>Rooin</u> | Function/Service  | <u>Category</u> | Operating Time |
| 3A1471                        | 14           | Stdby Liquid Temp | A               | l Year         |

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# EEB 63-0058

Rev O

## ATTACHMENT B

Mark WVB

Contract No. Manufacturer Туре CSPE/CSPE BIW 72C7-83849 Okonite Rockbestos 72C7-74910-2 XLPE/CSPE 69C3-64863-1 PE/PVC XLPE/CSPE Belden Corporation TR 822675 from WBN 74C7-85259 Belden Corporation TR 820907 from XLPE/CSPE • • 74C7-85259 J. \$ ITT Surp. 7307-84211



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| Sheet No.: <u>E</u> | <u>B-63-0058</u> |
|---------------------|------------------|
| •                   |                  |
| Revision:           | 0                |

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

14C

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

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| Prepared by:   | ·    |   |
| Reviewed by:   |      | · |
| QA Acceptance: |      |   |
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(3) SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Facility: Browns Ferry Nuclear Plant Sheet No. EEB 63-0059 Unit: Revision 0 50-296 Docket: Date 10-22-80 ENVIRONMENT DOCUMENTATION REF QUALIFICATION OUTSTANDING EQUIPMENT DESCRIPTION ITEMS METHOD Qualifi-Specifi-Specifi-Qualification Parameter cation cation cation System: 63 Engineering l year Attachment C.3 None -Operating Attachment A Plant ID No. Attachment A Analysis and Time (1)Test Component Cable WVB 3/c, No. 18, XLPE Generic Simultaneous Temperature Manufacturer: Attachment B 174 (4)None - $\left( {}^{0}F \right)$ 385 Attachment C.1| Test ۰. • • Pressure Adel Number: N/A N/A N/A N/A (PSIA)None (4) 15.0 Function: Generic Signal/Instrumentation -Relative Simultaneous Humidity (%) (4) 100 100 None Attachment C.1 Test Accuracy: Req'd: N/A Demon: N/A Chemical Spray · Sategory: Attachment A (4) N/A N/A . None N/A N/A Service: Attachment A Generic Radiation Sequential  $3.1 \times 10^4$ 2x10<sup>8</sup> (RAD) (4)Attachment C. Test None .ocation: 14 Generic Mat'l Test Attachment C.2 None 40 years (2)Aging N/A Flood Level Elev: 552' N/A Above Flood Level: Yes None N/A Submergence N/A N/A (4)<sup>··</sup> No Prepared by: R.L. mill votes: (1) See Section 2.4 in 79-01B report. (2). See Section 4.1.2 in 79-01B report. Reviewed by (3) All notes and other information not on these sheets are on the attached appendix sheets. **OA** Acceptance: See Section 3.0 and/or Appendix B in 79-01B report. (4) - 1 "

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Attachment A

System: 63 Unit: 3

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EEB <u>63-0059</u> Rev <u>0</u>

Component: Cable Mark: WVB 3/c, #18

| Plant I. D. No. | Room | Function/Service  | <u>Category</u> | <u>Operating Time</u> |
|-----------------|------|-------------------|-----------------|-----------------------|
| 3A1471          | 14   | Stdby Liquid Temp | A               | 1 Year                |

# EEB <u>63-0059</u>

Rev O

## ATTACHMENT B

Mark WVB

<u>Contract No.</u>

## Туре

72C7-83849 72C7-74910-2 69C3-64863-1

TR 822675 from WBN 74C7-85259

TR 820907 from 74C7-85259

73C7-84211

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XLPE/CSPĘ

CSPE/CSPE XLPE/CSPE PE/PVC

## XLPE/CSPE

3

# Belden Corporation

Belden Corporation

Manufacturer

ITT Surp.

BI₩

Okonite Rockbestos





| Facility: Browns Ferry Nucl<br>Unit: 3<br>Packat: 50 200              | ear Plant                                           | SYSTEM COMP                               | ONENT EVALUA       | TION WORK SH       | IEET (Rev 2)                                | (3)<br>Sheet No. <u>EEB</u><br>Revision <u>O</u> | 63-0060              |
|-----------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------|--------------------|--------------------|---------------------------------------------|--------------------------------------------------|----------------------|
| Docket: 50-296                                                        | м<br>                                               | ENVIRONMENT                               |                    | DOCUMEN            | TATION REF                                  | QUALIFICATION                                    | OUTSTANDING<br>ITEMS |
| EQUIPMENT DESCRIPTION                                                 | Parameter                                           | Specifi-<br>cation                        | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                          | METHOD                                           |                      |
| System: 63<br>Plant ID No. Attachment A                               | Operating<br>Time                                   | Attachment A                              | l Year .           | . (1)              | Attachment<br>C.3                           | Engineering<br>Analysis                          | None                 |
| Component Cable 'WVB<br>3/c, No. 18, PE<br>Manufacturer: Attachment B | Temperature                                         | 174                                       | 203                | - (4)              | IPCEA S-61-402<br>par 3.9 and<br>Appendix D | AttachmentC.2                                    | None                 |
| odel`Number: N/A                                                      | Pressure<br>(PSIA)                                  | 15.0                                      | · N/A              | (4)                | N/A                                         | . N∕A                                            | None                 |
| Function:<br>Signal/Instrumentation                                   | Relative<br>Humidity (%)                            | 100                                       | 100                | (4)                | IPCEA S-61-402<br>par 3.9,<br>3.7.3, 6.7    | Standard<br>Material<br>Requirement              | None                 |
| Accuracy: Req'd: N/A<br>Demon: N/A<br>Category: Attachment A          | Chemical<br>Spray                                   | N/A                                       | N/A                | (4)                | N/A                                         | N/A                                              | None                 |
| Service: Attachment A                                                 | Radiation<br>(RAD)                                  | 3.1 × 10 <sup>4</sup>                     | 4x10 <sup>7</sup>  | (4)                | NUREG-0588<br>Material<br>List              | Generic<br>Material '<br>Tests                   | None                 |
| Location: 14                                                          | Aging                                               | N/A                                       | 20 years           | (2).               | Attachment C.1                              | Oper. Experience                                 | None                 |
| Flood Level Elev: 552'<br>Above Flood Level: Yes ×<br>No              | Submergence                                         | N/A.                                      | :<br>N/A           | (4)                | N/A                                         | n/a                                              | None                 |
| Votes: (1) See Section 2                                              | 2.4 in 79-018 r                                     | eport.                                    |                    | •.                 | •                                           | · Prepared by: <u>/</u>                          | L. mills             |
| (2) See Section 4<br>(3) All notes and<br>sheets are or               | .1.2 in 79-01B<br>I other informa<br>I the attached | report.<br>tion not on t<br>appendix shee | these              |                    |                                             | Reviewed by:                                     | Ulagna Copy          |
| • (4) See Section 3                                                   | 1.0 and/or Appen                                    | ndix B in 79-                             | 018 report.        | : ``               | •••••••••••••••••••••••••••••••••••••••     | UA Acceptance;                                   |                      |

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## Attachment A

EEB 63-0060

Rev O

Component: Cable Mark: WVB

63 3

System: Unit:

3/c, ∅18

|   | <u>Plant I. D. No.</u> | Room | Function/Service  | Category | Operating Time |  |
|---|------------------------|------|-------------------|----------|----------------|--|
| • | 3A1471                 | 14   | Stdby Liquid Temp | A,       | l Year         |  |

# EEB 63-0060

Rev O

## ATTACHMENT B

Mark WVB

| Contract | No. |
|----------|-----|
|          |     |
|          |     |

Туре

CSPE/CSPE

XLPE/CSPE PE/PVC

XLPE/CSPE

XLPE/CSPE

1

72C7-83849 72C7-74910-2 69C3-64863-1

TR 822675 from WBN 74C7-85259

TR 820907 from 74C7-85259

73C7-84211

BIW Okonite Rockbestos

Belden Corporation

Manufacturer

Belden Corporation

ITT Surp.

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Sheet No: EEB-63-0068

Revision: O

#### ATTACHMENT C

C.1. TVA Engineering Report No. 1942

110

## Coax, Triax, and Signal Cable

Coaxial and Triaxial cable installed at Browns Ferry were purchased in accordance with General Electric Company Specification 22A1181, and the appropriate MIL-C-17 specification. Signal cables, both twisted pair and multiconductor, were purchased in accordance with TVA specifications. Some cable were of cross-linked polyethylene and chloronated polyethylene construction while the same kind of cable furnished under other contracts were of high molecular weight, high density polyethylene/polyvinyl chloride construction and some even polyethylene/polyvinyl chloride construction. It is not possible to make a complete identification by contract as to which circuit and function they serve. Recent reclassification of some functions to 1E status has made it almost a certainty that some cables now in a safety category are of polyethylene/polyvinyl construction.

Accordingly, we have examined the 20 HELB temperature profiles and find that only compartments 1, 3, 6, and 9 show profiles which more than briefly surpass the softening temperature of the linear polyethylene. However, owing to the thermal time lag in the cable material and the cable installation including the heat sink of conduit, tray, and shield material, the insulation will not experience the HELB temperature profile until some time has elapsed and the temperature is lower. Further, no load heat rise need be taken into account for these signal cables.

TVA has conducted tests (Chattanooga Central Laboratories Report No. L81-81-6821 dated October 1980, of PE, PVC cables under a temperature profile which envelops all the HELB profiles. Following this exposure, these cables sustained a dielectric test while immersed in water of 660 volts for 5 minutes, 960 volts for 5 minutes, and 220 volts ac for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April, or replaced at the next refueling outage.

For those cables located in compartment 0 (the containment), the service which these cables have seen thus far has exposed them to a gamma radiation dose of  $6.25 \times 10^{\circ}$  rads or more. This is sufficient to have cross-linked the polyethylene and PVC as well. Consequently, the insulation is now in fact a thermoset material and is capable of the same temperature that TVA's cross-linked polyethylene cable has demonstrated and is capable of withstanding the LOCA/SLB and the post-LOCA environment for a year.

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Sheet No: EEB-63-0000

Revision: 0

## ATTACHMENT C (Continued)

#### C.1 (Continued)

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Continued operation is justified, and TVA has prepared a LOCA/SLB, thermal aging, and radiation test procedure to be performed by Wyle Laboratories on samples of this cable to demonstrate the validity of this conclusion. Results of this testing program are expected to be available in April 1981.

One cable RG-114A/U has the possibility of being sensitive to pressure changes owing to its partial air dielectric; however, an analysis of this effect has indicated that the change in dielectric constant can be tolerated. Consequently for this cable too, there is justification for continued operation. The compression effect on the dielectric will be likewise tested at Wyle Laboratories along with the other cable tests and results are expected to be available by April 1981.

- C.2 Standard Material Long-Term Overload Temperature Rating
- C.3 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by: Reviewed by: QA Acceptance:\_\_\_\_

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SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Facility: Browns Ferry Nuclear Plant , Unit: 1 Docket: 50-259

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**OUALIFICATION** OUTSTALC: ENVIRONMENT DOCUMENTATION REF EQUIPMENT DESCRIPTION METHOD ITEMS Specifi-Qualifi-Specifi-Qualification Parameter cation cation cation System: 63 Operating Plant ID No. Attachment A Time N/A N/A M/A N/A Rone (1)Component Junction Box Temperature (°F) N/A M/A None N/A N/A Manufacturer: N/A (4) Pressure Engineering 21.5Model Number: N/A (PSIA) 21.5 Attachment B Analysis ilene. (4) max. Function: Terminal Housing Relative Humidity (%) (4)H/A R/A Kone R/A ~ N/A Accuracy: Reg'd: N/A 2 Demon: N/A Chemical Spray Category: N/A (4) N/A N/A R/A None N/A Service: N/A Radiation N/A N/5N/A N/A None (RAD) (4)Location: Attachment A Aging N/A (2)N/A N/A N/A None Flood Level Elev: 552' Above Flood Level: Yes X Submergence N/A N/A N/A H/A None (4) No

Notes: (1) See Section 2.4 in 79-01B report.

(2) See Section 4.1.2 in 79-01B report.

(3) All notes and other information not on these shaets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance;

Prepared by: R.L. Mill

Reviewed by: Julgaren

10-22-80

(3)

Revision O

Date

-Sheet No. \_\_\_\_\_EEB-63-0061

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# EEB <u>63-0061</u>

Rev O

## ATTACHMENT A

· Junction Boxes

System: 63 Unit: 1

MarkPlant I.D. No.RoomJOABox 301512

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EEB 63-0061

#### ATTACHMENT B

Rev O

## TVA Engineering Report EEB 19508

The junction boxes in the HELB areas are TVA type D boxes which are non ventilated, dust tight, and water tight similar to NEMA boxes except of 12and 10-gauge steel rather than of 14- and 12-gauge steel as in NEMA boxes. They are sealed with neoprene gaskets or RTV silicone in order to restrict moisture entry.

The boxes are not intended to serve as pressure boundaries. A pressure differential will equalize, hence there is no requirement to consider ability to resist deformation under differential pressure.

The steel of the box construction is not subject to thermal nor radiation aging effects in its service environment. Further, neither the RH of the normal environment nor the RH of the relatively short HELB environment will produce sufficient corrosion to painted boxes to affect the strength of the boxes. The neoprene gasket and RTV silicone sealing materials are adequate for the service environment temperature, and will be replaced after any HELB episode.

Consequently it is our engineering judgement that the junction boxes in themselves are not significantly affected by their service environment. The qualification of equipment located on or within these boxes is addressed separately. SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Facility: Browns Ferry Nuclear Plant . Unit: 2 Docket: 50-260

|                                                          | ENVIRGNMENT              |                    |                    | DOCUMEN            | TATION REF         | QUALIFICATION             | OUTSTAIC        |  |
|----------------------------------------------------------|--------------------------|--------------------|--------------------|--------------------|--------------------|---------------------------|-----------------|--|
| EQUIPMENT DESCRIPTION                                    | Parameter                | Specifi-<br>cation | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation | 112 11.00                 |                 |  |
| System: 63<br>Plant ID No. Attachment A                  | Operating<br>Time        | N/Ą                | N/A                | (1)                | ii/A               | ii/A                      | None            |  |
| Component Junction Box                                   |                          |                    |                    |                    |                    |                           |                 |  |
| Kanufacturer: N/A                                        | Temperature<br>(°F)      | N/A                | N/A                | (4)                | N/A                | N/A 1                     | llone           |  |
| Model Number: N/A                                        | Pressure<br>(PSIA)       | 21.5<br>max.       | 21.5               | (4)                | Attachment B       | Engineering .<br>Analysis | None            |  |
| Function: Terminal Housing                               | Relative<br>Humidity (%) | N/A                | N/A                | (4)                | N/A                | N/A                       | None            |  |
| Category: N/A                                            | Chemical<br>Spray        | N/A                | N/A                | (4)                | N/A                | K/A                       | None            |  |
| Service: N/A                                             | Radiation<br>(RAD)       | N/A                | N/A                | (4)                | N/A                | N/A                       | None            |  |
| Location: Attachment A                                   | Aging                    | N/A                | N/A                | (2)                | N/A                | N/A -                     | None            |  |
| Flood Level Elev: 552'<br>Above Flood Level: Yes ≫<br>No | Submergence              | N/A                | N/A                | (4)                | N/A                | . N/A                     | None            |  |
| Notes: (1) See Section 2                                 | 2.4 in 79-016 r          | eport.             |                    | •                  |                    | Prepared by: K            | <u>L. mills</u> |  |

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

Reviewed by: Auhane

EEB-63-0062

10-22-80

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Sheet No.

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|          |            |    |                |        | EEB <u>63-0062</u> |
| ()       |            |    | ATTACHMENT A   | ,<br>, | . Rev <u>6</u>     |
|          | -          |    | Junction Boxes |        |                    |
|          | System: 63 |    |                |        |                    |
| a        | Unit: 2    |    |                |        |                    |
| *        | Marsh      |    |                |        |                    |
|          |            |    | Plant 1.0. NO. |        | 12                 |
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EEB 63-0062

#### ATTACHMENT B

Rev \_O\_

## TVA Engineering Report EEB 1950B

The junction boxes in the HELB areas are TVA type D boxes which are non ventilated, dust tight, and water tight similar to NENA boxes except of 12and 10-gauge steel rather than of 14- and 12-gauge steel as in NENA boxes. They are sealed with neoprene gaskets or RTV silicone in order to restrict moisture entry.

The boxes are not intended to serve as pressure boundaries. A pressure differential will equalize, hence there is no requirement to consider ability to resist deformation under differential pressure.

The steel of the box construction is not subject to thermal nor radiation aging effects in its service environment. Further, neither the RH of the normal environment nor the RH of the relatively short HELB environment will produce sufficient corrosion to painted boxes to affect the strength of the boxes. The neoprene gasket and RTV silicone sealing materials are adequate for the service environment temperature, and will be replaced after any HELB episode.

Consequently it is our engineering judgement that the junction boxes in themselves are not significantly affected by their service environment. The qualification of equipment located on or within these boxes is addressed separately.

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SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Facility: Browns Ferry Nuclear Plant Unit: 3

Docket: 50-296

|                                                         | ENVIKONMENT              |                    |                    | DOCUMENTATION REF  |                    | QUALIFICATION           | CUTSTAND  |  |
|---------------------------------------------------------|--------------------------|--------------------|--------------------|--------------------|--------------------|-------------------------|-----------|--|
| EQUIPMENT DESCRIPTION                                   | Parameter                | Specifi-<br>cation | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation |                         |           |  |
| System: 63<br>Plant ID No. Attachment A                 | Operating<br>Time        | N/A                | -N/A               | (1)                | N/A                | N/A                     | llone     |  |
| Component Junction Box                                  |                          |                    |                    |                    | `                  |                         |           |  |
| Manufacturer: N/A                                       | Temperature              | N/A                | N/A -              | . (4)              | N/A                | N/A                     | None      |  |
| Nodel Number: N/A                                       | Pressure<br>(PSIA)       | 21.5<br>max.       | 21.5               | (4)                | Attachment B       | Engineering<br>Analysis | None      |  |
| Function: Terminal Housing                              | Relative<br>Humidity (%) | N/A                | N/A                | (4)                | I:/A               | N/A                     | lione     |  |
| Accuracy: Req'd: N/A<br>Demon: N/A<br>Category: N/A     | Chemical<br>Spray        | N/A                | N/A                | (4)                | N/A                | N/A                     | None      |  |
| Service: N/A                                            | Radiation -<br>(RAD)     | N/A                | N/A                | (4)                | N/A                | K/A                     | llone     |  |
| Location: Attachment A                                  | Aging                    | N/A                | N/A                | (2)                | N/A                | N/A                     | None      |  |
| Flood Level Elev: 552'<br>Above Flood Level: Yes×<br>No | Submergence              | N/A                | N/A                | (4)                | N/A                | . N/A                   | None      |  |
| Notes: (1) See Section 2                                | 2.4 in 79-018 re         | eport.             |                    | • .                |                    | Prepared by: <u>R</u>   | . J. mill |  |
| (2) See Section 4                                       | 1.2 in 79-018            | report.            | •                  | 5                  |                    | Reviewed by:            | HUagner   |  |

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

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Sheet No. Revision

Date

EEB-63-0063

10-22-80



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EEB 63-0063

Rev O

## ATTACHMENT A

## Junction Boxes

System: 63 Unit: 3

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| <u>Mark</u> | • | Plant I.D. No. | .* | Room |
|-------------|---|----------------|----|------|
| JOA         | ų | . Box 3017     |    | 12   |



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EEB 63-0063

#### ATTACHMENT B

Rev \_O\_\_\_\_

### TVA Engineering Report EEB 1950B ·

The junction boxes in the HELB areas are TVA type D boxes which are non ventilated, dust tight, and water tight similar to NEMA boxes except of 12and 10-gauge steel rather than of 14- and 12-gauge steel as in NEMA boxes. They are sealed with neoprene gaskets or RTV silicone in order to restrict moisture entry.

The boxes are not intended to serve as pressure boundaries. A pressure differential will equalize, hence there is no requirement to consider ability to resist deformation under differential pressure.

The steel of the box construction is not subject to thermal nor radiation aging effects in its service environment. Further, neither the RH of the normal environment nor the RH of the relatively short HELB environment will produce sufficient corrosion to painted boxes to affect the strength of the boxes. The neoprene gasket and RTV silicone sealing materials are adequate for the service environment temperature, and will be replaced after any HELB episode.

Consequently it is our engineering judgement that the junction boxes in themselves are not significantly affected by their service environment. The qualification of equipment located on or within these boxes is addressed separately. 



| Facility: Browns Ferry Nucl<br>Unit: 2                       | ear Plant                         | SYSTEM COMP                    | ONENT EVALUA        | TION WORK SH                           | EET (Rev 2)        | (3)<br>Sheet NoE<br>Revision0            | <u>B-63-0064</u>                      |
|--------------------------------------------------------------|-----------------------------------|--------------------------------|---------------------|----------------------------------------|--------------------|------------------------------------------|---------------------------------------|
| Docket: 50-260                                               |                                   |                                |                     | DOCUMEN                                | TATION REE         |                                          | OUTSTANDING                           |
| EQUIPMENT DESCRIPTION                                        |                                   | ENVIRONMENT                    |                     | DUCUMEN                                |                    | METHOD                                   | ITEMS                                 |
|                                                              | Parameter                         | Specifi-<br>cation             | Qualifi-<br>cation  | Specifi-<br>cation                     | Qualifi-<br>cation |                                          | ·                                     |
| System: 63<br>Plant ID No. Attachment A                      | Operating<br>Time                 | Attachment A                   | ] Year              | (1)                                    | Attachment<br>C.3  | Engincering .<br>Analysis                | None<br>-                             |
| Component Cable, WVB'<br>3/c, #18, CSPE                      | Temperature                       | 100                            | 250                 | - (4)                                  | Attachment C.      | Generic<br>Simultaneous<br>Test          | None -                                |
|                                                              | (°F)                              | 199                            | 250                 | (4)                                    |                    |                                          | ۰.                                    |
| Model Number: N/A                                            | Pressure<br>(PSIA)                | 15.0                           |                     | (4)                                    |                    | •                                        | ۹. ۳                                  |
| Function:<br>Signal/Instrumentation                          | Relative<br>Humidity (%)          | 100                            | 100                 | (4)                                    | Attachment C.1     | Generic<br>Simultaneous<br>Test          | None                                  |
| Accuracy: Req'd: N/A<br>Demon: N/A<br>Category: Attachment A | Chemical<br>Spray                 | N/A                            | N/A                 | (4)                                    | ` N/A              | N/A                                      | " None                                |
| Service: Attachment A                                        | Radiation<br>(RAD)                | 3.1x10 <sup>4</sup>            | 5x10 <sup>7</sup>   | . (4)                                  | Attachment C.1     | Generic<br>Sequential<br>Test            | None                                  |
| _ocation: 12                                                 | Aging                             | N/A                            | 40 years            | (2)                                    | Attachment C.2     | Generic Mat'l Test                       | ' None                                |
| Flood Level Elev: 552'<br>Nove Flood Level: Yes X            | Submergence                       | N/A                            | N/A                 | (4) <sup>.</sup>                       | N/A                | N/A                                      | None                                  |
| votes: (1) See Section 2                                     | 2.4 in 79-01B r                   | eport.                         |                     | •                                      |                    | · Prepared by: $\underline{\mathcal{R}}$ | 1. mills                              |
| (2) See Section 4                                            | 1.1.2 in 79-01B                   | report.                        | ·                   | · · `                                  | · . ·              | Reviewed by: <u>A</u>                    | Helagner 10/22/81                     |
| (3) All notes and<br>sheets are of<br>(4) See Section 3      | n the attached<br>3.0 and/cr Appe | appendix shee<br>ndix B in 79- | ets.<br>018 report. | : ```````````````````````````````````` | ,<br>,             | QA Acceptance;                           | · · · · · · · · · · · · · · · · · · · |

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# EEB <u>63-0064</u>

Rev O

## ATTACHMENT B

Mark WVB

|    | Contract No.                               | Туре                             | Manufacturer                 |
|----|--------------------------------------------|----------------------------------|------------------------------|
|    | 72C7-83849<br>72C7-74910-2<br>69C3-64863-1 | CSPE/CSPE<br>XLPE/CSPE<br>PE/PVC | BIW<br>Okonite<br>Rockbestos |
| TR | 822675 from<br>WBN 74C7-85259              | XLPE/CSPE                        | Belden Corporation           |
| TR | 820907 from<br>74C7-85259                  | XLPE/CSPE                        | Belden Corporation           |
|    | 73C7-84211                                 | •                                | ITT Surp.                    |

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Sheet No.: EEB-63-0064

Revision: O

## ATTACHMENT C

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Prepared b | y:   |
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| Reviewed b | y:   |
| OA Accepta | nce: |

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(3)SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Sheet No. FFR-63-0065 Facility: Browns Ferry Nuclear Plant Revision Unit: 2 Δ Date 10-22-80 Cocket: 50-260 OUTSTANDING **OUALIFICATION** DOCUMENTATION REF ENVIRONMENT ITEMS METHOD EQUIPMENT DESCRIPTION Specifi-Oualifi-Specifi-Qualification cation cation Parameter cation None Engineering System: 63 Attachment C.3 Operating 1 year Attachment A Analysis and Time Plant ID No. Attachment A (1)Test Component Cable, WVB Generic 3/c, #18, XLPE Simultaneous Temperature (°F) Manufacturer: Attachment B Attachment C-1 Test None 199 (4)385 Pressure Hodel Number: N/A (PSIA) (4)15.0 Function: Generic Signal/Instrumentation Relative Simultaneous Humidity (%) (4) None 100 Test 100 Attachment C.1 Accuracy: Req'd: N/A Demon: N/A Chemical Spray Category: Attachment A (4) None N/A N/A N/A N/A Service: Attachment A Generic Radiation Sequential 3.1x10<sup>4</sup> 2x10<sup>8</sup> Attachment C. (4) (RAD) None Test Generic Mat'l Test Location: 12 Attachment C None 40 years (2)• N/A Aging Flood Level Elev: 552' N/A None N/A N/A Above Flood Level: Yes X Submergence N/A (4) No

Notes: (1) See Section 2.4 in 79-01B report.

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: R. L. Mile

Reviewed by

QA Acceptance



Attachment A

System: 63 Unit: 2.

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EEB 63-0065

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Rev O

Component: Cable Mark: WVB :

3/c, \$18

| • | <u>Plant I. D. No</u> | ÷ | Room | Function/Service  | Category | Operating Time |
|---|-----------------------|---|------|-------------------|----------|----------------|
| • | 2A1472                | • | 12   | Stdby Liquid Temp | A .      | l Year         |

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## EEB 63-0065

Rev O

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## ATTACHMENT B

Mark WVB

|   |    | Contract No.                               | Туре                             | Manufacturer                 |
|---|----|--------------------------------------------|----------------------------------|------------------------------|
|   |    | 72C7-83849<br>72C7-74910-2<br>69C3-64863-1 | CSPE/CSPE<br>XLPE/CSPE<br>PE/PVC | 8IW<br>Okonite<br>Rockbestos |
| ı | TR | 822675 from<br>WBN 74C7-85259              | XLPE/CSPE                        | Belden Corporation           |
|   | TR | 820907 from<br>74C7-85259                  | XLPE/CSPE                        | Belden Corporation           |
|   |    | 7307-84211                                 |                                  | ITT Surp.                    |

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Sheet No: EEB-63-0065

Revision: 0

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLE tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Reviewed by: \_\_\_\_\_

QA Acceptance: \_\_\_\_

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| Facility: Browns Ferry Nuc<br>Unit: 2<br>Docket:50-260             | lear Plant               | SYSTEM COMP         | ONENT EVALU/       | ATION WORK SI      | HEET (Rev 2)                                | (3)<br>Sheet No. <u>EEB-</u><br>Revision <u>D</u><br>Date <u>10-</u> | 63-0066<br>22-80  |
|--------------------------------------------------------------------|--------------------------|---------------------|--------------------|--------------------|---------------------------------------------|----------------------------------------------------------------------|-------------------|
| FOULPMENT DESCRIPTION                                              |                          | ENVIRONMENT         |                    | DOCUME             | NTATION REF                                 | QUALIFICATION                                                        | OUTSTANDING       |
|                                                                    | Parameter                | Specifi-<br>cation  | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                          | ME MOD                                                               | 1164.5            |
| System: 63<br>Plant ID No. Attachment A                            | Operating<br>Time        | Attachment A        | l Year             | (1)                | Attachment<br>C.3                           | Engineering<br>Analysis                                              | None              |
| Component Cable, WVB<br>3/c, #18, PE<br>Menufacturer: Attachment B | Temperature<br>(°F)      | 199                 | 203                | (4)                | IPCEA S-61-402<br>par 3.9 and<br>Appendix D | Attachment C.2                                                       |                   |
| Mcdel Number: N/A                                                  | Pressure<br>(PSIA)       | 15.0                |                    | (4)                |                                             |                                                                      | •••               |
| Function:<br>Signal/Instrumentation                                | Relative<br>Humidity (%) | 100                 | 100                | · <sup>-</sup> (4) | IPCEA S-61-402<br>par 3.9,<br>3.7.3, 6.7    | Standard<br>Material<br>Requirement                                  | None              |
| Category: Attachment A                                             | Chemical<br>Spray        | N/A                 | N/A                | (4)                | N/A ·                                       | N/A                                                                  | .None             |
| Service: Attachment A                                              | Radiation<br>(RAD)       | 3,1x10 <sup>4</sup> | 4x107              | . (4)              | NUREG-0588<br>Material<br>List              | Generic<br>Material<br>Tests                                         | None              |
| Location: 12                                                       | Aging                    | N/A                 | 20 years           | (2)                | Attachment C.1                              | Oper. Experience                                                     | <sup>*</sup> None |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No           | Submergence              | N/A                 | N/A                | (4)                | N/A                                         | . N/A                                                                | ,<br>None         |
| Notes: (1) See Section 2                                           | 2.4 in $79-018$ r        | enort               |                    | •                  | :                                           | $\dot{P}$ Prepared by: $\mathcal{P}$                                 | 1. mills          |

- (2) See Section 4.1.2 in 79-01B report.
  - (3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Reviewed by:

QA Acceptance:



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Attachment A

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| System: 63                    |        |                   |          | EEB <u>63-0066</u> | <u>,</u> |
|-------------------------------|--------|-------------------|----------|--------------------|----------|
| Unit: 2                       | •      |                   |          | Rev _O             |          |
| Component: Cable<br>Mark: WVB | e<br>, | 3/c, #18          |          |                    |          |
| Plant I. D. No.               | Room   | Function/Service  | Category | Operating Time     |          |
| 2A1472                        | 12     | Stdby Liquid Temp | A        | l Year             |          |
|                               |        |                   |          |                    |          |

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## EEB <u>63-0066</u>

Rev O

## ATTACHMENT B

Mark WVB

| <u>Con</u> | tra | ct | <u>No</u> . |  |
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|            |     |    |             |  |

72C7-83849

72C7-74910-2

69C3-64863-1

TR 822675 from WBN 74C7-85259

TR 820907 from 74C7-85259

7307-84211

## Туре

CSPE/CSPE XLPE/CSPE PE/PVC

XLPE/CSPE

XLPE/CSPE

## Manufacturer

BIW Okonite Rockbestos

Belden Corporation

Belden Corporation

ITT Surp.

Sheet No: EEB- 63-0066

Revision: 0

## ATTACHMENT C

C.1 TVA Engineering Report No. 1942

#### Coax, Triax, and Signal Cable

Coaxial and Triaxial cable installed at Browns Ferry were purchased in accordance with General Electric Company Specification 22A1181, and the appropriate MIL-C-17 specification. Signal cables, both twisted pair and multiconductor, were purchased in accordance with TVA specifications. Some cable were of cross-linked polyethylene and chloronated polyethylene construction while the same kind of cable furnished under other contracts were of high molecular weight, high density polyethylene/polyvinyl chloride construction and some even polyethylene/polyvinyl chloride construction. It is not possible to make a complete identification by contract as to which circuit and function they serve. Recent reclassification of some functions to lE status has made it almost a certainty that some cables now in a safety category are of polyethylene/polyvinyl construction.

Accordingly, we have examined the 20 HELB temperature profiles and find that only compartments 1, 3, 6, and 9 show profiles which more than briefly surpass the softening temperature of the linear polyethylene. However, owing to the thermal time lag in the cable material and the cable installation including the heat sink of conduit, tray, and shield material, the insulation will not experience the HELB temperature profile until some time has elapsed and the temperature is lower. Further, no load heat rise need be taken into account for these signal cables.

TVA has conducted tests (Chattanooga Central Laboratories Report No. L81-81-6821 dated October 1980, of PE, PVC cables under a temperature profile which envelops all the HELB profiles. Following this exposure, these cables sustained a dielectric test while immersed in water of 660 volts for 5 minutes, 960 volts for 5 minutes, and 220 volts ac for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April, or replaced at the next refueling outage.

For those cables located in compartment 0 (the containment), the service which these cables have seen thus far has exposed them to a gamma radiation dose of  $6.25 \times 10^{\circ}$  rads or more. This is sufficient to have cross-linked the polyethylene and PVC as well. Consequently, the insulation is now in fact a thermoset material and is capable of the same temperature that TVA's cross-linked polyethylene cable has demonstrated and is capable of withstanding the LOCA/SLB and the post-LOCA environment for a year.

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Sheet No: EEB-63-0066

Revision: 0

## ATTACHMENT C (Continued)

## C.1 (Continued)

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Continued operation is justified, and TVA has prepared a LOCA/SLB, thermal aging, and radiation test procedure to be performed by Wyle Laboratories on samples of this cable to demonstrate the validity of this conclusion. Results of this testing program are expected to be available in April 1981.

One cable RG-114A/U has the possibility of being sensitive to pressure changes owing to its partial air dielectric; however, an analysis of this effect has indicated that the change in dielectric constant can be tolerated. Consequently for this cable too, there is justification for continued operation. The compression effect on the dielectric will be likewise tested at Wyle Laboratories along with the other cable tests and results are expected to be available by April 1981.

- C.2 Standard Material Long-Term Overload Temperature Rating
- C.3 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by: Reviewed by: - 4

QA Acceptance:

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'Facility: Browns Ferry Nuclear Plant . .Unit: 1 Cocket: 50-259 SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3) Sheet No. <u>FFR</u> 63-0067 Revision <u>O</u>

Cocket: 50-259 Date 10-23-80 OUTSTANDING DOCUMENTATION REF **OUALIFICATION** ENVIRONMENT METHOD ITE<sup>MS</sup> EQUIPMENT DESCRIPTION Specifi-Qualifi-Specifi-Oualification cation cation Parameter cation System: 63 Operating 1 Year Time Plant ID No. Attachment A (1)N/A N/A None ] Year Component Terminal Block Engineering Temperature Manufacturer: General (4)Attachment B.3 Analysis None 325 340  $(^{O}F)$ Electric Company • Model Number: EB-5 and CR15182 Pressure Engineering Attachment B.3 Analysis. (PSIA) . 21.5 88 None (4)Function: Wire Termination ' Relative Engineering Humidity (%) (4)100 Attachment B.3 Analysis None 100 Req'd: N/A Accuracy: Demon: N/A Chemical Spray (4) N/A N/A lategory: None. N/A N/A N/A Service: R/A Radiation Engineering . 2x10<sup>7</sup> 3.1x10<sup>7</sup> Attachment B.31 Analysis (4) None (RAD) \_ocation: Attachment A Attachment B.3 Engineering Anal None (2)40 Years N/A Aging Flood Level Elev: 552' N/A N/A None Sove Flood Level: Yes X Submergence N/A N/A

(4).

lotes: (1) See Section 2.4 in 79-01B report.

No

(2) See Section 4.1. in 79-01B report.

(3) All notes and other information not on these
sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: <u>*R.I. mills*</u>

Reviewed by:

QA Acceptance:

| EEB  | 63-0067 |  |     |   |     |  |
|------|---------|--|-----|---|-----|--|
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## Attachment A Terminal Blocks

System: 63 Unit: 1

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| Mark | •. | Plant I.D. No. | ۳ | ĸ | Room |
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| PMB  |    | F1S-63-11      |   |   | 12   |



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EEB 63-0067

## Attachment B.3 Terminal Block GE Type EB-5 and CR-151B

Rev O

Test Information and Data - Letter GE Company to H. J. Green of TVA dated 3 February 1978 supplied test data for Terminal Block GE Company catalog No. CR-151B.

- Letter Westinghouse to F. W. Chandler of TVA dated 9 March 1978 supplied data for Terminal Block Westinghouse Style No. 80530 series.

- BUR Owner's Group Report 081-A-01 dated 23 September 1980 supplied test data for Terminal Block GE Company Type No. EB-25.

The above test information includes aging, radiation, LOCA temperature and pressure testing, and is sufficient in our judgement to warrant confidence that the type EB-5, of the same material (cellulose phenolic) and same size as the tested type EB-25, and larger than, the tested type CR-151B will itself perform as well, and is satisfactory for continued service since they are located similarly in protective boxes. However, in connection with additional cable LOCA tests to be performed at Wyle Laboratories in Huntsville, Alabama, we will include the type EB-5 terminal block to fully confirm its similarity.
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| Facility: Browns Ferry Nucl<br>Unit: 2<br>Docket: 50-260                       | ear Plant                        | System cor             | PONENT EVALUA<br>- | TION WORK SH       | IEET (Rev 2)       | (3)<br>Sheet No. <u>FER</u><br>Revision <u>O</u><br>Date <u>10-</u> | 63-0068<br>2.3-80 |
|--------------------------------------------------------------------------------|----------------------------------|------------------------|--------------------|--------------------|--------------------|---------------------------------------------------------------------|-------------------|
| FOUTPMENT DESCRIPTION                                                          |                                  | ENVIRONMENT            |                    | DOCUMENTATION REF  |                    | QUALIFICATION                                                       | OUTSTANDING       |
|                                                                                | Parameter                        | Specifi-<br>cation     | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation | nemod .                                                             |                   |
| System: 63<br>Plant ID No. Attachment A                                        | Operating<br>Time                | l Year                 | 1 Year             | (1)                | N/A                | N/A                                                                 | None .            |
| Component Terminal Block                                                       |                                  |                        |                    |                    |                    |                                                                     |                   |
| Kanufacturer: General<br>Electric Company                                      | Temperature<br>(°F)              | 325 ·                  | 340                | (4)                | Attachment B.3     | Engineering<br>Analysis                                             | None              |
| Kodal Number: EB-5 and CR15182                                                 | Pressure<br>(PSIA)               | 21.5                   | - 88               | . (4)              | Attachment B.3     | Engineering<br>Analysis                                             | none .            |
| Function: Uire Termina-<br>tion '                                              | Relative<br>Humidity (%)         | 100                    | 100                | (4)                | Attachment B.3     | Engineering<br>Analysis                                             | None              |
| Couracy: Regid: N/A<br>Demon: N/A<br>Category: N/A                             | Chemical<br>Spray                | N/A                    | N/A                | (4)                | N/A                | N/A                                                                 | None .            |
| Service: N/A                                                                   | Radiation<br>(RAD)               | 3.1x10 <sup>7</sup>    | 2x10 <sup>7</sup>  | . (4)              | Attachment B.3     | Engineering<br>Analysis                                             | None              |
| .ocation: Attachment A                                                         | Aging                            | N/A                    | 40 Years           | (2)                | Attachment B.3     | Engineering Anal                                                    | None              |
| lcod Level Elev: 552<br>bove Flood Level: Yes X                                | Submergence                      | N/A                    | N/A                | (4)                | N/A                | N/A -                                                               | None              |
| Sotes: (1) See Section 2                                                       | .4 in 79-018 re                  | port.                  |                    | •                  |                    | Prepared by: 7                                                      | 2. L. mills       |
| <ul> <li>(2) See Section 4</li> <li>(3) All notes and sheets are on</li> </ul> | .1. in 79-018<br>tother informat | report.<br>tion not on | these              |                    |                    | Reviewed by:                                                        | Helagner          |
| • (4) See Section 3                                                            | .0 and/or Appen                  | dix B in 79            | -01B report.       | : \                | •.                 | QA Acceptance;                                                      | ······            |

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### Attachment A Terminal Blocks

System: 63 Unit: 2

<u>Mark</u>

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### Plant I.D. No.

Room

PMB

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EEB 63-0068

#### Attachment B.3 Terminal Block GE Type EB-5 and CR-151B

Rev O

Test Information and Data - Letter GE Company to H. J. Green of TVA dated 3 February 1978 supplied test data for Terminal Block GE Company catalog No. CR-1518.

- Letter Westinghouse to F. W. Chandler of TVA dated 9 March 1978 supplied data for Terminal Block Westinghouse Style No. 80530 series.

- BWR Owner's Group Report 081-A-01 dated 23 September 1980 supplied test data for Terminal Block GE Company Type No. EB-25.

The above test information includes aging, radiation, LOCA temperature and pressure testing, and is sufficient in our judgement to warrant confidence that the type EB-5, of the same material (cellulose phenolic) and same size as the tested type EB-25, and larger than, the tested type CR-151B will itself perform as well, and is satisfactory for continued service since they are located similarly in protective boxes. However, in connection with additional cable LOCA tests to be performed at Wyle Laboratories in Huntsville, Alabama, we will include the type EB-5 terminal block to fully confirm its similarity. 🗢 v za zarzustanie statu internetatione status status (status) (s

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Revision O

Sheet No. \_FFR 63-0069

Facility: Browns Ferry Nuclear Plant

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Date 10-23-80 OUALIFICATION OUTSTANDING DOCUMENTATION REF **ENVIRONMENT** EQUIPMENT DESCRIPTION METHOD . ITEMS Specifi-Oualifi-Specifi-Qualifi-Parameter cation cation cation cation System: 63 Operating 1 Year Plant ID No. Attachment A Time (1)None N/A 1 Year N/A Component Terminal Block Engineering Temperature (anufacturer: General) 325 (4) None 340 Attachment B.3 Analysis  $(^{0}F)$ Electric Company CR15182 Pressure Engineering (PSIA) 21.5 88 Attachment B.3 Analysis<sup>\*</sup> None (4) Punction: Mire Termination ' Relative Engineering Humidity (%) (4)100 100 Attachment B.3 Analysis None Req'd: N/A .ccuracy: Demon: N/A Chemical Spray ategory: (4) None. N/A N/A N/A N/A N/A ervice: N/A Engineering . Radiation 2x10<sup>7</sup>  $3.1 \times 10^7$ Attachment B.31 Analysis (RAD) None (4) ccation: Attachment A Attachment B.3 Engineering Anal 40 Years (2)None Aaina N/A lood Level Elev: 552' None N/A N/A bove Flood Level: Yes X Submergence N/A N/A  $(4)^{1}$ No \* Prepared by: <u>R.L. Mills</u> stes: (1) See Section 2.4 in 79-01B report.

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(2) See Section 4.1. in 79-01B report.

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix 8 in 79-018 report.

Reviewed by: Allhane

QA Acceptance:

| EEB | 63-0069                                |  |  |  |  |  |
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### Attachment A Terminal Blocks

System: 63 Unit: 3

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| Mark | • | Plant I.D. No. | • | • | Room |
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EEB 63-0069

#### Attachment B.3 Terminal Block GE Type EB-5 and CR-151B

Rev O

Test Information and Data - Letter GE Company to H. J. Green of TVA dated 3 February 1978 supplied test data for Terminal Block GE Company catalog No. CR-151B.

- Letter Westinghouse to F. W. Chandler of TVA dated 9 March 1978 supplied data for Terminal Block Westinghouse Style No. 80530 series.

- BWR Owner's Group Report 081-A-01 dated 23 September 1980 supplied test data for Terminal Block GE Company Type No. EB-25.

The above test information includes aging, radiation, LOCA temperature and pressure testing, and is sufficient in our judgement to warrant conficence that the type EB-5, of the same material (cellulose phenolic) and same size as the tested type EB-25, and larger than, the tested type CR-151B will itself perform as well, and is satisfactory for continued service since they are located similarly in protective boxes. However, in connection with additional cable LOCA tests to be performed at Wyle Laboratories in Huntsville, Alabama, we will include the type EB-5 terminal block to fully confirm its similarity.



SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Facility: Browns Ferry Nuclear Plant . Unit: 2 Docket: 50-260

**OUALIFICATION** OUTSTANDING ENVIRONMENT DOCUMENTATION REF EQUIPMENT DESCRIPTION METHOD ITEMS Specifi-Qualifi-Qualifi-Specification cation cation Parameter cation System: 64 1 Year Engineering Operating Attachment A Attachment None Analysis C.3 Plant ID No. Attachment A Time (1)Cable ' Component 16AWG, 3/c, WVB, (PE) IPCEA S-61-402 Standard Mat'l Long-Term Temp. Temperature (°F) par 3.9 and None Manufacturer:Attachment B (4)Rating 325 203 Appendix C.2 N/A None N/A N/A Pressure Model Number: N/A -69.7 . (PSIA) (4) Function: IPCEA S-61-402 Standard par 3.9, **Material** Relative Signal/Instrumentation Humidity (%) 3.7.3, & 6.7 Requirement None 100 100 (4) Accuracy: Reg'd: N/A Chemical Demon: N/A Spray **Category:** N/A N/A None. (4) Attachment A N/A N/A NUREG-0588 6.5x10'8 Generic Attachment A Service: 4x1098 Material Material Radiation None 4x107 Attach. C.1 List Tests (RAD) (4) Location: Ø None Attachment C.2 **Oper.** Experience 10 years (2)Aaina N/A Flood Level Elev: 552' Above Flood Level: Yes X Submergence N/A N/A N/A None N/A (4) No

lotes: (1) See Section 2.4 in 79-01B report.

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: W. Mil

(3)

Revision

Date

Sheet No. EEB 64-0001

Reviewed by: D.R. Helst

QA Acceptande:

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Attachment A

EEB-**64-000** (

System: 64 Unit: 2

Component: Cable Mark: WVB

| <u>Plant I. D. No.</u> | Room | <b>Function/Service</b> | <u>Category</u> | <u>Operating Time</u> |
|------------------------|------|-------------------------|-----------------|-----------------------|
| 2ES401                 | 0    | TE-64-52C DW TEMP       | A               | l yr                  |
| 2ES3276                | 0    | TE-64-52A DW TEMP       | A               | l yr                  |
| 3ES401                 | 0    | TE-64-52C DW TEMP       | Α.              | l yr                  |
| 3ES3276                | 0    | TE-64-52A DW TEMP       | А               | 1 yr                  |
| 1ES401                 | 0    | TE-64-52C DW TEMP       | А               | 1 yr                  |
| 1ES3276                | 0    | TE-64-52A DW TEMP .     | Α               | l yr                  |

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# EEB 64-0001

Rev \_\_\_\_\_

### ATTACHMENT B

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Mark WVB

|    | Contract No. Type                          |                                  | Manufacturer                 |
|----|--------------------------------------------|----------------------------------|------------------------------|
|    | 72C7-83849<br>72C7-74910-2<br>69C3-64863-1 | CSPE/CSPE<br>XLPE/CSPE<br>PE/PVC | BIW<br>Okonite<br>Rockbestos |
| TR | 822675 from<br>WBN 74C7-85259              | XLPE/CSPE                        | Belden Corporation           |
| TR | 820907 from<br>74C7-85259                  | XLPE/CSPE                        | Belden Corporation           |
|    | 7307-84211                                 |                                  | ITT Surp.                    |

# EEB 64-0001

Rev

### ATTACHMENT B

Mark WVB

Contract No.

<u>Type</u> CSPE/CSPE

XLPE/CSPE PE/PVC

XLPE/CSPE

XL'PE/CSPE

72C7-83849 72C7-74910-2 69C3-64863-1

TR 822675 from WBN 74C7-85259

TR 820907 from 74C7-85259

7307-84211

Manufacturer

BIW. Okonite Rockbestos

Belden Corporation

Belden Corporation

ITT Surp.





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Sheet No: EEB-64-000/

Revision: 0

on: <u>0</u>

#### ATTACHMENT C

C.1 Integrated dose - 10 years plus accident

#### Beta Dose

#### References:

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- 1. W. W. Parkinson, O. Sisman, October 1970, The Use of Plastics and Elastomers in Nuclear Radiation.
- 2. R. B. Blodgett, R. G. Fisher, June 1968, Insulations and Jackets for Control and Power Cables.
- 3. M. Asaka, S. Yamamoto, 1973, Radiation Resistance of Plastic Insulating Materials for Cable.

4. Anaconda-Continental Test Report No. 79117 dated April 1979.

5. Wyle Laboratory Test Report 43854-3.

6. Franklin Institute Test Reports E-C4113 and FC-5120.

7. Rockbestos Company Test Report dated July 1977 amended 1979.

The TVA value of  $4 \times 10^9$  rads for the beta accident dose at the periphery of the containment is being reevaluated due to its high value. However, using this value and making reference to the 7901-B DOR guidelines section 4.2.1 and the depth dose penetration, which owing to the low penetrating power of beta particles gives a factor of 10 reduction for 40 mils of jacketing material, and a factor of 10 for an insulation thickness of 30 mils and which is conservative for TVA's 600-volt power and control cables and extremely conservative for TVA's triax and coax and signal cable due to their thickness and the presence of metallic shielding material, and assigning a factor of 5 for the installation shielding of metal trays; conduit, boxes, and flexible conduit, we arrive at a total effective dose of .8 x 10' rads of beta.

Since the energy dissipation of gamma radiation occurs via ionizing processes, one can add the accident dose of  $4 \times 10^{\circ}$  rads of gamma directly. The accumulated integrated gamma 10-year dose (the time presently assigned to connectors and penetrations) amounts to 7 2.5 x 10 rads which added directly gives a total dose of 7.3 x 10 rads. In addition, since the containment is inerted in operation, the scission rate and deterioration of the insulation and jacketing materials through oxidation will be much less than for tests conducted in air.

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Sheet No: EEB - 64 - 0001

#### ATTACHMENT C (Con'd)

Revision: 0'

Since the above value of  $7.3 \times 10^7$  is less than the values for which we have in-air test data for SROAJ types (1.2 x 10°) and for XLPE types (2 x 10°), it is concluded that the beta dose in an accident will not disqualify the cables presently installed, and the cables will remain operable in the service environment.

C.2 TVA Engineering Report No. 1942

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

. These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

Reviewed by: Prepared by: QA Acceptance:



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SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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Revision

Sheet No. EEB-64-0002

Facility: Browns Ferry Nuclear Plant Unit: 1 Docket: 50-259

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Date QUALIFICATION OUTS AND INC ENVIRONMENT DOCUMENTATION REF EQUIPMENT DESCRIPTION METHOD ITEMS Specifi-Qualifi-Qualifi-Specifi-Parameter cation cation cation cation System: 64 Operating Plant ID No. Attachment A Time N/A ANA. 'Sone N/A H/A (1)Component Junction Box . Temperature (°F) · N/A M/A il/A N/A Kone Manufacturer: N/A (4)Pressure 21.5 Engineering Model Number: N/A (PSIA) 21.5 Attachment B Analysis (4) iona. max. Function: Terminal Housing Relative Humidity (2)(4)R/A N/A N/A N/A -Kone Accuracy: Reg'd: N/A Demon: N/A Chemical Spray Category: N/A N/A (4) N/A N/A. N/A lione . Service: N/A Radiation N/A 🕺 N/A N/A N/A None. (RAD) (4) Location: Attachment A (2)Aging N/A MZA R/A N/A None Flood Level Elev: 552' Above Flood Level: Yes X Submergence N/A N/A N/A N/A licne (4) No

Notes: (1) See Section 2.4 in 79-018 report.

(2) See Section 4.1.2 in 79-01B report.

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: W. Mita

Reviewed by: D.R. Websty,

QA Acceptance:

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# EEB -64-0002

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### ATTACHMENT A

# Junction Boxes

System: 64 Unit: 1 .

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| Mark  | Plant I.D. No. | Room |
|-------|----------------|------|
| 101   | JB-2882        | 9    |
| 303   | JB-2581        | 9    |
| 303   | JB-2891        | 8    |
| JOD   | JB-2802        | 12   |
| JOH   | JB-2343        | 15   |
| JOH   | JB-3344        | 15   |
| JOH   | JB-2802        | 12   |
| JOH   | · JB-2801      | 12   |
| J00   | JB-2279        | 12   |
| J0J   | JB-2892        | 9    |
| 300   | JB-2279        | 8    |
| J00   | JB-2904        | 8    |
| 300   | JB-2893        | 8    |
| JOA   | JB-2633        | 15   |
| JOA   | JB-2637        | 15   |
| JOB   | JB-2787        | 13   |
| JOB   | JB-2788        | 13   |
| JOB   | JB-2792        | 14   |
| JOB   | JB-2789        | 14   |
| JOD   | JB-2949        | 15   |
| JOD   | JB-515         | 15   |
| JOD   | JB-4788        | 8    |
| JOD   | JB-4780        | 8    |
| JOD   | JB-4790        | 8    |
| JOD . | JB-3647        | 14   |
| 300   | JB-2954        | . 14 |
| JON   | JB-3651        | 14   |
| JON   | JB-669         | 4    |
| 115   | JB-658         | 5    |
| .100  | JB-2619        | 12   |
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EEB -64- 00.02

### ATTACHMENT B

Rev

### TVA Engineering Report EEB 1950B

The junction boxes in the HELB areas are TVA type D boxes which are non ventilated, dust tight, and water tight similar to HEMA boxes except of 12and 10-gauge steel rather than of 14- and 12-gauge steel as in NEMA boxes. They are scaled with neoprene gaskets or RTV silicone in order to restrict moisture entry.

The boxes are not intended to serve as pressure boundaries. A pressure differential will equalize, hence there is no requirement to consider ability to resist deformation under differential pressure.

The steel of the box construction is not subject to thermal nor radiation aging effects in its service environment. Further, neither the RH of the normal environment nor the RH of the relatively short HELB environment will produce sufficient corrosion to painted boxes to affect the strength of the boxes. The neoprene gasket and RTV silicone sealing materials are adequate for the service environment temperature, and will be replaced after any HELB episode.

Consequently it is our engineering judgement that the junction boxes in themselves are not significantly affected by their service environment. The qualification of equipment located on or within these boxes is addressed separately.



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SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Facility: Browns Ferry Nuclear Plant Unit: 2 Docket: 50-260

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Date OUTSTAND. DOCUMENTATION REF QUALIFICATION ENVIRONMENT METHOD ITEMS EQUIPMENT DESCRIPTION Specifi-Oualifi-Specifi-Oualification Parameter cation cation cation System: 64 Operating Plant ID No. Attachment A Time R/A N/A None N/A N/A (1)Component Junction Box Temperature (<sup>O</sup>F) N/A R/A None M/A N/A Hanufacturer: N/A (4) Engineering Pressure 21.5 Model Number: N/A Analysis Attachment B Kone (PSIA) 21.5 · (4) max. Function: Terminal Housing Relative Humidity (%) (4) N/A None N/A N/A N/A Accuracy: Reg'd: N/A Demon: N/A Chemical Spray Category: N/A (4) N/A None N/A N/A N/A Service: N/A Radiation N/A None N/A K/A N/A (RAD) (4) Location: Attachment A (2)None N/A Aging N/A -N/A N/A Flood Level Elev: 552' Above Flood Level: Yes X Submergence N/A N/A N/A N/A None (4) No Prepared by: W. Mita See Section 2.4 in 79-01B report. Notes: (1)(2) See Section 4.1.2 in 79-01B report. ۰. Reviewed by: D.K. Hebston (3) All notes and other information not cr. these QA Acceptance: sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

(3)

Revision

Sheet No. \_\_\_\_\_\_\_\_

# EEB 64-0003

Rev \_

### ATTACHMENT A

### Junction Boxes

System: 64 Unit: 2

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| <u>Mark</u>                                                                                                                                           | Plant I.D. No.                                                                                                                                                                                               | • | Room                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------------------------|
| JOJ<br>JOD<br>JOH<br>JOH<br>JOH<br>JOH<br>JOO<br>JOO<br>JOO<br>JOO<br>JOO<br>JOD<br>JQD<br>JQD<br>JQD<br>JQD<br>JQD<br>JQD<br>JQD<br>JQD<br>JQD<br>JQ | JB-2911<br>JB-2807<br>JB-2807<br>JB-2806<br>JB-2281<br>JB-2281<br>JB-2901<br>JB-2894<br>JB-2793<br>JB-2790<br>JB-2790<br>JB-517<br>JB-2950<br>JB-4792<br>JB-4793<br>JB-4794<br>JB-3652<br>JB-2260<br>JB-2296 |   | 8<br>12<br>12<br>12<br>12<br>12<br>8<br>8<br>8<br>8<br>14<br>14<br>14<br>15<br>15<br>15<br>8<br>8<br>8<br>8<br>8<br>14<br>4<br>5 |
| JOC                                                                                                                                                   | JB-2795                                                                                                                                                                                                      |   | 12                                                                                                                               |

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EEB -64-0003

### ATTACHMENT B

### TVA Engineering Report EEB 1950B

Rev

The junction boxes in the HELB areas are TVA type D boxes which are non ventilated, dust tight, and water tight similar to NENA boxes except of 12and 10-gauge steel rather than of 14- and 12-gauge steel as in NENA boxes. They are sealed with neoprene gaskets or RTV silicone in order to restrict moisture entry.

The boxes are not intended to serve as pressure boundaries. A pressure differential will equalize, hence there is no requirement to consider ability to resist deformation under differential pressure.

The steel of the box construction is not subject to thermal nor radiation aging effects in its service environment. Further, neither the RH of the normal environment nor the RH of the relatively short HELB environment will produce sufficient corrosion to painted boxes to affect the strength of the boxes. The neoprene gasket and RTV silicone sealing materials are adequate for the service environment temperature, and will be replaced after any HELB episode.

Consequently it is our engineering judgement that the junction boxes in themselves are not significantly affected by their service environment. The qualification of equipment located on or within these boxes is addressed separately.

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Facility: Browns Ferry Nuclear Plant Unit: 2 ·

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3) ٠, Sheet No. EEB 64-0004 Revision

Date

Docket: 50-260

| FOULPMENT DESCRIPTION                                                   | ENVI RONMENT             |                    |                    | DOCUMENTATION REF  |                                         | QUALIFICATION ·                     | OUTSTANDING |  |
|-------------------------------------------------------------------------|--------------------------|--------------------|--------------------|--------------------|-----------------------------------------|-------------------------------------|-------------|--|
|                                                                         | Parameter                | Specifi-<br>cation | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                      | יינוחטטי                            |             |  |
| System: 64<br>Plant ID No. Attachment A                                 | Operating .<br>Time      | Attachment A       | ] Year             | (1)                | Attachment<br>C.4                       | Engineering<br>Analysis             | None        |  |
| Component Cable '<br>14AWG, 1/c, WCA; (PN)<br>Manufacturer:Attachment B | Temperature<br>(°F)      | 158 .              | 153                | (4)                | Attachments<br>C.1 and C.2              | Attachment C.3                      | None        |  |
| Model Number: N/A                                                       | Pressure<br>(PSIA)       | 15.0               |                    | ·.<br>(4)          | N/A                                     | N/A                                 | None        |  |
| Function: Control/Power                                                 | Relative<br>Humidity (%) | 100                | 100 -              | . (4)              | 1PCEA S-61-402<br>par 3.9, 3.7.3<br>6.7 | Standard<br>Material<br>Requirement | None        |  |
| Demon: N/A<br>Category: Attachment A                                    | Chemical<br>Spray        | N/A                | N/A                | -(4)               | N/A .                                   | · N/A                               | None        |  |
| Service: Attachment A                                                   | Radiation<br>(RAD)       | $3 \times 10^7$    | 4x10 <sup>7</sup>  | (4)                | NUREG-0588<br>Materials<br>List         | Generic<br>Material<br>Test         | None        |  |
|                                                                         | Aging                    | N/A                | 20 years           | (2).*              | Attachment C.2                          | Oper. Experience                    | None        |  |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No                | Submergence              | N/A                | N/A                | (4).               | N/A                                     | . • N/A ·                           | None        |  |
| Notes: (1) See Section 2                                                | 2.4 in 79-01B re         | eport.             |                    | -                  |                                         | Prepared by:                        | W. mita     |  |

(1) See Section 2.4 in 79-01B report. Notes:

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Reviewed by: D.R. Helister

QA Acceptance:

Attachment A

| System: 64<br>Unit: 2                            |                  |                                                              | Ň                | • EEB- <b>64- 0004-</b><br>Rev       |
|--------------------------------------------------|------------------|--------------------------------------------------------------|------------------|--------------------------------------|
| Component: Cabl<br>Mark: WCA                     | .e<br>(PN)       |                                                              | •                |                                      |
| <u>Plant I. D. No.</u>                           | Room             | Function/Service                                             | Category         | Operating Time                       |
| 1ES1191-I<br>1ES1198-I<br>2ES1191-I<br>2ES1198-I | 2<br>2<br>2<br>2 | TS-64-68 Air<br>TS-64-70 Air<br>TS-64-68 Air<br>TS-64-70 Air | A<br>A<br>A<br>A | l yr<br>l yr<br>l yr<br>l yr<br>l yr |

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## EEB 64-0004

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Rev \_

### ATTACHMENT B

Mark WCA

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<u>Contract No</u>. 72C7-75128 72X7-74885-1 73C7-84528 67C3-91618 72C7-75328-1 70C7-54179-1 TR 822378) 822639) Sequoyah 822639) 72C7-75228-1 822915) 72C7-75228-1

Plastic Wire & Cable Corp Brand-Rex Plastic Wire & Cable Coro Brand-Rex Brand-Rex Brand-Rex

Manufacturer

Plastic Wire & Cable Corp Plastic Wire & Cable Corp

| Sheet No.: | EEB- 64-0004 |
|------------|--------------|
|            | •            |
| Revision:  | · 0          |

### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of 75° C continuous,  $95^{\circ}$  C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121  $_{,C}$  (250° F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

| Prepared by:   | <u> </u> | <br> |
|----------------|----------|------|
| Reviewed by:   | •        | <br> |
| QA Acceptance: | !        | <br> |
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| Facility: Browns Ferry Nuc<br>Unit: 2<br>Docket: 50-260               | SYSTEM COMP              | ONENT EVALU/<br>-   | (3)<br>Sheet No. <u>EEB 64-0005</u><br>Revision<br>Date |                    |                                         |                                     |             |
|-----------------------------------------------------------------------|--------------------------|---------------------|---------------------------------------------------------|--------------------|-----------------------------------------|-------------------------------------|-------------|
| FOUTPMENT DESCRIPTION                                                 | ENVIRONMENT              |                     |                                                         | DOCUME             | NTATION REF                             | QUALIFICATION                       | OUTSTANDING |
|                                                                       | Parameter                | Specifi-<br>cation  | Qualifi-<br>cation                                      | Specifi-<br>cation | Qualifi-<br>cation                      | METHOD                              | ITEMS       |
| System: <sup>64</sup><br>Plant ID No. Attachment A                    | Operating<br>Time        | Attachment A        | ] Year                                                  | (1)                | Attachment<br>C.4                       | Engineering<br>Analysis             | None        |
| Component Cable<br>12AWG, 1/c, WBB, (PN)<br>Manufacturer:Attachment B | Temperature<br>(°F)      | 297                 | 153                                                     |                    | Attachments<br>C.1 and C.2              | Attachment C.3                      | None .      |
| Model Number: N/A                                                     | Pressure<br>(PSIA)       | 15.0                | N/A                                                     | (4)                |                                         | N/A                                 | None :      |
| Function: Control/Power                                               | Relative<br>Humidity (%) | 100                 | 100                                                     | . (4)              | IPCEA S-61-402<br>par 3.9, 3.7.3<br>6.7 | Standard<br>Material<br>Requirement | None        |
| Demón: N/A<br>Category: Attachment A                                  | Chemical<br>Spray        | N/A                 | N/A                                                     | (4)                | N/A                                     | N/A                                 | None        |
| Service: Attachment A                                                 | Radiation<br>(RAD)       | 3 x 10 <sup>7</sup> | 4x10 <sup>7</sup>                                       | . (4)              | NUREG-0588<br>Materials<br>List         | Generic<br>Material<br>Test         | None        |
|                                                                       | Aging                    | N/A                 | 20 vears                                                | (2)                | Attachment C.2                          | Oper, Experience                    | None        |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No              | Submergence              | N/A                 | N/A                                                     | (4)                | N/A                                     | . N/A                               | None        |
| Notes: (1) See Section 2                                              | .4 in 79-018 re          | port.               |                                                         |                    |                                         | Prenared by                         | 1 mit       |

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

Reviewed by: D.R. Helm

Attachment A

| System: 64<br>Unit: 2            |      | 、                |                 | EEB <b>-64- 0005</b><br>Rev |
|----------------------------------|------|------------------|-----------------|-----------------------------|
| Component: Cable<br>Mark: WBB (P | N)   |                  |                 |                             |
| Plant I. D. No.                  | Room | Function/Service | <u>Category</u> | Operating Time              |
| 1ES807-1                         | 3    | TS-64-72 Air     | A               | l yr                        |
| 2ES807-1                         | 3    | TS-64-72 Air     | Α               | l yr                        |
| 3ES807-1                         | 3    | TS-64-72 Air     | A               | l yr                        |

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# EEB <u>64-0005</u> Rev \_\_\_\_\_

## ATTACHMENT B

Mark WBB

Contract No.

67C3-91618 73C7-84528 72C7-75328-1 70C7-54179-1

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PN PN PN PN

## Manufacturer

Brand-Rex Plastic Wire & Cable Corp Brand-Rex Brand-Rex



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Sheet No.: EEB- 64-0005

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5): These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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| Facility: Browns Ferry Nuclear Plant<br>Unit: 2<br>Docket:50-260 |                          | SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) |                    |                    | IEET (Rev 2)                            | (3)<br>Sheet No. <u>EEB 64-0006</u><br>Revision<br>Date |             |
|------------------------------------------------------------------|--------------------------|------------------------------------------------|--------------------|--------------------|-----------------------------------------|---------------------------------------------------------|-------------|
| FOUTPMENT DESCRIPTION                                            |                          | ENVIRONMENT                                    |                    | DOCUMEN            | ITATION REF                             | QUALIFICATION                                           | OUTSTANDING |
|                                                                  | Parameter                | Specifi-<br>cation                             | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                      | METROD                                                  | 11EPi5 .    |
| System: <sup>64.</sup><br>Plant ID No. Attachment A              | Operating<br>Time        | Attachment A                                   | l Year             | (1)                | Attachment<br>C.4                       | Engineering<br>Analysis                                 | None        |
| Component Cable<br>14AWG, 1/c, NCA, (PN)                         |                          |                                                |                    | •                  |                                         | • .                                                     |             |
| Manufacturer:Attachment B                                        | Temperature<br>(°F)      | 294                                            | 153                | (4)                | Attachments<br>C.1 and C.2              | Attachment C.3                                          | None .      |
| Hodel Number: N/A                                                | Pressure<br>(PSIA)       |                                                | N/A                | (4)                | N/A                                     | N/Δ                                                     | None        |
| Function: Control/Power                                          | Relative<br>Humidity (%) | 100                                            | 100 -              | (4)                | IPCEA S-61-402<br>par 3.9, 3.7.3<br>6.7 | Standard<br>Material<br>Requirement                     | None        |
| Accuracy: Req'd: N/A<br>Demon: N/A<br>Category: Attachment A     | Chemical<br>Spray        | ·                                              | N/A .              | (4)                | N/A                                     | <br>N/A                                                 | None        |
| Service: Attachment A                                            | Radiation<br>(RAD)       | 3 × 10 <sup>7</sup>                            | 4x10 <sup>7</sup>  | . (4)              | NUREG-0588<br>Materials<br>List         | Generic<br>Material<br>Test                             | None        |
| LOCATION: 4                                                      | Aging                    | N/A                                            | 20 years           | (2)                | Attachment C.2                          | Oper. Experience                                        | None        |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X               | Submergence              | N/A                                            | N/A                | · · · · ·          | N/A                                     | . N/A <sup>.</sup>                                      | None        |

Notes: (1) See Section 2.4 in 79-01B report.

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

Prepared by:  $\underline{W}$ 

Reviewed by: D.R. Weller

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Attachment A

| Syste<br>Unit:         | em: 64<br>: 2        | 1            |                | • |                                                                   | ,          | EEB- <b>64-000 G</b><br>Rev |
|------------------------|----------------------|--------------|----------------|---|-------------------------------------------------------------------|------------|-----------------------------|
| Compo<br>Mark:         | onent:               | Cable<br>WCA | e<br>(PN)      |   | • .                                                               |            |                             |
| <u>Plant</u>           | : I. D.              | No.          | Room           |   | Function/Service                                                  | Category   | Operating Time              |
| 1ES3:<br>2ES3:<br>3ES3 | 308-11<br>308<br>308 |              | .4<br>4 -<br>4 |   | TS-64-73 CS CLR PMP<br>TS-64-73 CS CLR PMP<br>TS-64-73 CS CLR PMP | A .<br>A . | l yr<br>l yr<br>l yr        |
| 5205.                  |                      |              | ••             |   |                                                                   |            | 1 J1                        |



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EEB 64-0006

ATTACHMENT B

Mark WCA

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Contract No. 72C7-75128 72X7-74885-1 73C7-84528 67C3-91618 72C7-75328-1 70C7-54179-1 TR 822378) Sequoyah 822639) 7207-75228-1 822915)

7207-83874-1

Manufacturer

Rev

Plastic Wire & Cable Corp Brand-Rex Plastic Wire & Cable Corp **Brand-Rex** Brand-Rex Brand-Rex

Plastic Wire & Cable Corp

Plastic Wire & Cable Corp



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Sheet No.: EEB-64-0006

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

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This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of 75° C continuous,  $95^{\circ}$  C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121 C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

| <b>C.4</b> | The post-HELB conditions are les | ss than the normal cable rating and | , |
|------------|----------------------------------|-------------------------------------|---|
|            | in our judgment, the cables coul | ld operate satisfactorily for a     | - |
|            | post-accident of a year.         | •                                   |   |

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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(3) • SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Facility: Browns Ferry Nuclear Plant Sheet No. EEB 64-0007 Unit: 2 Revision Docket: 50-260 Date ENVIRONMENT DOCUMENTATION REF QUALIFICATION OUTSTANDING EQUIPMENT DESCRIPTION METHOD ITEMS Specifi-Oualifi-Oualifi-Specification cation Parameter cation cation System: 64 Engineering 1 Year Attachment None Operating Attachment A C.4 Analysis Plant ID No. Attachment A Time (1) Component Cable ' 14AWG, 1/c, WCA, (PN) Attachments Temperature (°F) Manufacturer: Attachment B None . 294 153 (4)C.1 and C.2 Attachment C.3 ۰. Pressure Model Number: N/A (PSIA) (4) 15.0 N/A " N/A N/A None Function: Control/Power LPCEA S-61-402 Standard Relative' par 3.9, 3.7.3 Material Humidity (%) 6.7 Requirement (4) None 100 100 Accuracy: Req'd: N/A Demon: N/A Chemical Spray Category: Attachment A (4) N/A N/A N/A . N/A . None Service: Attachment A NUREG-0588 Géneric Radiation Materials Material  $3 \times 10^7$ 4x107 (RAD) (4)Test List None Location: 5 Aaina N/A (2)None 20 years Attachment C.2 Oper. Experience Flood Level Elev: 552' **、**· Above Flood Level: Yes X Submergence N/A N/A N/A N/A None (4) · · No Notes: See Section 2.4 in 79-01B report. Prepared by: W. Mita (1)

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

Reviewed by: B.R. Hilston

QA Acceptance:

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Attachment A

| System: 64<br>Unit: 2           |           | L.                                             |          | EEB- <b>64-0007</b><br>Rev |
|---------------------------------|-----------|------------------------------------------------|----------|----------------------------|
| Component: Cable<br>Mark: WCA ( | 9<br>(PN) | 、                                              |          |                            |
| <u>Plant I. D. No.</u>          | Room      | Function/Service                               | Category | Operating Time             |
| 1ES3746–II<br>2ES3674           | 5<br>5 '  | TS-64-71 RHH PMP FAN<br>TS-64-71 RHH PMP MTR D | A<br>A   | l yr<br>l yr               |

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## EEB 64-0007

Rev \_\_\_

#### ATTACHMENT B

Mark WCA

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<u>Contract No</u>.

72C7-75128 72X7-74885-1 73C7-84528 67C3-91618 72C7-75328-1 70C7-54179-1 TR 822378) Sequoyah 822639) 72C7-75228-1 822915) 72C7-83874-1 <u>Manufacturer</u>.

Plastic Wire & Cable Corp Brand-Rex Plastic Wire & Cable Coro Brand-Rex Brand-Rex Brand-Rex

Plastic Nire & Cable Corp

Plastic Wire & Cable Corp

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Sheet No.: EEB- 64-0007

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous,  $95^{\circ}$  C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

| <b>C.4</b> | The post-HELB conditions are less than the normal cable rating and | i, |
|------------|--------------------------------------------------------------------|----|
|            | in our judgment, the cables could operate satisfactorily for a     |    |
|            | post-accident of a year.                                           |    |

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:

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| FOULPMENT DESCRIPTION                                                          | ,                          | ENVIRONMENT        | ******             | DOCUMEN            | ITATION REF        | QUALIFICATION                          | OUTSTANDIN |
|--------------------------------------------------------------------------------|----------------------------|--------------------|--------------------|--------------------|--------------------|----------------------------------------|------------|
|                                                                                | Parameter                  | Specifi-<br>cation | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation | METHOD                                 | 11543      |
| System: <sup>64</sup><br>Plant ID No. Attachment A                             | Operating<br>Time          | Attachment A       | ] year             | (1)                | Attachment C.3     | Engineering<br>Analysis and<br>Test    | None       |
| Component Cable WUB-1, (X<br>16AWG, 2/c, Type TX<br>Canufacturer: Attachment B | PE)<br>Temperature<br>(°F) | 220                | 385<br>N/A         | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test<br>H/A | None ·     |
| <pre>%odel Number: N/A</pre>                                                   | Pressure<br>(PSIA)         | 15.0               |                    | (4)                | •<br>•             |                                        | ••         |
| Function:<br>Signal/Instrumentation                                            | Relative<br>Humidity (%)   | 100                | 100                | (4)                | Attachment C.]     | Generic<br>Simultaneous<br>Test        | None       |
| Demon: N/A<br>Lategory:Attachment A                                            | Chemical<br>Spray          | N/A ·              | N/A                | (4)                | N/A                | N/Å                                    | None       |
| iervice: Attachment A                                                          | Radiation<br>(RAD)         | $3.1 \times 10^7$  | 2x10 <sup>8</sup>  | . (4)              | Attachment C.1     | Generic<br>Sequential .<br>Test        | None       |
| .ocation: b -                                                                  | Aging                      | N/A                | 40 years           | (2)                | Attachment C.2     | Generic Mat'l Test                     | None       |
| lood Level Elev: 552'<br>Sove Flood Level: Yes X<br>No                         | Submergence                | N/A                | N/A                | (4)                | N/A                | . N/A                                  | None       |
| otes: (1) See Section 2                                                        | .4 in 79-018 re            | eport.             |                    | •                  | 2                  | Prepared by:                           | ). Mita    |



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System: 64 Unit: 2

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Component: Cable Mark: WUB-1

| Plant I. D. No. | Room | Function/Service | Category | <u>Operating Time</u> |
|-----------------|------|------------------|----------|-----------------------|
| 1R2744          | 6    | TE-64-55A AIR    | A        | l yr                  |
| 1R2746          | 6    | TE-64-55B AIR    | A        | l yr                  |
| 1R2748          | 6    | TE-64-55C AIR    | A        | l yr                  |
| 1R2750          | 6    | TE-64-55D AIR    | A        | 1 yr                  |
| 1R2757          | 6    | TE-64-55E AIR    | A        | l yr                  |
| 1R2759          | 6.   | TE-64-55F AIR    | A        | l yr                  |
| 1R2742          | 6    | TE-64-52B AIR    | Α        | 1 yr                  |
| 2R2744          | 6    | TE-64-55A AIR    | Α        | 1 yr                  |
| 2R2746          | 6    | TE-64-55B AIR    | A        | l yr                  |
| 2R2748          | 6    | TE-64-55C AIR    | A        | l yr                  |
| 2R2750          | 6    | TE-64-55D AIR    | Α        | l yr                  |
| 2R2757          | 6    | TE-64-55E AIR    | Α        | l yr                  |
| 2R2759          | 6    | TE-64-55F AIR    | A        | l yr                  |
| 2R2742          | 6    | TE-64-52B AIR    | А        | 1 yr                  |
| 3R2744          | 6    | TE-64-55A AIR    | Α        | lyr                   |
| 3R2746          | 6    | TE-64-55B AIR    | A        | 1 yr                  |
| 3R2748          | 6    | TE-64-55C AIR    | Α        | l yr                  |
| 3R2750          | 6    | TE-64-55D AIR    | Α        | l ýr                  |
| 3R2757          | 6    | TE-64-55E AIR    | Α.       | l yr                  |
| 3R2759          | 6    | TE-64-55F AIR    | Α        | l yr                  |
| 3R2742          | 6    | TE-64-52B AIR    | Α        | 1 yr                  |

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EEB-**(4- 000 B** Rev . . . **.** 

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## ATTACHMENT B

Mark WUB-1

Contract No.

74C7-85464 71C7-54336 72C7-83427 72C7-54994

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Type

CSPE/PVC XLPE/CSPE CSPE/CSPE Manufacturer

Rev

EEB 64-0008

Continental Wire & Cable Continental Wire & Cable Continental Wire & Cable Boston Ins. Wire

Sheet No: EEB -64-0008

Revision: 0

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

|   | Reviewed by:   |
|---|----------------|
| • | Prepared by:   |
|   | QA Acceptance: |

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Facility: Browns Ferry Nuclear Plant Unit: 2

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3) Sheet No. EEB 64-0009 Revision Date

Docket: 50-260

14

| FOULPMENT DESCRIPTION                                                           | ENVIRONMENT                     |                       |                    | DOCUMEN            | NTATION REF        | QUALIFICATION                   | OUTSTANDING |  |
|---------------------------------------------------------------------------------|---------------------------------|-----------------------|--------------------|--------------------|--------------------|---------------------------------|-------------|--|
|                                                                                 | Parameter                       | Specifi-<br>cation    | Qualiři-<br>cation | Specifi-<br>cation | Qualifi-<br>cation | nemob                           | 1100.       |  |
| System: 64<br>Plant ID No. Attachment A                                         | Operating<br>Time               | Attachment A          | l Year ·           | (1)                | Attachment<br>C.3  | Engineering<br>Analysis [       | None        |  |
| Component Cable WUB-1, (CS<br>16AWG, 2/c, Type TX<br>Manufacturer: Attachment B | Temperature<br>(°F)             | 220                   | 250                | . (4)              | Attachment C.1     | Generic<br>Simultaneous<br>Test | None        |  |
| Model Number: N/A                                                               | Pressure<br>(PSIA)              | 15.0                  | N/A                | (4)                | N/A ·              | N/A                             | None        |  |
| Function:<br>Signal/Instrumentation                                             | Relative<br>Humidity <b>(%)</b> | 100                   | 100                | (4)                | Attachment C.1     | Generic<br>Simultaneous<br>Test | None        |  |
| Demon: N/A<br>Category: Attachment A                                            | Chemical<br>Spray               | N/A                   | N/A                | (4)                | N/A                | N/A                             | None        |  |
| Service: Attachment A                                                           | Radiation<br>(RAD)              | 3.1 × 10 <sup>7</sup> | 5x10 <sup>7</sup>  | . (4)              | Attachment C.1     | Generic<br>Sequential<br>Test   | None        |  |
| _OCATION: 6                                                                     | Aging                           | N/A                   | 40 years           | (2)                | Attachment C.2     | Generic Mat'l Test              | None        |  |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No                        | Submergence                     | N/A                   | N/A.               | (4)                | N/A                | N/A                             | None        |  |
| Notes: (1) See Section 2                                                        | 2.4 in 79-01B re                | eport.                |                    | •                  | ,,,,,,,,,_         | Prepared by: W                  | Mila        |  |

\otes: See Section 2.4 in 79-01B report. (1)

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

Reviewed by: O.N. Webster

## Attachment A

| System: | 64 |
|---------|----|
| Unit:   | 2  |

### EEB-64-0009 Rev

Component: Cable Nark: WUB-1

| <u>Plant I. D. No.</u> | Room | <u>Function/Service</u> | Category       | <u>Operating Time</u> |  |
|------------------------|------|-------------------------|----------------|-----------------------|--|
| 1R2744                 | 6 ·  | TE-64-55A AIR           | A              | l yr                  |  |
| 1R2746                 | 6    | TE-64-55B AIR.          | Α ΄            | 1 yr                  |  |
| 1R2748                 | 6    | TE-64-55C AIR           | * A            | l yr                  |  |
| 1R2750                 | 6.   | TE-64-55D AIR           | A              | l yr                  |  |
| 1R2757                 | 6    | TE-64-55E AIR           | A              | 1 yr                  |  |
| 1R2759                 | 6.   | TE-64-55F AIR .         | A              | 1 yr                  |  |
| 1R2742                 | 6    | TE-64-52B AIR           | A              | l yr                  |  |
| 2R2744                 | 6    | TE-64-55A AIR           | A              | l yr                  |  |
| 2R2746                 | 6    | TE-64-55B AIR           | Α ΄            | 1 yr                  |  |
| 2R2748                 | 6    | TE-64-55C AIR .         | A              | l yr                  |  |
| 2R2750                 | 6    | TE-64-55D AIR           | A              | l'yr                  |  |
| 2R2757                 | 6    | TE-64-55E AIR           | A              | l yr                  |  |
| · 2R2759               | 6 ·  | TE-64-55F AIR           | A              | l yr                  |  |
| 2R2742                 | 6    | TE-64-52B AIR           | A              | l yr                  |  |
| 3R2744                 | 6    | TE-64-55A AIR           | A              | l yr'                 |  |
| 3R2746 ·               | 6    | TE-64-55B AIR           | A              | l yr                  |  |
| 3R2748                 | 6    | TE-64-55C AIR           | A              | l yr '                |  |
| 3R2750                 | 6    | TE-64-55D AIR           | A              | 1 yr                  |  |
| 3R2757                 | 6    | TE-64-55E AIR           | A              | 1 yr `                |  |
| 3R2759                 | 6    | TE-64-55F AIR           | A <sup>*</sup> | l yr                  |  |
| 3R2742                 | 6    | TE-64-52B AIR           | A              | l yr                  |  |
| •                      |      |                         | •              |                       |  |

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# EEB 64-0009

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Rev \_\_\_\_\_

## ATTACHMENT B

## Mark WUB-1

Contract No.

74C7-85464

71C7-54336 72C7-83427 72C7-54994 Type

CSPE/PVC XLPE/CSPE CSPE/CSPE <u>Manufacturer</u>

Continental Wire & Cable Continental Wire & Cable Continental Wire & Cable Boston Ins. Wire



Sheet No .: EEB-64-0009

Revision:

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

> Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

C.2 NUREG-0588 Material List

C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Prepared by: \_\_\_\_\_

Reviewed by:

QA Acceptance:

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Facility: Browns Ferry Nuclear Plant . Unit: 3 Docket:50-296

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SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

| FOUTPMENT DESCRIPTION                                                                                                                                             | ENVIRONMENT              |                    |                    | DOCUMENTATION REF  |                    | QUALIFICATION<br>METHOD | OUTSTANDI |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------|--------------------|--------------------|--------------------|-------------------------|-----------|
|                                                                                                                                                                   | Parameter                | Specifi-<br>cation | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation | HE MOD                  | 11003     |
| System: 64<br>Plant ID No. Attachment A                                                                                                                           | Operating<br>Time        | N/A                | N/A                | (1)                | N/A                | N/A                     | None      |
| Component Junction Box                                                                                                                                            |                          |                    |                    |                    |                    |                         |           |
| Manufacturer: N/A                                                                                                                                                 | Temperature<br>(°F)      | N/A                | N/A                | . (4)              | N/A                | N/A                     | None      |
| Model Number: N/A                                                                                                                                                 | Pressure<br>(PSIA)       | 21.5<br>max.       | ,<br>21.5          | (4)                | Attachment B       | Engineering<br>Analysis | None      |
| Function: Terminal Housing                                                                                                                                        | Relative<br>Humidity (%) | N/A                | N/A                | . (4)              | N/A                | N/A                     | None      |
| Demon: N/A<br>Category: N/A                                                                                                                                       | Chemical<br>Spray        | N/A                | N/A                | (4)                | N/A                | N/A                     | ,<br>None |
| Service: N/A                                                                                                                                                      | Radiation<br>(RAD)       | N/A                | N/A                | . (4)              | N/A                | N/A                     | None      |
| Location: Attachment A                                                                                                                                            | Aging                    | N/A                | N/A                | (2)                | N/A                | N/A                     | None      |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No                                                                                                          | Submergence              | N/A                | N/A                | . (4)              | N/A                | . N/A                   | None      |
| Notes: (1) See Section 2.4 in 79-01B report.                                                                                                                      |                          |                    |                    |                    | ~ *                | Prepared by: <u></u>    | ). Mita   |
| <ul> <li>(2) See Section 4.1.2 in 79-01B report.</li> <li>(3) All notes and other information not on these sheets are on the attached appendix checks.</li> </ul> |                          |                    |                    |                    | · · · ·            | Reviewed by:            | R. Helata |
| · (4) See Section 3                                                                                                                                               | .0 and/or Appen          | : v                |                    | QA Acceptance:     | ·                  |                         |           |
# ATTACHMENT A

# Junction Boxes

System: 64 Unit: 3

| <u>Mark</u>                                                               | , | Plant I.D. No                                                                                                                                                                                                                       | <u>.</u> | • | Room                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| JOF<br>JOH<br>JOH<br>JOO<br>JOO<br>JOO<br>JOO<br>JOO<br>JOO<br>JOO<br>JOO |   | JB-2892<br>JB-2911<br>JB-2810<br>JB-2820<br>JB-2282<br>JB-2282<br>JB-2921<br>JB-2895<br>JB-2638<br>JB-2794<br>JB-2794<br>JB-2791<br>JB-2951<br>JB-4796<br>JB-4797<br>JB-4798<br>JB-2955<br>JB-3653<br>JB-3448<br>JB-3535<br>JB-2796 |          | • | 8<br>12<br>12<br>12<br>12<br>8<br>8<br>8<br>15<br>14<br>14<br>15<br>15<br>8<br>8<br>8<br>8<br>14<br>14<br>14<br>14<br>14<br>14<br>15<br>15<br>15<br>8<br>8<br>8<br>15<br>15<br>15<br>15<br>15<br>15<br>15<br>15<br>15<br>15 |

Rev ,

EEB - 64 -0010

### ATTACHMENT B

EEB -64-0010

#### Rev

### TVA Engineering Report EEB 1950B

The junction boxes in the HELB areas are TVA type D boxes which are non ventilated, dust tight, and water tight similar to NEMA boxes except of 12and 10-gauge steel rather than of 14- and 12-gauge steel as in NEMA boxes. They are scaled with neoprene gaskets or RTV silicone in order to restrict moisture entry.

The boxes are not intended to serve as pressure boundaries. A pressure differential will equalize, hence there is no requirement to consider ability to resist deformation under differential pressure.

The steel of the box construction is not subject to thermal nor radiation aging effects in its service environment. Further, neither the RH of the normal environment nor the RH of the relatively short HELB environment will produce sufficient corrosion to painted boxes to affect the strength of the boxes. The neoprene gasket and RTV silicone sealing materials are adequate for the service environment temperature, and will be replaced after any HELB episode.

Consequently it is our engineering judgement that the junction boxes in themselves are not significantly affected by their service environment. The qualification of equipment located on or within these boxes is addressed separately. . . . .

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| FOULPMENT DESCRIPTION                                                                                       |                                                   | ENVIRONMENT                               |                    | DOCUMENTATION REF  |                                         | QUALIFICATION                       | OUTSTANDIN        |
|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-------------------------------------------|--------------------|--------------------|-----------------------------------------|-------------------------------------|-------------------|
| EQUITMENT DESCRIPTION                                                                                       | Parameter                                         | Specifi-<br>cation                        | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                      | METHOD                              | ITEMS             |
| System: 64<br>Plant ID No. Attachment A                                                                     | Operating<br>Time                                 | Attachment A                              | l Year             | . (1)              | Attachment<br>C.4                       | Engineering<br>Analysis             | None              |
| Component Cable<br>14AWG, 2/c, WHB, (PNJ)<br>Manufacturer:Attachment B                                      | Temperature<br>(°F)                               | 147 -                                     | 153                | (4)                | Attachments<br>C.1 and C.2              | Attachment C.3                      | None .            |
| Model Number: N/A                                                                                           | Pressure<br>(PSIA)                                | 15                                        | N/A                | (4)                | N/A                                     | N/A                                 | None :            |
| Function: Control/Power                                                                                     | Relative ·<br>Humidity (%)                        | 100                                       | 100                | (4)                | IPCEA S-61-402<br>par 3.9, 3.7.3<br>6.7 | Standard<br>Material<br>Requirement | None              |
| Demon: N/A<br>Category: Attachment A                                                                        | Chemical<br>Spray                                 | N/A                                       | N/A                | (4)                | N/A                                     | N/A                                 | None              |
| Service: Attachment A                                                                                       | Radiation<br>(RAD)                                | $2.1 \times 10^7$                         | 4x10 <sup>7</sup>  | . (4)              | NUREG-0588<br>Materials<br>List         | Generic<br>Material<br>Test         | None              |
|                                                                                                             | Aging                                             | N/A                                       | 20 years           | (2)                | Attachment C,2                          | Oper. Experience                    | None              |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No                                                    | Submergence                                       | N/A                                       | N/A                | (4)                | N/A                                     | . N/A                               | None              |
| Notes: (1) See Section 2                                                                                    | .4 in 79-018 re                                   | eport.                                    |                    | •                  |                                         | Prepared by: <u></u>                | ). Mila           |
| <ul> <li>(2) See Section 4.</li> <li>(3) All notes and sheets are on</li> <li>(4) See Section 3.</li> </ul> | 1.2 in 79-01B<br>other informat<br>the attached a | report.<br>tion not on t<br>appendix shee | hese<br>ts.        | · · · ·            | · · ·                                   | Reviewed by:                        | <u>R. Helster</u> |

| System: 64<br>Unit: 2           |        |                                  |            | EEB- <b>64-</b> 0012.<br>Rev |
|---------------------------------|--------|----------------------------------|------------|------------------------------|
| Component: Cable<br>Mark: WHB ( | (PNJ)  |                                  |            |                              |
| <u>Plant I. D. No.</u>          | Room   | Function/Service                 | Category   | <u>Operating Time</u>        |
| 1PC351-I<br>1PC357-I            | 8<br>8 | PDIS-64-20 AIR<br>PDIS-64-21 AIR | A/B<br>A/B | 1 hr/1 yr<br>1 hr/1 yr       |

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# EEB 64-0012

Rev \_\_\_\_\_

## ATTACHMENT B

Mark WHB

Туре

PNJ

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PJJ.

PJJ.

PJJ PNJ

PNJ

<u>Contract No</u>. 67C3-91618 87148 XFR From SQN 72C7-75228-1 75K7-86150-1 73C7-84528 75K5-86506-1 72C7-75328-2 70C7-54179-1 Manufacturer

Plastic Wire & Cable

Plastic Wire & Cable

Cyprus Rome Cable AIW Tamaqua Brand-Rex

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Sheet No.: EEB-64-00/2

Revision: 0

### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous,  $95^{\circ}$  C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121 C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

| <b>C.4</b> | The post-HELB conditions are le | ss than the normal cable rating and | i, |
|------------|---------------------------------|-------------------------------------|----|
|            | in our judgment, the cables cou | ld operate satisfactorily for a     |    |
|            | post-accident of a year.        |                                     |    |

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:

8C



SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Facility: Browns Ferry Nuclear Plant Unit: 2 Docket: 50-260

8

System: 64

Component

Service: Attachment A

Flood Level Elev: 552'

Location: 8

Date ENVIRONMENT · DOCUMENTATION REF **OUALIFICATION** OUTSTANDING EQUIPMENT DESCRIPTION METHOD ITEMS Specifi-Oualifi-Specifi-Qualifi-Parameter cation cation cation cation Attachment Engineering None 1 Year Operating Attachment A Analysis C.4 Plant ID No. Attachment A Time (1)Cable ' 14AWG, 1/c, WCA, (PN) Attachments Temperature Manufacturer: Attachment B None . 153 (4)C.1 and C.2 $(^{O}F)$ Attachment C.3 157 Pressure Model Number: N/A (PSIA)(4) 15.0 N/A N/A N/A None Function: Control/Power IPCEA S-61-402 Standard Relative par 3.9, 3.7.3 Materia] 6.7 Humidity (%) Requirement None (4) 100 100 . Accuracy: Req'd: N/A Chemical Demon: N/A Spray Category: Attachment A N/A -(4) N/A N/A N/A None

(4)

(2)

(4)

Above Flood Level: Yes X Submergence No Notes: (1) See Section 2.4 in 79-01B report.

(2) See Section 4.1.2 in 79-01B report.

(3) All notes and other information not on these sheets are on the attached appendix sheets.

Radiation

(RAD)

Aging

 $2.1 \times 10^7$ 

N/A

N/A

4x107

N/A

20 years\*

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by:

(3)

Sheet No.

Revision

EEB 64-0013

Reviewed by: D.K. Helster

QA Acceptance:

Generic

Material

N/A

Test

Attachment C.2 Oper. Experience

NUREG-0588

N/A

Materials

List

None

None

None



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Attachment A

System: 64 Unit: 2

Component: Mark: Cable WCA (PN)

| <u>Plant I. D. No.</u> | Room   | <b>Function/Service</b>         | <u>Category</u> | Operating Time |
|------------------------|--------|---------------------------------|-----------------|----------------|
| 2PC595-1               | 8      | FCV-64-32 Air                   | Α               | l yr           |
| 2PC596-1               | 8 •    | FCV-64-32 Air                   | Α               | l yr           |
| 2PC597-I               | 8      | FCV-64-32 Air                   | Α               | l yr           |
| 2PC339-I               | 8      | FCV-64-34 Air                   | Α               | 1 yr           |
| 2PC340-1               | 8      | FCV-64-34 Air                   | A               | 1 yr           |
| 3PC341-I               | 8      | FCV-64-34 Air                   | Α               | l yr           |
| 2PC577-I               | 8      | FCV-64-18 Air                   | Α               | lyr            |
| 2PC578-I               | 8      | FCV-64-18 Air                   | Α               | l yr           |
| 2PC579-1               | 8      | FCV-64-18 Air                   | Α               | l yr           |
| 2PC583-I               | 8      | FCV-64-19 Air                   | A               | l yr           |
| 2PC584-1               | 8      | FCV-64-19 Air                   | А               | l yr           |
| 2PC585-1               | 8      | FCV-64-19 Air                   | Α               | lyr            |
| 2PC353-I               | 8      | FCV-64-20 Air                   | A               | 1 yr           |
| 2PC354-I               | 8      | FCV-64-20 Air                   | A               | 1 yr           |
| 2PC355-I               | 8      | FCV-64-20 A1r                   | Α               | l yr           |
| 2PC360-I               | 8      | FCV-64-21 Air                   | A               | l vr           |
| 2PC361-I               | 8      | FCV-64-21 Air                   | Ā               | 1 vr           |
| 2PC362-I               | 8      | FCV-64-21 A1r                   | Ā               | l vr           |
| 2PL3812                | 8      | FCV-64-141 Air                  | Â               | l vr           |
| 2PL3813                | 8      | FCV-64-141 Air                  | A               | 1 vr           |
| 2PL3814                | 8      | FCV-64-141 Air                  | Ā               | 1 vr           |
| 1PL5189                | 8      | FCO-64-60A Air                  | A/B             | 1 hr/1 vr      |
| 1PC583-I               | 8      | FCV-64-19 Air                   | A               | l vr           |
| 1PC584-I               | 8      | FCV-64-19 Air                   | A -             | 1 yr           |
| 1PC585-I               | 8.     | FCV-64-19 Air                   | A               | 1  vr          |
| 1PC353-I               | 8      | FCV-64-20 Air                   | A               | l vr           |
| 1PC354-I               | 8      | FCV-64-20 Air                   | A               | 1 vr           |
| 1PC355-I               | 8      | FCV-64-20 Air                   | A               | l vr           |
| 1PC360-I               | 8      | FCV-64-21 Air                   | A               | 1  yr          |
| 1PC361-T               | 8      | FCV-64-21 Air                   | A               | l vr           |
| 1PC362-T               | 8      | FCV-64-21 A1r                   | A               | 1  vr          |
| 1PL3812                | Ř      | FCV - 64 - 141 Atr              | A               | 1 vr           |
| 1PL3813                | Ř      | FCV-64-141 Atr                  | A               | 1  vr          |
| 1PL3814                | Ř      | FCV-64-141 Air                  | A               | 1 vr           |
| 301.5186               | 8      | FC0-64-60A A1r                  | A/B             | 1 hr/1 vr      |
| 320595-1               | Ř      | FCV = 64 = 32 Air               | Δ               | 1  vr          |
| 320596-1               | 8      | FCV = 64 = 32 AT                | Δ               | 1 vr           |
| 3PC507_T               | 8      | FCV = 64 = 32 ATT               | Δ               |                |
| 3DC330_T               | 8      | FCV = 64 = 34                   | A<br>A          | 1 yr           |
| 300339-1               | Q<br>Q | FOV-04-04 AIL<br>FOV-64_34 AIG  | л<br>Л          | 1              |
| 300340-1               | 0<br>Q | FCV-64-34 AIF<br>FCV_64_34 Aim  | n<br>A          | 1 yr           |
| 32610077               | 0      | FUY-04-04 AIF<br>DDC0 6/ 16 Adm | л<br>,          | 1 yr           |
| 3E01000-1              | 0      | PDC0-64-16 A1F                  | A<br>^          | 1 yr           |
| 2521202-1              | 0      | rucu-04-10 A1r                  | A               | r AL           |

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System: 64 Unit: 2

Component: Cable Mark: WCA (PN) (Continued)

| <u>Plant I. D. No.</u> | Room | Function/Service | Category                              | <u>Operating Time</u> |
|------------------------|------|------------------|---------------------------------------|-----------------------|
| 2PC339-1               | 8    | FSV-64-34 Air    | A/B .                                 | 1 hr/1 yr             |
| 2PC340-I               | 8    | FSV-64-34 Air    | 1                                     | . 1                   |
| 2PC341-I               | 8    | FSV-64-34 Air    | 4                                     |                       |
| 2PC614-II              | 8    | FSV-64-17 Air    |                                       |                       |
| 2PC615-II              | 8    | FSV-64-17 Air    |                                       |                       |
| 2PC616-11              | 8    | FSV-64-17 Air    |                                       |                       |
| 2PC577-1               | 8    | FSV-64-18 Air    |                                       |                       |
| 2PC578-I               | 8    | FSV-64-18 Air    |                                       |                       |
| 2PC579-1               | 8    | FSV-64-18 Air    |                                       |                       |
| 2PC583-1               | 8    | FSV-64-19 Air    |                                       |                       |
| 2PC584-I -             | 8    | FSV-64-19 Air    |                                       |                       |
| 2PC585-I               | 8    | FSV-64-19 Air    |                                       | Į                     |
| 2PC353-I               | 8    | FSV-64-20 Air    |                                       |                       |
| 2PC354-I               | 8    | FSV-64-20 Air    |                                       |                       |
| 2PC355-I               | 8    | FSV-64-20 Air    | ļ                                     |                       |
| 2PC360-1               | 8    | FSV-64-21 Air    |                                       |                       |
| 2PC361-I               | 8    | FSV-64-21 Air    |                                       |                       |
| 2PC362-I               | 8    | FSV-64-21 Air    |                                       |                       |
| 2PL3812                | 8    | FSV-64-141 Air   |                                       |                       |
| 2PL3813                | 8    | FSV-64-141 Air   |                                       |                       |
| 2PL3814                | 8    | FSV-64-141 Air   |                                       |                       |
| 3PC595-1               | 8    | FSV-64-32 Air    |                                       |                       |
| 3PC596-I               | 8    | FSV-64-32 Air    |                                       |                       |
| 3PC597-I               | 8    | FSV-64-32 Air    |                                       |                       |
| 3PC339-1               | 8    | FSV-64-34 Air    |                                       |                       |
| 3PC340-1               | 8    | FSV-64-34 Air    |                                       |                       |
| 3PC341-I               | 8    | FSV-64-34 Air    |                                       |                       |
| 3PC614-II              | 8    | FSV-64-17 Air    |                                       |                       |
| 3PC615-II              | 8    | FSV-64-17 Air    |                                       |                       |
| 3PC616-II              | 8    | FSV-64-17 Air    |                                       |                       |
| 3PC577-I               | ·8   | FSV-64-18 Air    |                                       | ۴                     |
| 3PC578-1               | 8    | FSV-64-18 Alr    | 1                                     |                       |
| 3PC579-I               | 8    | FSV-64-18 Air    |                                       |                       |
| 3PC583-1               | 8    | FSV-64-19 Air    |                                       |                       |
| 3PC584-I               | 8    | FSV-64-19 Air    |                                       |                       |
| 3PC585-I ·             | 8    | FSV-64-19 Air    | 4                                     |                       |
| 3PC353-I               | 8    | FSV-64-20 Air    |                                       |                       |
| 3PC354                 | 8    | FSV-64-20 Air    |                                       |                       |
| 3PC355                 | 8    | FSV-64-20 Air    |                                       | 1                     |
| 3PC360-1               | 8    | FSV-64-21 Air    |                                       | •                     |
| 3PC361-1               | 8    | FSV-64-21 Air    |                                       |                       |
| 3PC362-1               | 8    | FSV-64-21 Air    | · · · · · · · · · · · · · · · · · · · |                       |
| 3PL3812                | 8    | FSV-64-141 Air   |                                       | 6                     |
| 3PL3813                | 8    | FSV-64-141 Air   |                                       |                       |
| 3PL3814                | 8    | FSV-64-141 Air   |                                       |                       |
|                        | 7    |                  | 1                                     | ŧ                     |

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Attachment A

System: 64 Unit: 2

Component: Cable Nark: WCA (PN) (Continued)

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| <u>Plant I. D. No.</u> | Room   | Function/Service               | <u>Category</u> | Operating Time        |
|------------------------|--------|--------------------------------|-----------------|-----------------------|
| 3PC577-1               | 8      | FCV-64-18 Air                  | А               | l yr                  |
| 3PC578-I               | 8      | FCV-64-18 Air                  | A               | l yr                  |
| 3PC579-I               | 8      | FCV-64-18 Air                  | А               | l yr                  |
| 3PC583-I               | 8      | FCV-64-19 Air                  | A               | 1 vr                  |
| 3PC584-I               | 8      | FCV-64-19 Air                  | A               | 1 vr                  |
| 3PC585-I               | 8      | FCV-64-19 Air                  | A .             | l yr                  |
| 3PC353-I               | 8      | FCV-64-20 Air                  | A               | l vr                  |
| 3PC354-I               | 8      | FCV-64-20 Air                  | Ā               | l vr                  |
| 3PC355-I               | 8      | FCV-64-20 Air                  | A               | 1 vr                  |
| 3PC360-I               | 8      | FCV-64-21 Air                  | A               | 1  vr                 |
| 3PC361-I               | 8      | FCV-64-21 Air                  | Ā               | 1  yr                 |
| 3PC362-I               | 8      | FCV-64-21 Air                  | A               | l vr                  |
| 3ES1191-I              | 8      | TS-64-68 Air                   | A               | 1  yr.                |
| 3ES1198-I              | 8      | TS-64-70 Air                   | Ā               | 1  vr                 |
| 3PL3812                | 8      | FCV-64-141 Air                 | A               | 1 vr                  |
| 3PL3813                | 8      | FCV-64-141 Air                 | A               | 1 vr                  |
| 3PL3814                | 8      | FCV-64-141 Air                 | A <sup>*</sup>  | 1  vr                 |
| 1PC595-I               | 8      | FSV-64-32 Air                  | A/B             | 1 hr/l vr             |
| 1PC596-I               | 8      | FSV-64-32 Air                  | A/B             | 1 hr/l vr             |
| 1PC597-I *             | 8      | FSV-64-32 Air                  | A/B             | 1 hr/l vr             |
| 1PC339-I               | 8      | FSV-64-34 Air                  | A/B             | 1 hr/1 vr             |
| 1PC340-I               | 8      | FSV-64-34 Air                  | A/B             | 1 hr/1 vr             |
| 1PC341-I               | 8      | FSV-64-34 Air                  | A/B             | 1 hr/1 vr             |
| 1PC614-II              | 8.     | FSV-64-17 Air                  | A/B             | 1 hr/1 vr             |
| 1PC615-II              | 8      | FSV-64-17 Air                  | A/B             | 1 hr/1 vr             |
| 1PC616-II              | 8      | FSV-64-17 Air                  | A/B             | 1 hr/1 vr             |
| 1PC577-I               | 8 -    | FSV-64-18 Air                  | A/B             | 1 hr/1 vr             |
| 1PC578-1               | 8      | FSV-64-18 A1r                  | A/B             | 1 hr/1 vr             |
| 1PC579-I               | 8      | FSV-64-18 Air                  | A/B             | 1 hr/1 vr             |
| 1PC583-I               | 8      | FSV-64-19 Air                  | A/B             | 1 hr/1 vr             |
| 1PC584-I               | 8      | FSV-64-19 'Air                 | A/B             | 1 hr/l vr             |
| 1PC585-I               | 8      | FSV-64-19 A1r                  | A/B             | 1 hr/l vr             |
| 1PC353-I               | 8      | FSV-64-20 Air                  | A/B             | 1 hr/1 vr             |
| 1PC354-T               | 8      | FSV-64-20 Air                  | A/B             | 1 hr/1 vr             |
| 1PC355-T               | 8      | FSV-64-20 A1-                  | Δ/B             | $\frac{1}{1} hr/1 yr$ |
| 1PC360-T               | 8      | FSV-64-21 Afr                  | A/R             | 1 hr/1 yr             |
| 1PC361-T               | 8      | FSV = 64 = 21 A1r              | A/B             | 1 hr/1 yr             |
| 1PC362-T               | 8      | FSV-64-21 A17                  | A/B             | 1 hr/1 yr             |
| 1PL3812                | 8      | FSV-64-141 Afr                 | A/B             | 1 hr/1 yr             |
| 101 3813               | 8      | FSV-64-141 AIT                 | A/B             | 1 hr/l yr             |
| 1PL3814                | 8      | FSV_6/_1/1 A4~                 | Λ/B             | 1 hr/1 yr             |
| 200505-1               | 8      | ECA-04-141 VIL                 | Λ/D<br>λ/D      | 1 hm/1                |
| 220333-1<br>220506_1   | Q<br>Q | гэү-04-34 АІГ<br>Гсу_64_22 Аз- |                 | 1 hr/1 yr             |
| 21 CJ70-1<br>200507_T  | 0      | rov-04-32 Alr<br>vev 24 22 Al- | A/D             | I Dr/1 yr             |
| 751.34781              | ~      | FSV-04-1/ 417                  | A / K           | 1 77 7 1 17 7         |

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## ATTACHMENT B

Mark WCA

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PN PN PN

PN

PN. PN

PN

| <u>Contract No.</u>  |                                                                                                                                                                                                  |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 72C7-75128           |                                                                                                                                                                                                  |
| 72X7-74885-1         |                                                                                                                                                                                                  |
| ·73C7-84528          |                                                                                                                                                                                                  |
| 67C3-91618           |                                                                                                                                                                                                  |
| 72C7-75328-1         |                                                                                                                                                                                                  |
| 70C7-54179-1         |                                                                                                                                                                                                  |
| 822378)              |                                                                                                                                                                                                  |
| 822639) Sequoyan     |                                                                                                                                                                                                  |
| 822915) /20/-/5228-1 |                                                                                                                                                                                                  |
| 72C7-83874-1         |                                                                                                                                                                                                  |
|                      | <u>Contract No</u> .<br>72C7-75128<br>72X7-74885-1<br>73C7-84528<br>67C3-91618<br>72C7-75328-1<br>70C7-54179-1<br>822378)<br>822639) Sequoyah<br>822639) 72C7-75228-1<br>822915)<br>72C7-83874-1 |

Plastic Wire & Cable Corp Brand-Rex Plastic Wire & Cable Corp Brand-Rex Brand-Rex Brand-Rex

Manufacturer

Plastic Wire & Cable Corp Plastic Wire & Cable Corp

Sheet No.: EEB- 64-00/3

Revision: 0\_\_\_\_

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

| <b>C.4</b> | The post-HELB conditions are less | than the normal cable rating and, |
|------------|-----------------------------------|-----------------------------------|
|            | in our judgment, the cables could | operate satisfactorily for a      |
|            | post-accident of a year.          |                                   |

| Prepared by:   | ۹<br>۹  |    |
|----------------|---------|----|
| Reviewed by:   | · · · · |    |
| QA Acceptance: | 1       |    |
|                | 1       | r. |

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1 21 (3) SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Facility: Browns Ferry Nuclear Plant Sheet No. EEB-64-0014. Unit: 3 Revision Docket: 50-296 Date ENVIRONMENT DOCUMENTATION REF OUALIFICATION OUTSTANDING EQUIPMENT DESCRIPTION ITEMS METHOD Specifi-Qualifi-Qualifi-Specification Parameter cation cation cation System: 64 Operating Engineering Plant ID No. - EB. Time ATTACH. A | 1 Year Analysis None Attachment C (1)Component **Electrical Penetrations** Simultaneous Assembly Manufacturer: Temperature · (°F) Attachment 8.5 Test None · 325 Attach. B.2 (4)General Electric Company Simul taneous Pressure Model Number: NS04 Attach. B.3 Attachment B.5 Test None (PSIA) • <u>\*</u> • 67 (4) Function: Low voltage power and control primary Simultaneous Relative containment penetration Humidity (%) Attachment B.5 None Test 100 100 **(4)** Accuracy: Reg'd: N/A Demon: N/A Chemical Spray Category: See Attach. A None N/A (4) N/A N/A N/A 6.5x107 4x109 Service: See Attachment A 6.5x107 Attachment B.6 1. Test  $4 \times 10^9$  . Radiation 2. Engineering Attachment C Attach. B. (RAD) Analysis · (4) None Location: 0 None Attachment B.7 Attach. B.4 Test Aging N/A · (2)Flood Level Elev: 552' Above Flood Level: Yes X Submergence N/A N/A N/A N/A None  $(4)^{'}$ No Votes: Prepared by: (1) See Section 2.4 in 79-01B report. (2) See Section 4.1. in 79-018 report. Reviewed by: A.K. H. elster (3) All notes and other information not on these sheets are on the attached appendix sheets. QA Acceptance: See Section 3.0 and/or Appendix B in 79-01B report. (4)

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# ATTACHMENT A

# Electrical Penetrations

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| System:<br>Unit: | 64<br>3 | ,                                                                                                                                                           |               |
|------------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
|                  |         | i<br>A                                                                                                                                                      |               |
| <u>Mark</u>      |         | Plant I.D. No.                                                                                                                                              | Room          |
| EB<br>EF<br>FA   | •       | DW TEMP/3ES401<br>DW TEMP/3ES3276<br>FCV/FSV-64-28A<br>-28B<br>-28C<br>-28D<br>-28E<br>-28F<br>-28F<br>-28G<br>-28H<br>-28J<br>-28J<br>-28J<br>-28K<br>-28L | 0<br>0'<br>00 |

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Attachment B

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|----|-----------------------------------------|---------|--------------------------------------------------------------|-------------------------------------------|-------------------------------------------------------|-----------------------------------|-------------------------------------------------|-----------------------------------------------|-------------------------------------------------|--------------------------------|
| 1. | Integrated do                           | ose     | - 10 years                                                   | normal                                    | operations.                                           | plus                              | one LOC                                         | ۱.                                            |                                                 |                                |
| 2. | Penetrations<br>Connectors<br>Cable     |         | 352<br>325<br>340                                            | ,<br>                                     |                                                       | `                                 |                                                 |                                               | r                                               |                                |
| 3. | Penetrations<br>Connectors<br>Cable     | · · · · | 136.7<br>93<br>77.7                                          |                                           | •                                                     | *                                 |                                                 |                                               | •                                               |                                |
| 4. | Penetrations<br>Connectors<br>Cable     |         | 40 years<br>10 years<br>40 years                             | 'n                                        |                                                       |                                   | ·<br>·                                          | ,                                             |                                                 | •                              |
| 5. | Penetrations<br>and Cable<br>Connectors | -       | GE Report<br>GE Report<br>GE Report<br>Voltage<br>Wyle Labor | EPAQ-05<br>EPAQ-06<br>EPAQ-06<br>ratory R | 5, Low Vol<br>0, Maximum<br>1, Maximum<br>Report 4385 | tage,<br>Emerg<br>Emerg<br>4-2, I | Emergend<br>gency Env<br>gency Env<br>Browns Fé | cy Enviro<br>vironmen<br>vironmen<br>erry Con | onmental<br>tal Test-<br>tal Test-<br>nectors S | Test<br>Signal<br>Low<br>andia |
| 6. | Penetrations<br>Connectors<br>Cable     |         | TVA Engine<br>TVA Engine<br>TVA Engine                       | eering R<br>eering R<br>eering R          | eport EEB<br>eport EEB<br>eport EEB                   | 1921<br>1921<br>1921              | ,                                               |                                               |                                                 |                                |
| 7. | Penetrations<br>Connectors<br>Cable     |         | GE Prototy<br>Wyle Labor<br>NRC o588 I                       | /pe Test<br>ratory R<br>1aterial          | : Data - Ep<br>Report 4385<br>s List (Cr              | oxy Li<br>-2, Bi<br>osslir        | ife Tests<br>rowns Fer<br>nked Poly             | ry Conne<br>vethyleni                         | ectors<br>e)                                    |                                |
| 8. | Penetrations<br>Connectors<br>Cable     | 1 1 1   | Material<br>Sequentia<br>Generic Ma                          | tests<br>l tests<br>aterial               | tests                                                 |                                   |                                                 |                                               |                                                 | ×                              |
|    |                                         |         |                                                              |                                           |                                                       |                                   |                                                 |                                               |                                                 |                                |

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#### ATTACHMENT C

#### TVA Engineering Report EEB 1921

This report is to update the documentation of the qualification of the General Electric canister type electrical penetration assemblies used at Browns Ferry Unit 3 for Class IE low voltage power and control service into the drywell. TVA designations for these units are EA, EB, EC, ED, EE, and EF.

The penetration assemblies inside the drywell consist of four pertinent features; the penetration conductor seals, the conductor pigtails, the connectors affixed to the ends of the pigtails, and the junction box which is bolted to the header plate and encloses the foregoing items.

The junction boxes are fabricated from 0.104-inch-thick steel. This thickness is sufficient to essentially completely shield the box contents from beta radiation and to reduce the total gamma dose by about 25 percent. Therefore, the integrated 40-year normal operation plus one LOCA dose seen by the box contents will be approximately  $1.05 \times 10^8$  rads gamma and the 10-year plus LOCA dose would be about 4.9 x  $10^7$  rads gamma. GE report EPAQ-046 indicates this level should cause no change in the epoxy sealant. The GE Vulkene cable (cross-linked polyethylene) is also known to be little affected by 1 x  $10^8$  rads gamma (see the NRC 0588 materials list for acknowledgement of this). The connectors have been qualified for 6.9 x  $10^7$  rads (see Wyle report 43854-2) which exceeds the 10-year plus LOCA dose they would receive by about 40 percent.

Regarding thermal aging, GE report "Prototype Test Data, Epoxy Life Tests," indicates the epoxy is suitable for 40 years service and the Vulkene cable is known to also be suitable for 40 years service. Since the Browns Ferry containment is inerted a large portion of the time, thermal aging effects should be greatly reduced from what it would be in a normal air environment. The connectors have been qualified for 10 years (see Wyle report 43854-2).

The combined LOCA-HELB profile for Browns Ferry causes thermal aging equivalent to less than 30 days normal operation, as calculated by the 10<sup>0</sup> C rule. Therefore, the thermal aging effects of a LOCA-HELB can be neglected. Aging due to any one LOCA or HELB would be considerably less.

The long-term humidity resistance of the epoxy is satisfactory (see GE report EPAQ-037, Epoxy Insulation Resistance Tests) and that of the cable is well documented. Therefore, they will remain fully functional for a year after a LOCA or HELB since neither the radiation, thermal, or humidity effects of an accident have any significant effect on the materials. The connectors show adequate insulation resistance at the end of a combined LOCA-HELB event (see Wyle report 43854-2) to indicate the ability to function for a year after an accident. Note also the Wyle test was for a combined LOCA-HELB which is thermally more severe than any one event would be, and the pressures were 25 psi higher than is expected to actually occur.

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## ATTACHMENT C (Continued)

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In conclusion, the penetration and cable are qualified for 39 years service plus a year of post-accident operation. The connectors are qualified for 10 years service plus a year of post-accident operation, and they should be replaced with qualified heat shrink splices at the end of 10 years operation.

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| Jnit: 3<br>Cocket: 50-296                                                                             | ear_Plant •.             | SYSTEM COMP                                             | PONENT EVALUA                  | TION WORK SH       | EET (Rev 2)                    | (3)<br>Sheet No. <u>EEB-(</u><br>Revision<br>Date | 64-0015     |
|-------------------------------------------------------------------------------------------------------|--------------------------|---------------------------------------------------------|--------------------------------|--------------------|--------------------------------|---------------------------------------------------|-------------|
| EQUIPMENT DESCRIPTION                                                                                 | ENVIRONMENT              |                                                         |                                | DOCUMENTATION REF  |                                | QUALIFICATION<br>METHOD                           | OUTSTAND    |
|                                                                                                       | Parameter                | Specifi-<br>cation                                      | Qualifi-<br>cation             | Specifi-<br>cation | Qualifi-<br>cation             | •<br>                                             | ,<br>       |
| System: 64 ··<br>Plant ID No. EF ·                                                                    | Operating<br>Time        | Arrach . A                                              | 1 Year                         | (1)                | Attachment C                   | Engineering<br>Analysis                           | 'None       |
| Component<br>Electrical Penetrations<br>Assembly<br>Conutacturer:<br>General Electric                 | Temperature ·<br>(°F)    | 325                                                     | Attach. B.2                    | (4)                | Attachment B.5                 | Test '                                            | None        |
| Company<br>Model Number: NSO4                                                                         | Pressure<br>(PSIA)       | - 67                                                    | Attach. B.3                    | (4)                | Attachment B.5                 | Test                                              | • •<br>None |
| Function: Low voltage<br>power and control primary<br>containment penetration<br>Accuracy: Peold: N/A | Relative<br>Humidity (%) | 100                                                     | 100                            | (4)                | Attachment B.5                 | Test                                              | . None      |
| Demon: N/A<br>Category: See Attach. A                                                                 | Chemical<br>Spray        | N/A                                                     | N/A                            | (4)                | N/A                            | N/A                                               | - None      |
| Service: See Attachment A                                                                             | Radiation<br>(RAD)       | 6.5x10 <sup>7</sup><br>4x10 <sup>9</sup><br>Attach. B.1 | 6.5x107<br>4x10 <sup>9</sup> · | (4)                | Attachment B.6<br>Attachment C | 1. Test<br>2. Engineering<br>Analysis             | ' None      |
| Location: 0                                                                                           | Aging                    | N/A                                                     | Attach. B.4                    | (2)                | Attachment B.7                 | Test                                              | • None ·    |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No                                              | Submergence              | N/A                                                     | N/A                            | (4)                | . N/A                          | N/A                                               | None        |
| Votes: (1) See Section 2                                                                              | 2.4 in 79-018 re         | eport.                                                  | •                              | •.                 | ••••                           | Prepared by:                                      | W. Mila     |

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# ATTACHMENT A

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# Electrical Penetrations

EEB- 64-0015

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| System:<br>Unit: | <sup>4</sup> 64<br>3 |                                                                                                                                                                     |      |
|------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| e                |                      | . ·                                                                                                                                                                 |      |
| Mark             |                      | Plant I.D. No.                                                                                                                                                      | Room |
| EB<br>EF<br>FA   |                      | DW TEMP/3ES401<br>DW TEMP/3ES3276<br>FCV/FSV-64-28A<br>-28B<br>-28C<br>-28D<br>-28E<br>-28F<br>-28F<br>-28G<br>-28H<br>-28J<br>-28H<br>-28J<br>-28K<br>-28L<br>-28L |      |

Attachment B

EEB - 64 -0015

Rev .Integrated dose - 10 years normal operations plus one LOCA. 1. 352 2. Penetrations 325 Connectors 340 Cable 3. Penetrations 136.7 Connectors 93 77.7 Cable 4. ! Penetrations 40 years Connectors 10 years Cable 40 years GE Report EPAQ-055, Low Voltage, Emergency Environmental Test Penetrations -5. GE Report EPAQ-060, Maximum Emergency Environmental Test-Signal and Cable GE Report EPAQ-061, Maximum Emergency Environmental Test-Low Voltage 🕢 Myle Laboratory Report 43854-2, Browns Ferry Connectors Sandia Connectors Report TVA Engineering Report EEB 1921 6. Penetrations TVA Engineering Report EEB 1921 Connectors Cable TVA Engineering Report EEB 1921 GE Prototype Test Data - Epoxy Life Tests 7. Penetrations Wyle Laboratory Report 4385-2, Browns Ferry Connectors Connectors NRC 0588 Materials List (Crosslinked Polyethylene) Cable Material tests 8. Penetrations Connectors Sequential tests Generic Material tests Cable

EEB - 64 - 0015

#### Rev

#### ATTACHMENT C

#### TVA Engineering Report EEB 1921

This report is to update the documentation of the qualification of the General Electric canister type electrical penetration assemblies used at Browns Ferry Unit 3 for Class 1E low voltage power and control service into the drywell. TVA designations for these units are EA, EB, EC, ED, EE, and EF.

The penetration assemblies inside the drywell consist of four pertinent features; the penetration conductor seals, the conductor pigtails, the connectors affixed to the ends of the pigtails, and the junction box which is bolted to the header plate and encloses the foregoing items.

The junction boxes are fabricated from 0.104-inch-thick steel. This thickness is sufficient to essentially completely shield the box contents from beta radiation and to reduce the total gamma dose by about 25 percent. Therefore, the integrated 40-year normal operation plus one LOCA dose seen by the box contents will be approximately  $1.05 \times 10^8$  rads gamma and the 10-year plus LOCA dose would be about 4.9 x  $10^7$  rads gamma. GE report EPAQ-046 indicates this level should cause no change in the epoxy sealant. The GE Vulkene cable (cross-linked polyethylene) is also known to be little affected by  $1 \times 10^8$  rads gamma (see the NRC 0588 materials list for acknowledgement of this). The connectors have been qualified for 6.9 x  $10^7$  rads (see Wyle report 43854-2) which exceeds the 10-year plus LOCA dose they would receive by about 40 percent.

Regarding thermal aging, GE report "Prototype Test Data, Epoxy Life Tests," indicates the epoxy is suitable for 40 years service and the Vulkene cable is known to also be suitable for 40 years service. Since the Browns Ferry containment is inerted a large portion of the time, thermal aging effects should be greatly reduced from what it would be in a normal air environment. The connectors have been qualified for 10 years (see Wyle report 43854-2).

The combined LOCA-HELB profile for Browns Ferry causes thermal aging equivalent to less than 30 days normal operation, as calculated by the 10° C rule. Therefore, the thermal aging effects of a LOCA-HELB can be neglected. Aging due to any one LOCA or HELB would be considerably less.

The long-term humidity resistance of the epoxy is satisfactory (see GE report EPAQ-037, Epoxy Insulation Resistance Tests) and that of the cable is well documented. Therefore, they will remain fully functional for a year after a LOCA or HELB since neither the radiation, thermal, or humidity effects of an accident have any significant effect on the materials. The connectors show adequate insulation resistance at the end of a combined LOCA-HELB event (see Wyle report 43854-2) to indicate the ability to function for a year after an accident. Note also the Wyle test was for a combined LOCA-HELB which is thermally more severe than any one event would be, and the pressures were 25 psi higher than is expected to actually occur.

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## EEB -64-0015

Rev .

ATTACHMENT C (Continued)

In conclusion, the penetration and cable are qualified for 39 years service plus a year of post-accident operation. The connectors are qualified for 10 years service plus a year of post-accident operation, and they should be replaced with qualified heat shrink splices at the end of 10 years operation.

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Unit: 2

(3) Sheet No. \_ EEB 64-0016 Révisión Date

| Docket: 50-260                                                                 | ••                       | •                   | • •                |                    |                                                 | Date                                |             |  |
|--------------------------------------------------------------------------------|--------------------------|---------------------|--------------------|--------------------|-------------------------------------------------|-------------------------------------|-------------|--|
| FOUTOMENT DESCOTOTION                                                          |                          | ENVIRONMENT         |                    | DOCUMENTATION REF  |                                                 | QUALIFICATION                       | OUTSTANDING |  |
|                                                                                | Parameter'               | Specifi-<br>cation  | Qualifi-<br>cation | Specifi-<br>cation | Qualifi-<br>cation                              |                                     |             |  |
| System: <sup>64</sup><br>Plant ID No. Attachment A                             | Operating<br>Time        | Attachment A        | 1 Year .           | (1)                | Attachment<br>C:3                               | Engineering<br>Analysis             | None _      |  |
| Component Cable WVA, (PE)<br>16AWG, 2/c, Type MS<br>Manufacturer: Attachment B | Temperature<br>(°F)      | 211 .               | 203                | (4)                | IPCEA S-61-402<br>par 3.9 and<br>Attachment C.2 | Attachment C.2                      | None .      |  |
| Model Number: N/A                                                              | Pressure<br>(PSIA)       | 15                  | N/A                | (4)                | N/A                                             | N/A                                 | None        |  |
| Function:<br>Signal/Instrumentation                                            | Relative<br>Humidity (%) | . 100               | 100                | (4)                | IPCEA S-61-402<br>par 3.9,<br>3.7.3, 6.7        | Standard<br>Material<br>Requirement | None        |  |
| Category: Attachment A                                                         | Chemical<br>Spray        | N/A                 | N/A                | (4)                | N/A                                             | . N/A                               | None        |  |
| Service: Attachment A                                                          | Radiation<br>(RAD)       | $2.1 \times 10^{7}$ | 4x107              | (4)                | NUREG-0588<br>Naterial<br>List                  | Generic<br>Material<br>Tests        | None        |  |
| Location: 9.                                                                   | Aging                    | N/A                 | 20 years           | (2)                | Attachment C.1                                  | Oper. Experience                    | · None      |  |
| Flood Level Elev: 552'<br>Above Flood Level: Yes X<br>No                       | Submergence              | N/A '               | N/A                | (4)                | N/A                                             | . <sup></sup> N/A                   | . None      |  |

Notes: (1) See Section 2.4 in 79-01B report.

- See Section 4.1.2 in 79-01B report. (2)
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- See Section 3.0 and/or Appendix B in 79-01B report. (4)

QA Acceptance:

Reviewed by: D.R. Helster.

Prepared by: W. Mila

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Attachment A

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| System:
Unit: | 64
2 | * | • | • | | | EEB- 64- 0016
Rev |
|-------------------|---------|--------------|------|---|------------------|------------|----------------------|
| Componen
Mark: | it: | Cable
WVA | | | | . • | |
| Plant I. | D. | No. | Room | • | Function/Service | Category | Operating Time |

| | | | فكالمجبى كالمسمعهمية | ومسجود ومنابعة والمستوجب والمترو |
|----------|-----|----------------|----------------------|----------------------------------|
| 1R2870 | 9 | PT-64-67 Air | A | l yr |
| 2P2870 · | 9 · | PT-64-67 Air . | · A | l yr |
| 3R2870 | 9 | PT-64-67 Air | A | 1 yr |
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EEB 64-0016

Rev _____

ATTACHMENT B

Mark WVA

| • | <u>Contract No</u> . | Туре |
|----|----------------------------------|-------------|
| | 77K5-823265 | FRXLPE/CSPE |
| | /26/-83944 | PE / DVC |
| | 72C7-74910-1 | XLPE/CSPE |
| TR | 822676 from SQN
76K5-87232 | FREP/CPE |
| TR | 827773 from BLN
78K5-824447 | FREP/CPE |
| TR | 826953 from BLN
, 78K5-824447 | FREP/CPE |

77K5-820991 73C7-84211 Manufacturer

Rockbestos Continental Wire & Cable Rockbestos Continental Wire & Cable

Continental Wire & Cable

Anaconda

Anaconda

Boston Ins. Wire
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Sheet No: EEB- 64-0016

Revision: O

ATTACHMENT C

C.1 TVA Engineering Report No. 1942

Coax, Triax, and Signal Cable

Coaxial and Triaxial cable installed at Browns Ferry were purchased in accordance with General Electric Company Specification 22A1181, and the appropriate MIL-C-17 specification. Signal cables, both twisted pair and multiconductor, were purchased in accordance with TVA specifications. Some cable were of cross-linked polyethylene and chloronated polyethylene construction while the same kind of cable furnished under other contracts were of high molecular weight, high density polyethylene/polyvinyl chloride construction and some even polyethylene/polyvinyl chloride construction. It is not possible to make a complete identification by contract as to which circuit and function they serve. Recent reclassification of some functions to 1E status has made it almost a certainty that some cables now in a safety category are of polyethylene/polyvinyl construction.

Accordingly, we have examined the 20 HELB temperature profiles and find that only compartments 1, 3, 6, and 9 show profiles which more than briefly surpass the softening temperature of the linear polyethylene. However, owing to the thermal time lag in the cable material and the cable installation including the heat sink of conduit, tray, and shield material, the insulation will not experience the HELB temperature profile until some time has elapsed and the temperature is lower. Further, no load heat rise need be taken into account for these signal cables.

TVA has conducted tests (Chattanooga Central Laboratories Report No. L81-81-6821 dated October 1980, of PE, PVC cables under a temperature profile which envelops all the HELB profiles. Following this exposure, these cables sustained a dielectric test while immersed in water of 660 volts for 5 minutes, 960 volts for 5 minutes, and 220 volts ac for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April, or replaced at the next refueling outage.

For those cables located in compartment 0 (the containment), the service which these cables have seen thus far has exposed them to a gamma radiation dose of $6.25 \times 10^{\circ}$ rads or more. This is sufficient to have cross-linked the polyethylene and PVC as well. Consequently, the insulation is now in fact a thermoset material and is capable of the same temperature that TVA's cross-linked polyethylene cable has, demonstrated and is capable of withstanding the LOCA/SLB and the post-LOCA environment for a year.

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| Facility: Browns Ferry Nuc
Unit: 2
Cocket: 50-260 | lear Plant | <u>Ş</u> YSTEM COMP | ONENT EVALUA
- | ATION WORK SH | IEET (Rev 2) | (3)
Sheet No. <u>EEB</u>
Revision
Date | 64-0017. |
|---|------------------------------------|-----------------------|------------------------------------|---------------|--------------------|---|--------------|
| FOUTOMENT DESCRIPTION | ENVIRONMENT | | | DOCUMEN | ITATION REF | QUALIFICATION | OUTSTANDING |
| | Parameter | Specifi-
cation | Qualifi: Specifi-
cation cation | | Qualifi-
cation | METRUD | TTEMS . |
| System: 64
Plant ID No. Attachment A | Operating
Time | Attachment A |] year _ | (1) | Attachment C.3 | Engineering
Analysis and
Test | None |
| Component Cable WAX (AL/
16AWG, 2/c, Type MS
Canufacturer: Attachment B | Temperature
(°F) | 211 | 385 | (4) | Attachment C.1 | Generic ·
Simultaneous
Test | None · |
| todel Number: N/A | Pressure
(PSIA) | 15 | N/A | (4) | N/A | N/A | • None |
| Function:
Signal/Instrumentation | Relative
Humidity (%) | 100 | 100 | (4) | Attachment C.1 | Generic
Simultaneous
Test | |
| Demon: N/A
Lategory:Attachment A | Chemical .
Spray | N/A | N/A | (4) | N/A | N/A | None |
| jervice: Attachment A | Radiation
(RAD) | 2.1 x 10 ⁷ | 2x10 ⁸ | (4) | Attachment C.1 | Generic
Sequential | None |
| | Aging | N/A | 40 years | (2) | Attachment C.2 | Generic Mat'l Test | None |
| lood Level Elev: 552'
bove Flood Level: Yes X
No | Submergence | N/A | - N/A | · (4) · | N/A | - N/A | ,
None |
| lotes: (1) See Section 2
(2) See Section 4 | 2.4 in 79-018 re
.1.2 in 79-018 | eport.
report. | • | | | Prepared by: <u>/</u> | W. nyite |
| (3) All notes and | l other informat | | haca | | • • • | Reviewed by: 🟒 | A.R. Welster |

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

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| System: 64
Unit: 2 | | | | EEB- 64: 0017
Rev |
|------------------------------|------|------------------|----------|-----------------------------|
| Component: Cabl
Mark: WVA | e . | | | |
| <u>Plant I. D. No.</u> | Room | Function/Service | Category | Operating Time |
| 1R2870 | 9 | PT-64-67 Air | А | l yr |
| 2P2870 | 9 · | PT-64-67 Air | Α | l yr |
| 3R2870 | 9 | PT-64-67 Air | A | 1 yr |

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EEB 64-0017

Rev ___

ATTACHMENT B

Mark WVA

FREP/CPE

Туре Contract No. • 77K5-823265 FRXLPE/CSPE 72C7-83944 FRXLPE/CSPE PE/PVC 69C3-64863-1 72C7-74910-1 XLPE/CSPE FREP/CPE TR 822676 from SQN 76K5-87232 FREP/CPE 827773 from BLN TR 78K5-824447

TR 826953 from BLN 78K5-824447

> 77K5-820991 73C7-84211

Manufacturer

Rockbestos . Continental Wire & Cable Rockbestos Continental Wire & Cable

Continental Wire & Cable

Anaconda

Anaconda

Boston Ins. Wire ITT

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Sheet No: EEB-64-0017

Revision: 0

ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

C.2 NUREG-0588 Material List

C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

| Reviewed by: | |
|--------------|--|
| Prepared by: | |
| | |

QA Acceptance:



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Facility: Browns Ferry Nuclear Plant Unit: 2 Docket: 50-260

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(.3) ۰. Sheet No. _ EEB 64-0018 Revision Date

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| FOULPMENT DESCRIPTION | • | ENVIRONMENT | | DOCUMEN | ITATION REF | QUALIFICATION | OUTSTANDING |
|--|-----------------------------------|--------------------|--------------------|--------------------|---|-------------------------------------|--------------|
| | Parameter | Specifi-
cation | Qualifi-
cation | Specifi-
cation | Qualifi-
cation | Method . | - 11CPi3
 |
| System: 64
Plant ID No. Attachment A | Operating
Time | Attachment A | l Year | ,
` (1) | Attachment
C.4 | Engineering
Analysis | None |
| Component Cable WCA, (P
14AWG, 1/c
Manufacturer:Attachment B | ()
Temperature
(°F) | 211 | 153 | (4) | Attachments
C.1 and C.2 | Attachment C.3 | None - |
| Model Number: N/A | Pressure
(PSIA) | 15 | N/A | (4) | N/A | •.
N/A | None |
| Function: Control/Power | Relative
Humidity (%) , | 100 | 100 · | (4) | LPCEA S-61-402
par 3.9, 3.7.3
6.7 | Standard
Material
Requirement | None |
| Demon: N/A
Category: Attachment A | Chemical
Spray | N/A | N/A | (4) | N/A - | · N/A | None |
| Service: Attachment A | Radiation
(RAD) | 2.1×10^7 | 4x10 ⁷ | . (4) | NUREG-0588
Materials
List | Generic
Material
Test | · None |
| Location: 9 | Aging | N/A | 20 years | (2) | Attachment C.2 | Oper, Experience | None |
| Flood Level Elev: 552'
Above Flood Level: Yes X
No | Submergence | N/A | Ň/A | (4) | N/A | . N/A ` | None |
| Notes: (1) See Section 2 | 2.4 in 79-01B re | eport. | £ . | ••• | | Prepared by: | W. nila |

(1) See Section 2.4 in 79-01B report. Notes:

- See Section 4.1.2 in 79-01B report. (2)
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

Reviewed by: O.R. H. elster

System: 64 Unit: 2

Component: Cable Mark: WCA (PN)

Plant I. D. No. Room 1RP23-IA 9 1RP97-IIA 9 1RP97-IIA 9 9 1RP322-IIB 1RP260-IB 9 9 1RP322-IIB 9 2RP23-IA 9 2RP97-IIA 9 2RP97-11A 9 2RP322-IIB 2PP260-IB , 9 2RP322-IIB' 9 9 3RP23-IA 3RP97-IIA 9 3RP97-IIA 9 9 3RP322-IIB 3RP260-IB 9 9 3RP322-11B

Function/Service PS-64-56A Air PS-64-56C Air PS-64-56C Air PS-64-56D Air PS-64-56B Air PS-64-56D Air PS-64-56A Air PS-64-56C Air PS-64-56C Air PS-64-56D Air PS-64-56B Air PS-64-56D Air PS-64-56A Air PS-64-56C Air PS-64-56C Air PS-64-56D Air PS-64-56B Air PS-64-56D Air

EEB-**64- 0018**. Rev

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Category Operating Time
A 1 day

EEB 64-0.018

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ATTACHMENT B

Mark WCA

Type

PN

PN PN

PN

PN.

PN

PN

Contract No. 72C7-75128 72X7-74885-1 73C7-84528 67C3-91618 72C7-75328-1 70C7-54179-1 TR 822378) 822639) Sequoyah 822639) 72C7-75228-1 822915) 72C7-83874-1 Manufacturer

Rev _

Plastic Wire & Cable Corp Brand-Rex Plastic Wire & Cable Corp Brand-Rex Brand-Rex Brand-Rex

Plastic Wire & Cable Corp

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Sheet No.: EEB- 64-0018

Revision: 0

ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

'C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of 75° C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121 C (250° F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

| C.4 | The post-HELB conditions are less than the normal cable rating and, |
|------------|---|
| | in our judgment, the cables could operate satisfactorily for a |
| | post-accident of a year. |

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| Prepared by: | \
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| Reviewed by: | \ |
| OA Acceptance: | 1 |





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| Facility: Browns Ferry Nucl
Unit: 2
Docket: 50-260 | ear Plant . | SYSTEM COMP | ONENT EVALUA
- | TION WORK SH | IEET (Rev 2) | (3)
Sheet No. <u>EEB</u>
Revision
Date | 54-0019 |
|--|----------------------------|-----------------------|--------------------|------------------------------------|---|---|-------------|
| FOULDMENT DESCRIPTION | ENVIRONMENT | | | DOCUMENTATION REF | | QUALIFICATION | OUTSTANDING |
| | Parameter | Specifi-
cation | Qualifi-
cation | Specifi- Qualifi-
cation cation | | 1, LIIOD | 11CHU - |
| System: 64
Plant ID No. Attachment A | Operating
Time | Attachment A | 1 Year | (1) | Attachment
C.4 | Engineering
Analysis | None |
| Component Cable WGB, (P
12AWG, 2/c
Manufacturer:Attachment B | iJ)
Temperature
(°F) | 211 | 153 | (4) | Attachments
C.1 and C.2 | Attachment C.3 | None - |
| Kodel Number: N/A | Pressure
(PSIA) | 15 | N/A | (4) | N/A | N/A | None |
| Function: Control/Power | Relative
Humidity (%) | 100 | 100 | (4) | IPCEA S-61-402
par 3.9, 3.7.3
6.7 | Standard
Material
Requirement | None |
| Category: Attachment A | Chemical
Spray | N/A | N/A | (4) | N/A | N/A | • None |
| Service: Attachment A | Radiation
(RAD) | 2.1 x 10 ⁷ | 4x10 ⁷ | . (4) | NUREG-0588
Materials
List | Generic
Material
Test | None |
| Location: g | Aging | N/A | 20 years | (2) | Attachment C.2 | Oper, Experience | None |
| Ficod Level Elev: 552'
Above Flood Level: Yes X
No | Submergence | N/A | N/A | (4) | N/A | . N/A | None |
| Notes: (1) See Section 2 | 2.4 in 79-01B re | eport. | | • | | · Prepared by: | U. Mila |

- (2) See Section 4.1.2 in 79-01B report.
 - (3) All notes and other information not on these sheets are on the attached appendix sheets.
 - (4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

Reviewed by: D.R. Webster

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| System:
Unit: | 64
2 | | | | EEB -64- 0019
Rev |
|-------------------|----------------|-------------|------------------|-----------------|-----------------------------|
| Componen
Mark: | t: Cabl
WGB | le
(PNJ) | | | |
| | . | , | | • | |
| Plant I. | <u>D. No.</u> | Room | Function/Service | <u>Category</u> | Operating Time |
| 1ES750-I | | 9 | PS-64-58B Air | A | l yr |
| 1ES991-I | | 9 | PS-64-58B Air | 1 | 1 |
| 1ES992-I | | 9 | PS-64-58D Air | | · |
| 1ES753-I | | 9 | .PS-64-58D Air | | |
| 2ES750-I | | 9 | PS-64-58B Air | | |
| 2ES991-I | | 9 | PS-64-58B Air . | | |
| 2ES992-I | | 9 | PS-64-58D Air | | |
| 2ES753-I | | 9 | PS-64-58D Air | | k i |
| 2ES3253-3 | II. | 9 | PS-64-58C Air | | |
| 3ES750-I | | 9 | PS-64-58B Air | | 2 |
| 3ES991-I | | 9 | PS-64-58B Air | | |
| 3ES992-I | | 9 | PS-64-58D Air | | |
| 3ES753-I | | 9 | PS-64-58D Air | I | |

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EEB 64-0019

ATTACHMENT B

Mark WGB

<u>Contract No</u>.

67C3-91618

73C7-84528

75K7-86150-1

75K5-86506-1

74C7-85069-1

70C7-54179-2 71X7-54761-1

70C7-54179-1

72C7-54872

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Туре

· PNJ

рјј

рјј

PJJ

рјј

PNJ PNJ

PNJ

PNJ

Manufacturer

Rev

Brand-Rex Rome Cable Cyprus American Insulated Wire Rome Plastic Wire & Cable Corp General Cable Plastic Wire & Cable Corp Brand-Rex

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| Sheet | No. | : | EEB- | 6 | 4 | 00 | 19 |
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Revision: _____

ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of 75° C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C (250° F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

| C.4 | The post-HELB conditions are less | than the normal cable rating and, |
|------------|-----------------------------------|-----------------------------------|
| | in our judgment, the cables could | operate satisfactorily for a |
| | post-accident of a year. | • |

| Prepared by: | \
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|----------------|--------|
| Reviewed by: | |
| OA Accentance: | 1
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System: 64

Component

Location: 9

14AWG, 2/c



SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)



(3)

Facility: Browns Ferry Nuclear Plant Unit: 2 Docket: 50-260

Sheet No. EEB 64-0020 Revision Date OUTSTANDING DOCUMENTATION REF QUALIFICATION ENVIRONMENT EQUIPMENT DESCRIPTION METHOD ITEMS Specifi-Qualifi-Qualifi-Specification cation cation cation Parameter Attachment Engineering None Operating AttachmentA 1 Year C.4 Analysis Plant ID No. Attachment A Time (1)Cable WHB, (PNJ) Attachments Temperature Manufacturer:Attachment B None -Attachment C.3 153 (4)C.1 and C.2(⁰F) 214 Pressure Hodel Number: N/A 15 (PSIA) (4)N/A N/A H/A None * Function: Control/Power IPCEA S-61-402 Standard par 3.9, 3.7.3 Materia] Relative Requirement None Humidity (%) 6.7 (4) 100 100 Accuracy: Reg'd: N/A Demon: N/A Chemical Spray Category: Attachment A (4) N/A N/A N/A None N/A Service: Attachment A NUREG-0588 Generic Radiation Materials Material 2.1×10^7 4x107 (RAD) (4) Test None List (2)None Aaina N/A Attachment C.2 Oper. Experience 20 years Flood Level Elev: 552' Above Flood Level: Submergence Yes X N/A N/A N/A N/A None (4) -No

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Notes: See Section 2.4 in 79-01B report. (1)

- See Section 4.1.2 in 79-01B report. (2)
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- See Section 3.0 and/or Appendix B in 79-01B report. (4)

Prepared by: Mil

Reviewed by: O. H. Hebster

· QA Acceptance:

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| System: 64
Unit: 2 | | | | EEB- 64= 0020
Rev |
|---------------------------------|------|------------------|----------|-----------------------------|
| Component: Cable
Mark: WHB (| PNJ) | | | |
| <u>Plant I. D. No.</u> | Room | Function/Service | Category | <u>Operating Time</u> |
| 1ES5-I | 9 | PS-64-57B Air | А | 30 days |
| 1ES21-I | 9 · | PS-64-57D Air | 1 | |
| 2ES2678-11 | 9 | PS-64-57A Air | | l l |
| 2ES5-I | 9 | PS-64-57B Air | | |
| 2ES21-I | 9 | PS-64-57D Air | | |
| 2ES2681-I | 9 | PS-64-57C Air . | | |
| 2ES3250-II | 9 | PS-64-58A Air | | |
| 2ES3491-II | 9 | PS-64-58A Air | 1 | |
| 2ES3492-II | 9 | PS-64-58C Air | . | |

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EEB 64-0020

Rev _____

ATTACHMENT B

Mark WHB

.

| <u>Contract No</u> . | Туре | Manufacturer |
|--|----------------------------------|---|
| 67C3-91618 | PNJ | Plastic Nire & Cable |
| 87148 XFR From SQN 72C7-
75228-1 | PJJ | . Plastic Wire & Cable |
| 75K7-86150-1
73C7-84528
75K5-86506-1
72C7-75328-2
70C7-54179-1 | PJJ.
PJJ
PJJ
PNJ
PNJ | Cyprus
Rome Cable
AIW
Tamaqua
Brand-Rex |

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Sheet No.: EEB-64-0020 *

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Revision: 0

ATTACHMENT C .

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of 75° C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C (250° F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:_____

Reviewed by:_____

QA Acceptance:_____

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OUTS: ANDING

ITEMS

None

None

(3)

Sheet No. EEB 64-0021

Facility: Browns Ferry Nuclear Plant Unit: 2 Docket: 50-260

Cable '

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Revision Datè ENVIRONMENT DOCUMENTATION REF **OUALIFICATION** EQUIPMENT DESCRIPTION METHOD Specifi-Qualifi-Specifi-Qualification Parameter cation cation cation Engineering Attachment 1 Year Operating Attachment A Analysis C.4 Plant ID No. Attachment A Time (1). 14AWG, 2/c, WHB, (PNJ) Attachments Temperature Manufacturer: Attachment B 174 Attachment C.3 153 (4)C.1 and C.2 (^{0}F)

Pressure Model Number: N/A (PSIA) 15 (4) N/A N/A N/A None Function: Control/Power IPCEA S-61-402 Standard par 3.9, 3.7.3 Relative Material Humidity (%) 6.7 Requirement None (4)100 100. Accuracy: Reg'd: N/A Demon: N/A Chemical Spray Category: Attachment A N/A (4) N/A N/A N/A None Service: Attachment A NUREG-0588 Generic Radiation Materials Material 4x107 3.1×10^4 (RAD) (4) Test List None Location: 12 Aging N/A (2) 20 years Attachment C.2 Oper. Experience None Flood Level Elev: 552' Submergence Above Flood Level: Yes X N/A N/A N/A N/A None (4) No

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Notes: See Section 2.4 in 79-01B report. (1)

- See Section 4.1.2 in 79-01B report. (2)
- (3) All notes and other information not on these sheets are on the attached appendix sheets.

See Section 3.0 and/or Appendix B in 79-01B report. (4)

Prepared by: N. Mita

Reviewed by: S.R. Helster

QA Acceptance:

łi.

System: 64

Component

| System: 64
Unit: 2 | 4 | | | EEB -64- 0021
Rev |
|-------------------------------|------------|------------------|-----------------|-----------------------------|
| Component: Cable
Mark: WHB | e
(PNJ) | | | |
| <u>Plant I. D. No.</u> | Room | Function/Service | <u>Category</u> | <u>Operating Time</u> |
| 1PL3805 | 12 | FSV-64-31 Air | A/B | l hr/l yr |
| 2PL3805 | 12 | FSV-64-31 Air | A/B | 1 hr/1 yr |
| 3PL3805 | 12 | FSV-64-31 Air | A/B | 1 hr/l yr |
| 1PL3805 | 12 | FCV-64-31 Air | Α | l yr |
| 2PL3805 | 12 | FCV-64-31 Air | Α | l yr |
| 3PL3805 | 12 | FCV-64-31 Air | A . | l yr |

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EEB 64-0021

Rev

ATTACHMENT B

Mark WHB

| Contract No. | <u>Type</u> | Manufacturer |
|--|----------------------------------|---|
| 67C3-91618 | PNJ | Plastic Wire & Cable |
| 87148 XFR From SQN 72C7-
75228-1 | рјј | Plastic Wire & Cable |
| 75K7-86150-1
73C7-84528
75K5-86506-1
72C7-75328-2
70C7-54179-1 | PJJ,
PJJ
PJJ
PNJ
PNJ | Cyprus
Rome Cable
AIW
Tamaqua
Brand-Rex |

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Sheet No.: EEB- 64-002/

Revision: 0

ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

80

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of 75° C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C (250° F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Nethod

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:_____

Reviewed by:_____

QA Acceptance:_____



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(3) SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Facility: Browns Ferry Nuclear Plant Sheet No. EEB 64-0022 'Unit: Ž Revisión Docket: 50-260 Date DOCUMENTATION REF ENVIRONMENT OUALIFICATION OUTSTANDING EQUIPMENT DESCRIPTION METHOD ITEMS Specifi-Qualifi-Specifi-Qualifi-Parameter cation cation cation cation System: 64 Operating Attachment A 1 Year. Attachment Engineering None Plant ID No. Attachment A Time **C.**3 Analysis (1)Component Cable WVA; (PE) IPCEA 5-61-402 16AWG, 2/c, Type MS par 3.9 and Temperature (°F) Manufacturer: Attachment B 203 None Attachment C.2 Attachment C.2 (4)199

N/A • None · N/A Pressure N/A Model Number: N/A 15 (PSIA) (4) Function: **IPCEA S-61-402** Standard 'Signal/Instrumentation Relative par 3.9, Material Humidity (%) Requirement None 3.7.3, 6.7 100 100 · (4) Accuracy: Reg'd: N/A Demon: N/A Chemical Spray Category: Attachment A · (4) N/A N/A N/A N/A 'None Service: Attachment A NUREG-0588 Generic Haterial Radiation Material 3.1×10^4 4x107 (RAD) List (4) Tests None Location: 12 **Oper:** Experience Attachment C.1 None Aging 20 years N/A (2)Flood Level Elev: 552' Above Flood Level: Yes X Submergence N/A _-N/A . N/A N/A None (4) No

Votes: (1) See Section 2.4 in 79-01B report.

(2) See Section 4.1.2 in 79-01B report.

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: <u></u>

Reviewed by:

QA Acceptance:



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Attachment A

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| System:
Unit: | 64
2 | 1 | • | 1 | | | EEB- 61 _ 002 <u>2</u>
Rev |
|--------------------|-----------|--------------|------|------------|---------|----------|--------------------------------------|
| Component
Mark: | : | Cable
WVA | | | • | | · · |
| <u>Plant I.</u> | <u>D.</u> | No. | Room | Function/S | Service | Category | Operating Time |
| 1R2726 | | | 12 | PX-64-51 A | ir | А/В . | 1 hr/1 vr |
| 1R2725 | | | 12 | PX-64-51 A | ir · | 1 | 1 |
| 2R2726 | | | 12 | PX-64-51 A | ir | | • |
| 2R2725 | | | 12 | PX-64-51 A | ir | | <u>د</u> |
| 2R2725 | | | 12 | PT-64-51 A | ir | | |
| 2R2726 | | | 12 | PT-64-51 A | ir · | | · · |
| 2R2715 | | | 12 | PX-64-54 A | ir | 1 I | |
| 2R2716 | | | 12 | LT-64-54 A | ir ' | • | |
| 3R2726 | | | 12 | PX-64-51 A | ir | | l' |
| 3R2725 | | | 12 | PX-64-51 A | ir . | | •. |
| | | | • | 2, . | - | ł | 1 |



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EEB 64-0022

Rev _____

ATTACHMENT B

Mark WVA

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| | Contract No. | Туре |
|----|---|-------------|
| | 77K5-823265 | FRXLPE/CSPE |
| | 6903-64863-1 | PE/PVC · |
| | 72C7-74910-1 | XLPE/CSPE |
| TR | 822676 from SQN
76K5-87232 | FREP/CPE |
| TR | 827773 [,] from BLN
78K5-824447 | FREP/CPE |
| TR | 826953 from BLN
78K5-824447 | FREP/CPE |
| | 77K5-820991 | |
| | 73C7-84211 | |

' Manufacturer

Rockbestos Continental Wire & Cable Rockbestos Continental Wire & Cable

Continental Wire & Cable

Anaconda

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Anaconda

Boston Ins. Wire ITT

Sheet No: EEB- 64 - 0022

Revision: O

ATTACHMENT C (Continued)

C.1 (Continued)

110

Continued operation is justified, and TVA has prepared a LOCA/SLB, thermal aging, and radiation test procedure to be performed by Wyle Laboratories on samples of this cable to demonstrate the validity of this conclusion. Results of this testing program are expected to be available in April 1981.

One cable RG-114A/U has the possibility of being sensitive to pressure changes owing to its partial air dielectric; however, an analysis of this effect has indicated that the change in dielectric constant can be tolerated. Consequently for this cable too, there is justification for continued operation. The compression effect on the dielectric will be likewise tested at Wyle Laboratories along with the other cable tests and results are expected to be available by April 1981.

- C.2 Standard Material Long-Term Overload Temperature Rating
- C.3 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by: Reviewed by:_____

QA Acceptance:____

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| Facility: Browns Ferry Nuc
Unit: 2
Docket: 50-260 | lear Plant . | SYSTEM COM | PONENT EVALU/
- | ATION WORK SH | HEET (Rev 2) | (3)
Sheet No. <u>EEB</u>
Revision
Date | <u>64-0023</u> |
|---|--|---|--------------------|--------------------|-------------------|---|----------------|
| EQUIDMENT DESCRIPTION | | ENVIRONMENT | ENVIRONMENT | | NTATION REF | QUALIFICATION | OUTSTANDING |
| | Parameter | Specifi-
cation | Qualifi-
cation | Specifi-
cation | Qualifi
cation | . חבותטט | |
| System: 64
Plant ID No. Attachment A | Operating
Time | Attachment A | l year | (1) | Attachment C3 | Engineering
Analysis and
Test | None . |
| Component Cable WVA; (XL/E
16AWG, 2/c, Type MS
Manufacturer: Attachment B | P)
Temperature
(°F) | 199 | 385 | (4) | Attachment C.1 | Generic .
Simultaneous
Test | None . |
| :odel Number: N/A | Pressure
(PSIA) | 15 . | N/A | (4) | N/A | N/A | None |
| Function:
Signal/Instrumentation | Relative
Humidity (%) | . 100 | _ 100 | (4) | Attachment C.1 | Generic
Simultaneous
Test |
None |
| Demon: N/A
Demont A | Chemical
Spray | N/A | N/A | (4) | N/A | | ,
None |
| Service: Attachment A | Radiation
(RAD) | 3.1×10^4 | 2x10 ⁸ | . (4) | Attachment C.1 | Generic
Sequential | None |
| .ocation: 12 · | Aging | N/A - | .40 years | (2) | Attachment C.2 | Generic Mat'l Test | None |
| Flood Level Elev: 552'
bove Flood Level: Yes X
No | Submergence | N/A | N/A | (4) | N/A | . · N/A | None |
| lotes: (1) See Section 2 | 2.4 in 79-01B r | eport. | | · · · | - | Prepared by: | W. Vyita |
| (2) See Section 4
(3) All notes and
sheets are or | .1.2 in 79-01B
d other information the attached a | report.
tion not on 1
appendix shee | these | • | , | Reviewed by: | R. Wilsto |

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(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

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EEB-**64-0023** Rev

Component: Cable Mark: WVA

System: 64 Unit: 2

| <u>Plant I. D. No.</u> | Room | Function/Service | Category | <u>Operating Time</u> |
|------------------------|------|---------------------------|----------|-----------------------|
| 1R2726 | 12 | PX-64-51 Air | A/B | l hr/l yr |
| 1R2725 | 12 | PX-64-51 Air |] | 1 - |
| 2R2726 | 12 | PX-64-51 Air | | |
| 2R2725 | 12 | PX-64-51 Air | | 1 |
| 2R2725 | 12 | PT-64-51 Air | | |
| 2R2726 | 12 | PT-64-51 Air | | |
| 2R2715 | 12 | PX-64-54 Air | | |
| 2R2716 | 12 | LT-64-54 Air ⁻ | | |
| 3R2726 | 12 | PX-64-51 Air | | |
| 3R2725 | 12 | PX-64-51 Air | | • |
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EEB <u>64-0023</u>

Rev _____

ATTACHMENT B

Mark WVA

| | <u>Contract No</u> . | Туре | |
|----|---|---|--|
| | 77K5-823265
72C7-83944
69C3-64863-1
72C7-74910-1 | FRXLPE/CSPE
FRXLPE/CSPE
PE/PVC
XLPE/CSPE | |
| TR | 822676 from SQN
76K5-87232 | FREP/CPE | |
| TR | 827773 from BLN
78K5-824447 | FREP/CPE | |
| TR | 826953 from BLN
78K5-824447 | FREP/CPE | |
| | 77K5-820991
73C7-84211 | | |

Manufacturer

Rockbestos Continental Wire & Cable Rockbestos Continental Wire & Cable

Continental Wire & Cable

Anaconda

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Anaconda

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Boston Ins. Wire ITT'

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Sheet No: EEB -64 -0023

Revision: 0

### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Reviewed by:	,
Prepared by:	•
•	
QA Acceptance:	



13C





SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)



Facility: Browns Ferry Nuclear Plant Unit: 1 Docket: 50-259

Date QUALIFICATION OUTSTANDING DOCUMENTATION REF ENVIRONMENT ITEMS EQUIPMENT DESCRIPTION METHOD Specifi-Oualifi-Specifi-Oualification cation cation cation Parameter System: 64 Engineerind 1 Year Attachment None Operating \_ Attachment A Analysis C.3 Plant ID No. Attachment A Time (1)Cable ' Component IPCEA S-61-402 Standard Mat'l 16AWG, 3/c, NVB, (PE) None par 3.9 and Long-Term Temp. Temperature (°F) Manufacturer:Attachment B (4)Appendix C.2 Rating 325 203 ' N/A None N/A N/A Pressure Model Number: N/A 69.7 (PSIA) (4) Function: IPCEA S-61-402 Standard par 3.9, Material Relative Signal/Instrumentation Humidity (%) 3.7.3, & 6.7 Requirement 100 None 100 (4) Accuracy: Req'd: N/A Chemical Demon: N/A Spray Category: N/A -Attachment A. (4) N/A None N/A N/A NUREG-0588 6.5x10'8 Generic Attachment A Service: 4x10<sup>9</sup> Material Material Radiation None 4x10<sup>7</sup> Attach. C.1 List Tests (RAD) (4):ocation: Q. 10 years **Oper.** Experience None Attachment C.2 (2)N/A Aging 1. Flood Level Elev: 552! Submergence N/A N/A Above Flood Level: Yes X (4) N/A N/A None No Prepared by: W. Yita lotes: (1) See Section 2.4 in 79-01B report.

(2) See Section 4.1.2 in 79-01B report.

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

(3)

Revision

Sheet No. EEB 64-0024

Reviewed by: D.R. Helston.

QA Acceptance:

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### Attachment A

•System: 64 Unit: <u>1</u>	•	a,		•	EEB- <i>61-002.4</i> Rev
Component: Mark:	Cable WVB	• • •			· .
<u>Plant I. D.</u>	No.	Room	Function/Service	<u>Category</u>	Operating Time.
IES401 IES3276		0 0 ·	7E-64-52C DW TEMP 7E-64-52A DW TEMP	A ∳.	1 Year ↓

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EEB 67-0024

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### ATTACHMENT B

Mark WVB

Type

CSPE/CSPE

XLPE/CSPE PE/PVC

XLPE/CSPE

XLPE/CSPE

<u>Contract No</u>.

<u>(</u>\_\_

72C7-83849 72C7-74910-2 69C3-64863-1

TR 822675 from WBN 74C7-85259

TR 820907 from 74C7-85259

73C7-84211

<u>Manufacturer</u>

Rev

BIW Okonite Rockbestos

Belden Corporation

Belden Corporation

ITT Surp.



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Sheet No: EEB -64-0024

Revision: 0

on: 0

### ATTACHMENT C

C.1 Integrated dose - 10 years plus accident

Beta Dose

### References:

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- 1. W. W. Parkinson, O. Sisman, October 1970, The Use of Plastics and Elastomers in Nuclear Radiation.
- 2. R. B. Blodgett, R. G. Fisher, June 1968, Insulations and Jackets for Control and Power Cables.
- 3. M. Asaka, S. Yamamoto, 1973, Radiation Resistance of Plastic Insulating Materials for Cable.
- 4. Anaconda-Continental Test Report No. 79117 dated April 1979.

5. Wyle Laboratory Test Report 43854-3.

6. Franklin Institute Test Reports E-C4113 and FC-5120.

7. Rockbestos Company Test Report dated July 1977 amended 1979.

The TVA value of  $4 \times 10^9$  rads for the beta accident dose at the periphery of the containment is being reevaluated due to its high value. However, using this value and making reference to the 7901-B DOR guidelines section 4.2.1 and the depth dose penetration, which using to the low penetrating power of beta particles gives a factor of 10 resultion for 40 mils of jacketing material, and a factor of 10 for an insulation thickness of 30 mils and which is conservative for TVA's 600-volt power and control cables and extremely conservative for TVA's triax and coax and signal cable due to their thickness and the presence of metallic shielding material, and assigning a factor of 5 for the installation shielding of metal trays, conduit, boxes, and flexible conduit, we arrive at a total effective dose of .8 x 10 rads of beta.

Since the energy dissipation of gamma radiation occurs via ionizing processes, one can add the accident dose of  $4 \times 10^{\circ}$  rads of gamma directly. The accumulated integrated gamma l0-year dose (the time presently assigned to connectors and penetrations).amounts to 7 2.5 x 10' rads which added directly gives a total dose of 7.3 x 10' rads. In addition, since the containment is inerted in operation, the scission rate and deterioration of the insulation and jacketing materials through oxidation will be much less than for tests conducted in air.



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Sheet No: EEB-64-0024

### ATTACHMENT C (Con'd)

Revision: 0

Since the above value of 7.3 x  $10^7$  is less than the values for which we have in-air test data for SROAJ types (1.2 x 10°) and for XLPE types (2 x 10°), it is concluded that the beta dose in an accident will not disqualify the cables presently installed, and the cables will remain operable in the service environment.

C.2 TVA Engineecing Report No. 1942

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

Reviewed	Ъу:	·
Prepared	by:	

QA Acceptance:\_\_\_\_\_



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(3) SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Facility: Browns Ferry Nuclear Plant Sheet No. EEB-64-0025. Unit: 1 Revisión Cocket: 50-259 Date OUTSTANDING **OUALIFICATION** ENVIRCHMENT **DOCUMENTATION REF** ITEMS EQUIPMENT DESCRIPTION METHOD Oualifi-Specifi-Qualifi-Specification cation cation Parameter cation Engineering System: 64 Attachment C 1 Year Attachment A Operating None Analysis Plant 10 No. EF. Time (1)Component Electrical · Penetration Assembly Simultaneous None Temperature (°F): Attachment B.4 Test Attach. B.A Manufacturer: General 325 (4)Electric Company • • Simultaneous Pressure Hodel Number: Series 100 Test None (PSIA)Attachment B.4 67 Attach. B.3 (4)Function: Low voltage Simultaneous. power and control primary Relative · · Test 🗇 None containment penetration Attachment B.4 Humidity (%). 100 100 (4). Accuracy: Regid: Demon: Chemical. Spray None (4) N/A Catagory: See Attachment A N/A N/A N/A Service: See Attachment A 6.9x10<sup>7</sup> 1. Test 6.5x10<sup>7</sup> Attachment B. 2. Engineering Radiation  $4 \times 10^9$  · 4x10<sup>9</sup> Attachment C Analysis None (RAD) (4) <u>Attach.</u> B.1 0 Location: Attachment B.GAttachment B.7 None 40 years Aaina (2)N/A Flood Level Elev: 552' N/A ' None Above Flood Level: Yes X N/A Submergence N/A N/A  $(4)^{+}$ No

Notes: (1) See Section 2.4 in 79-01B report.

- (2) See Section 4.1. in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: W. Nita

Reviewed by: A. M. M. electre

QA Acceptance:

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EEB- 64-0025 Rev 0

# ATTACINENT A

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# Electrical Penetrations

Unit:	•	
Mark	Plant I.D. No.	Room
EB EF FA	DW/TEMP/1ES401 DW/TEMP/1ES3276 FCV/FSV-64-28A -28B -28C -28D -28E -28F -28F -28G -28H -28J -28K -28L -28L	07

EEB -64-0025 Integrated dose - 10 years normal operation plus one LOCA 1. Rev 2. Penetrations 340 Cable 340 Splices 358 3. Penetration 103 Cable 103 · 134 Splices 4. Penetrations -GE 100 Series Low Voltage Qualification Test Report dated and Cable January 1974 and Addendum No. 1 dated Harch 1974 Splices FIRL Final Report F-C4033-3 -5. Penetrations TVA Engineering Report EEE 1926 -Cable TVA Engineering Report EEB 1926 -TVA Engineering Report EE? 1926 Splices ... 6. Penetrations -GE Report 100 Series Low Voltage Qualification Test Report dated January 1974 Cable NRC 0588 Materials List (Crosslinked Polyethylene) Splices TVA Engineering Report EEB 1926 (Attachment C) -7.

Penetrations Material Tests -Generic Material Tests Cable Tests and Analysis Splices -



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Attachment B



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EEB - 64 - 002

Rev

### Attachment C

### TVA Engineering Report 1926

 This report is to update the documentation of the qualification of the General'Electric Series 100 modular-type electrical penetration assemblies used at Browns Ferry Units 1 and 2 for Class 1E low voltage power and control service into the drywell. TVA designations for these units are EA, EF, and EG.

The penetration assemblies inside the drywell consist of four pertinent features; the penetration conductor seals, the conductor pigtails, the pigtail splices, and the junction box which is bolted to the header plate and encloses the foregoing items.

The junction boxes are fabricated from 0.104-inch-thick steel. This thickness is sufficient to essentially completely shield the box contents from beta radiation and to reduce the total gamma dose by about 25 percent. Therefore, the integrated 40-year normal operation plus one LOCA dose seen by the box contents will be approximately 1.05 'x 108 rads gamma. The penetration epoxy seals, the Vulkene cable, and Raychem WCSF-N heat shrink splice insulation are documented to be qualified for this level of radiation.

Regarding thermal aging, the epoxy sealants are documented for 40-year life and the vulkene cable, (Crosslinked polyethylene) is known to be suitable for 40 years service. The Raychem heat shrink tubing are fully qualified by FIRL report F-C4033-3 except a normal temperature life equivalent of the accelerated aging performed was not specified. However the tubing material is a thermosetting, crosslinked, polyethylene-based material and the thermal preaging performed 7 days at 150°C, is generally in agreement with Arrhenius curves experimentally derived for similar insulating compounds and which predict 40 years life at 80° to 90°C temperatures. Additionally, since the Browns Ferry containment is inerted a large portion of the time, thermal aging effects will be greatly reduced from what it would be in a normal air environment resulting in better retention of initial properties at the end of 40 years than indicated by the available test data on the penetration assembly materials.

The long term humidity resistance of the epoxy sealants, Vulkene cable, and Raychem splices is also documented.

LOCA reports available indicated the penetration seals, Vulkene cable, and Raychem heat shrink tubing retain sufficient insulation resistance after LOCA testing to indicate the ability to function for one year post accident operation.

In conclusion these penetration assemblies are qualified for 40 years normal service and one year of post accident operation.

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Cocket:50-260

EQUIPMENT DESCRIPTION	ENVIRCHMENT			DOCUMEN	TATION REF	QUALIFICATION	OUTSTANDING
	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation	•••.	•••••••
System: '64 Plant ID No. EF	Operating Time	Attachment A	1:Year	(1)	Attachment C	Engineering Analysis	None
Component Electrical Penetration Assembly Manufacturer: General	Temperature	325	Attach. B <b>.</b> 2	(4)	Attachment B.4	Simultaneous Test	None .
Electric Company Model Number: Series 100	Pressure (PSIA)	67	Attach. B.3	(4)	Attachment B.4	Simultaneous Test	None
Function: Low voltage power and control primary containment penetration	Relative Humidity (%).	100	100	(4)	Attachment B.4	Simultaneous . Test	None .
Category: See Attachment A	Chemical. Spray	N/A·	N/A	(4)	N/A	·. N/A	None
Service: See Attachment A	Radiation (RAD)	.6.5x10 <sup>7</sup> 4x10 <sup>9</sup> Attach.B.1	6.9x10 <sup>7</sup> 4x10 <sup>9</sup> .	. (4)	Attachment B.5 Attachment C	1. Test 2. Engineering Analysis	None
Location: U	Aging	<u>N/A</u>	40 years	(2)	Attachment B.6	Attachment B.7	None
Flood Level Elev: 552' Above Flood Level: Yes X No	Submergence	. N/A.	N/A	(4)	N/A ·	N/A	, None

Notes: (1) See Section 2.4 in 79-018 report.

(2) See Section 4.1. in 79-01B report.

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B: in 79-01B. report.

Prepared by: W. Mita

Reviewed by: B.R. Webster

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QA Acceptance:

EEB	64-0026
Rev_	0

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# ATTACHMENT A

# Electrical Penetrations

System: 64 Unit: 2

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<u>Mark</u>

EB EF FA

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Plant I.D. No.
DW TEMP/2ES401 DW TEMP/2ES3276 FCV/FSV-64-28A -28B -28C -28D -28E -28F -28F -28F -28G -28H -28J -28J -28J -28K -28K
-28J -28K -28L -28L -28M

Room

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•			,	Attach	ment B		•	EEB	-64	-0026
1.	Integrated do	se	- 10 years	normal	operati	on plus	one LOCA	Rev		
2.	Penetrations Cable Splices		340 340 358					-		
3.	Penetration Cable ·Splices		103 103 134			•				
4.	Penetrations and Cable	-	GE 100 Se January 1	eries Lou 1974 and	w Voltag Addendu	je Qualii um No. l	fication T dated !lar	est R ch 19	eport da 74	ted
	Splices	-	FIRL Fina	al Repor	t F-C403	3-3				
5.	Penetrations Cable Splices		TVA Engir TVA Engir TVA Engir	neering   neering   neering	Report Report Report	EEB 1926 EEB 1926 EE3 1926				
6. ,	Penetrations Cable Splices		GE Report dated Jar NRC 0588 TVA Engin	t 100 Se nuary 19 Materia neering 1	ries Low 74 ls List ReportE	/ Voltage (Crossi EB 1926	e Qualific inked Poly (Attachmer	ation ethyl nt C)	Test Re ene)	port
7.	Penetrations Cable Splices	-	Material Generic I Tests and	Tests Material Manalys	Tests is	•			•	

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EEB -64-0026

Rev

### Attachment C

### TVA Engineering Report 1926

This report is to update the documentation of the qualification of the General Electric Series 100 modular-type electrical penetration assemblies used at Browns Ferry Units 1 and 2 for Class 1E low voltage power and control service into the drywell. TVA designations for these units are EA, EF, and EG.

The penetration assemblies inside the drywell consist of four pertinent features; the penetration conductor seals, the conductor pigtails, the pigtail splices, and the junction box which is bolted to the header plate and encloses the foregoing items.

The junction boxes are fabricated from 0.104-inch-thick steel. This thickness is sufficient to essentially completely shield the box contents from beta radiation and to reduce the total gamma dose by about 25 percent. Therefore, the integrated 40-year normal operation plus one LOCA dose seen by the box contents will be approximately 1.05 x 108 rads gamma. The penetration epoxy seals, the Vulkene cable, and Raychem WCSF-N heat shrink splice insulation are documented to be qualified for this level of radiation.

Regarding thermal aging, the epoxy sealants are documented for 40-year life and the vulkene cable, (Crosslinked polyethylene) is known to be suitable for 40 years service. The Ráychem heat shrink tubing are fully qualified by FIRL report F-C4033-3 except a normal temperature life equivalent of the accelerated aging performed was not specified. However the tubing material is a thermosetting, crosslinked, polyethylene-based material and the thermal preaging performed 7 days at 150°C, is generally in agreement with Arrhenius curves experimentally derived for similar insulating compounds and which predict 40 years life at 80° to 90°C temperatures. Additionally, since the Browns Ferry containment is inerted a large portion of the time, thermal aging effects will be greatly reduced from what it would be in a normal air environment resulting in better retention of initial properties at the end of 40 years than indicated by the available test data on the penetration assembly materials.

The long term humidity resistance of the epoxy sealants, Vulkene cable, and Raychem splices is also documented.

LOCA reports available indicated the penetration seals, Vulkene cable, and Raychem heat shrink tubing retain sufficient insulation resistance after LOCA testing to indicate the ability to function for one year post accident operation.

In conclusion these penetration assemblies are qualified for 40 years normal service and one year of post accident operation.

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SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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Sheet N	o. EEB	64-0027
Revisio	n	

- Date

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Facility: Browns Ferry Nuclear Plant . Unit: 1 Cocket: 50-259

EQUIPMENT DESCRIPTION		ENVIRONMENT		DOCUMEN	TATION REF	QUALIFICATION METHOD	OUTSTANDING
	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation		11645
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	l Year	(1)	C.4	Analysis	
Component Cable 14AWG, 1/c, WCA, (PN) Anufacturer:Attachment B	Temperature (°F)	292	153	 (4)	Attachments C.1 and C.2	Attachment C.3	None
odel Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
function: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Materia] Requirement	None .
ategory: Attachment A	Chemical Spray	N/A.	N/A	(4)	N/A	N/A	None
ervice: Attachment A	Radiation (RAD)	3 x 10 <sup>7</sup>	4×10 <sup>7</sup>	. (4)	NUREG-0588 Materials List	Generic Material Test	None
ocation: 2	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
lood Level Elev: 552' bove Flood Level: Yes X No	Submergence	N/A	N/A	(4) ·	N/A	N/A .	None,

otes: (1) See Section 2.4 in 79-01B report.

(2) See Section 4.1.2 in 79-01B report.

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Reviewed by: B.R. Webster

QA Acceptance:

Prepared by:

Attachment A

System: Unit:	64 1				EEB- <b>64 0027</b> Rev
Component: Cable Mark: WCA(PN)					
<u>Plant I.</u>	D. No.	Room	Function/Service	<u>Category</u>	Operating Time
1ES1191-	·I	2	TS-64-68 AIR	A	l Year
1ES1198-	·I	2	TS-64-70 AIR	Α	1 Year '
2ES1191-	-I	2	TS-64-68 AIR	Α	1 Year
2ES1198-	·I	2	TS-64-70 AIR	Α	l Year

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# EEB <u>64-0027</u>

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#### ATTACHMENT B

Mark WCA

Type

PN

ΡN

PN

PN

PN. PN

PN

Contract No. 72C7-75128 72X7-74885-1 73C7-84528 67C3-91618 72C7-75328-1 70C7-54179-1 TR 822378) Sequoyah 822639) 72C7-75228-1 822915) 72C7-83874-1 Manufacturer

Plastic Wire & Cable Corp Brand-Rex Plastic Wire & Cable Coro Brand-Rex Brand-Rex Brand-Rex

Plastic Wire & Cable Corp

Plastic Wire & Cable Corp'

Sheet No.: EEB- 64-0027

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

80

 This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of 75° C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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Facility: Browns Ferry Nucl Unit: 1 Cocket: 50-259	ear Plant	SYSTEM COMP	ONENT EVALUA -	TION WORK SH	EET (Rev 2)	(3) Sheet No. <u>EEB</u> Revision Date	64-0028
FOULDMENT DESCOLDTION		ENVIRONMENT		DOCUMEN	TATION REF	QUALIFICATION	OUTSTANDING
	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation	· ',	Here.
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	l Year	(1)	Attachment C.4	Analysis	
Component Cable ' 12AWG, 1/c, WBB, (PN) Manufacturer:Attachment B	Temperature (°F)	297	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
todel Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	. N/A	N/A	None
unction: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
ategory: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
ervice: Attachment A	Radiation (RAD)	3 x 10 <sup>7</sup>	4x10 <sup>7</sup>	. (4)	NUREG-0588 Materials List	Generic Material Test	None
ocation: 3 ·	Aging	N/A	20 years	(2)	Attachment C.2	Oper, Experience	None
lcod Level Elev: 552' bove Flood Level: Yes X No	Submergence	N/A	N/A .	(4)	N/A	. N/A	None

stes: (1) See Section 2.4 in 79-01B report.

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by:

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Reviewed by:

QA Acceptance;

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System: 6 Unit: 1	4				EEB <b>-64- 0078</b> Rev
Component: Nark:	Cabl WBB(	e , PN)			
<u>Plant I. D</u>	<u>. No.</u>	Room	Function/Service	Category	<u>Operating Time</u>
1ES807-1		3	TS-64-72. AIR	A	l Year
2ES807-I		3	TS-64-72 AIR	А	1 Year
3E8807-I		3	TS-64-72 AIR .	А	l Year

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# EEB 64-0028

#### ATTACHMENT B

Mark WBB

Contract No.

67C3-91618 73C7-84528 72C7-75328-1 70C7-54179-1 Type PN PN PN PN Manufacturer

Rev

Brand-Rex Plastic Wire & Cable Corp Brand-Rex Brand-Rex ·

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Sheet	No.	:	EEB- 4	0	<b>4-</b>	0	02	8

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

80

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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Facility: Browns Ferry Nucl Unit: 1 Docket: 50-259	ear Plant .	SYSTEM COMP	ONENT EVALUA	TION WORK SH	EET (Rev-2)`	(3) Sheet No. <u>EEB 6</u> Revision Date	54-0029.
	• ENVIRONMENT			DOCUMEN	TATION REF	QUALIFICATION METHOD	OUTSTANDING
EQUIPMENT DESCRIPTION	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation		
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	l Year	(1)	Attachment C.4	Engineering Analysis	None _
Component Cable 14AWG, 1/c, WCA, (PN) Manufacturer:Attachment B	Temperature (°F)	139 .	153	(4)	Attachments C.1 and C.2	Attachment C.3	None -
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	, - 100	(4)	LPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Accuracy: Req'd: N/A Demon: N/A Category: Attachment A	Chemical Spray	- N/A	N/A	(4)	N/A	~ N/A	None
Service: Attachment A	Radiation (RAD)	3 x 10 <sup>7</sup>	4x10 <sup>7</sup>	. (4)	NUREG-0588 Materials List	Generic Material Test	None
Location: 4 .	Aging	N/A	20 years	(2)	Attachment C.2	Oper, Experience	None
Flood Level Elev: 552' Above Flood Level: Yes X No	Submergence	N/A	N/A	(4)	. N/A	N/A	None
Notes: (1) See Section (2) See Section 4	2.4 in 79-018 r 1.2 in 79-018	eport. report.	•		,	Prepared by:	N. Wita R. Helstu

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

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Attachment A

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System: 64 Unit: 1		·	•	EEB- <i>6<b>4</b>- 00 29</i> Rev
Component: Mark:	Cable WCA(PN)		• •	
<u> Plant I. D. No.</u>	Room	Function/Service	<u>Category</u>	Operating Time
1ES3308-11 2ES3308 3ES3308	4 4 4	TS-64-73 CS COOLER PMPS TS-64-73 CS COOLER PMPS TS-64-73 CS COOLER PMPS	A A A `•	l Year 1 Year 1 Year

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# EEB 64-0029

Rev \_\_\_\_

#### ATTACHMENT B

Mark WCA

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Contract No. 72C7-75128 72X7-74885-1 73C7-84528 67C3-91618 72C7-75328-1 70C7-54179-1 TR 822378) Sequoyah 822639) 72C7-75228-1 822915) 72C7-75228-1 Manufacturer

Plastic Wire & Cable Corp Brand-Rex Plastic Wire & Cable Coro Brand-Rex Brand-Rex Brand-Rex

Plastic Wire & Cable Corp

Plastic Wire & Cable Corp

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Sheet	No.:	EEB-64-0029	ļ

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Revision:

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

**8C** 

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms ' the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_\_ Reviewed by:\_\_\_\_\_

QA Acceptance:

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(3) SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Sheet No. FFB 64-0030 Facility: Browns Ferry Nuclear Plant . Jnit: 1 Revision Jocket: 50-259 Date DOCUMENTATION REF **OUALIFICATION** OUTSTANDING ENVIRONMENT METHOD ITEMS EQUIPMENT DESCRIPTION Oualifi-Specifi-Qualifi-Specification cation cation cation Parameter None Engineering Attachmen 1 Year System: 64 Analysis C.4 Operating Attachment A Plant ID No. Attachment A Time (1)Cable ' Component None 14AWG, 1/c, WCA, (PN) Attachments Temperature (°F) lanufacturer: Attachment B 139 C.1 and C.2 Attachment C.3 153 (4)• • Pressure lodel Number: N/A (PSIA)(4) 15.0 N/A N/A N/A None . unction: Control/Power IPCEA S-61-402 Standard par 3.9, 3.7.3 Material Relative 6.7 Requirement None Humidity (%) (4) 100 100 ccuracy: Req'd: N/A Demon: N/A Chemical Spray ategory: Attachment A (4) N/A None N/A N/A N/A ervice: Attachment A NUREG-0588 Generic Radiation Material Materials 4x107  $3 \times 10^7$ (RAD) (4)Test None List ocation: 5 Attachment C.2 Oper. Experience None N/A (2)Aging 20 years lood Level Elev: 552' pove Flood Level: Yes X Submergence N/A N/A N/A N/A None (4) No

stes: (1) See Section 2.4 in 79-01B report.

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- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-018 report.

· Prepared by: W. Mita

Reviewed by: A.R. Helster.

QA Acceptance:

## Attachment A

System: 64 Unit: 1		-	<u>ـ</u>	EEB- <b>64 00 30</b> Rev
Component: Mark:	Cable WCA(PN)			
Plant I. D. No	Room	Function/Service	Category	Operating Time
1ES3746-II 2ES3674	5 5	TS-64-71 RHH PMP FAN TS-64-71 RHH PMP FAN	A A	l Year l Year

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# EEB 64-0030

Rev \_\_\_\_

#### ATTACHMENT B

Mark WCA

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PN

<u>Contract No</u>. 72C7-75128 72X7-74885-1 73C7-84528 67C3-91618 72C7-75328-1 70C7-54179-1 TR 822378) Sequoyah 822639) 72C7-75228-1 822915) 72C7-75228-1 72C7-83874-1 Manufacturer

Plastic Wire & Cable Corp Brand-Rex Plastic Wire & Cable Corp Brand-Rex Brand-Rex Brand-Rex Plastic Wire & Cable Corp

Plastic Wire & Cable Corp



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Sheet No .: EEB-64-0030

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

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. This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous,  $95^{\circ}$  C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

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C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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Facility: Browns Ferry Nucl Unit: 1 Docket: 50-259	lear Plant	SYSTEM COMP	ONENT EVALU/	ATION WORK SI	IEET (Rev 2)	(3) Sheet No. <u>EEB</u> Revision Date	8 64-0031
EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMEN	TATION REF	QUALIFICATION	OUTSTANDING
	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation	METHOD	ITEMS
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachmen C.4	Engineering Analysis	
Component Cable ' 12AWG, 2/c, WGB, (PNJ) fanufacturer:Attachment B	Temperature ( <sup>°</sup> F) ·	139	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
todel Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
unction: Control/Power	Relative Humidity (%)	100	100	(4)	12CEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Demon: N/A ^	Chemiçal Spray	N/A	N/A	(4)	N/A	N/A	None
ervice: Attachment A	Radiation (RAD)	3 × 10 <sup>7</sup>	4x10 <sup>7</sup>	. (4).	NUREG-0588 Materials List	Generic Material Test	None
	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
lood Level Elev: 552' bove Flood Level: Yes X No-	Submergence	N/A	N/A	(4)	N/A	. N/A	None
otes: (1) See Section 2 (2) See Section 4	.4 in 79-01B re .1.2 in 79-01B	port. report.	•			Prepared by:	V. mita

(3) All notes and other information not on these sheets are on the attached appendix sheets.

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(4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

Reviewed by: D.R. Wilster



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EEB-**6†-** 003/ Rev

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System: 64 Unit: 1

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Component: Cable Mark: WGB(PNJ)

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Room	Function/Service	<u>Category</u>	<u>Operating Time</u>
_			*
5	TS-64-69 RHR PMP MTR B	A	1 Year
5	TS-64-69 RHR PMP MTR B	A	1 Year
5	TS-64-71 RHR PMP MTR B	A	1 Year
	<u>Room</u> 5 5 5	RoomFunction/Service5TS-64-69 RHR PMP MTR B5TS-64-69 RHR PMP MTR B5TS-64-71 RHR PMP MTR B	RoomFunction/ServiceCategory5TS-64-69 RHR PMP MTR BA5TS-64-69 RHR PMP MTR BA5TS-64-71 RHR PMP MTR BA

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# EEB 64-0031

Rev \_\_\_\_\_

#### ATTACHMENT B

Mark WGB

Contract No. 67C3-91618 73C7-84528 75K7-86150-1 75K5-86506-1 74C7-85069-1 70C7-54179-2 71X7-54761-1 72C7-54872 70C7-54179-1 Type

PNJ PJJ PJJ

PJJ

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PNJ PNJ PNJ PNJ PNJ

#### Manufacturer

	Brand-Rex	
•	Rome Cable	
	Cyprus	
	American Insulated Wi	ire
	Rome 🐃	
	Plastic Wire & Cable	Corp
	General Cable	•
	Plastic Wire & Cable	Corp
	Brand-Rex	
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Sheet No.: EEB-64-003/

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Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating -

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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Facility: Browns Ferry Nuclear Plant . Unit: 1 Docket: 50-259 SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3	5)
Sheet No.	EEB 64-0032
Revision	
Date	

1 - 1

DOCUMENTATION REF OUALIFICATION OUTSTANDING ENVIRONMENT METHOD ITEMS EQUIPMENT DESCRIPTION Oualifi-Cualifi-Specifi-Specification cation cation cation Parameter System: 64 Engineering Attachment C.3 None l year Operating Attachment A Analysis and Time Plant ID No. Attachment A Test (1)Component Cable WVA, (XL/EP) Generic 16AWG, 2/c, Type MS Simu]taneous Temperature (°F) Manufacturer: Attachment B 217 (4)Attachment C.11 Test None 385 None N/A N/A N/A Pressure Mcdel Number: N/A (PSIA) (4) 15 Function: Generic Signal/Instrumentation Relative Simultaneous Humidity (%) (4) Attachment C.1 None 100 100 Test Reg'd: N/A Accuracy: Demon: N/A Chemical ~ Spray Category: Attachment A (4) "None N/A N/A N/A N/A Service: Attachment A Generic Radiation Sequential Test  $3.1 \times 10^7$ 2x10<sup>8</sup> (4)Attachment C.1 (RAD) None \_ocation: Generic Mat'l Test 6 None Attachment C.2 (2)40 years N/A Aging , Flood Level Elev: 552' None N/A N/A Shove Flood Level: Yes X Submergence N/A N/A (4) No

iotes: (1) See Section 2.4 in 79-01B report.

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: 1. Mula

Reviewed by: <u>A. Welson</u>

QA Acceptance:

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Attachment A

System: 64			:	EEB - 64 - 0032
Unit: 1		4.		Rev
Component: Mark:	Cable WVA	·		

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<u>Plant I. D. No.</u>	Room	Function/Service	<u>Category</u>	Operating Time
1R2725 1R2726 1R2715 1R3886 3R2856 3R2725 3R2726	6 6 6 6 6 6 6	PT-64-51 AIR PT-64-51 AIR LT-64-54 AIR LT-64-66 AIR LT-64-66 AIR PT-64-51 AIR PT-64-51 AIR	A/B A/B A/B A A A A/B A/B	$ \frac{1}{1} \frac{Hr}{Hr} - \frac{1}{1} \frac{Yr}{Yr} \\ \frac{1}{1} \frac{Hr}{Hr} - \frac{1}{1} \frac{Yr}{Yr} \\ \frac{1}{1} \frac{Hr}{Hr} \\ \frac{1}{1} \frac{Hr}{Hr} - \frac{1}{1} \frac{Yr}{Yr} \\ \frac{1}{1} \frac{Hr}{Hr} - \frac{1}{1} \frac{Yr}{Yr} $
3R2715	6	LT-64-54 AIR	A/B	1 Hr - 1 Yr

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# EEB <u>64-0032</u>

Rev \_\_\_\_\_

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#### ATTACHMENT 8

## Mark WVA

	<u>Contract No</u> .	Туре	Manufacturer		
	77K5-823265 72C7-83944 69C3-64863-1 72C7-74910-1	FRXLPE/CSPE FRXLPE/CSPE PE/PVC XLPE/CSPE	` Rockbestos Continental Wire & Cable Rockbestos Continental Wire & Cable		
TR	822676 from SQN 76K5-87232	FREP/CPE	Continental Wire & Cable		
TR	827773 from BLN 78K5-824447	FREP/CPE	Anaconda		
TŘ	826953 from BLN 78K5-824447	FREP/CPE	Anaconda		
	77K5-820991 73C7-84211		Boston Ins. Wire		

7307-84211

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Sheet No: EEB -64-0032

Revision: 0

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Prepared by:	-

Reviewed by:

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Facility: Browns Ferry Nucl Unit: 1 Docket: 50-259	lear Plant	SYSTEM COMP	PONENT EVALU	ATION WORK SH	EET (Rev 2)	(3) Sheet No. <u></u> Revision Date	3 64-0033
EQUIPMENT DESCRIPTION		ENVIRONMENT		DOCUMEN	TATION REF-	QUALIFICATION METHOD	OUTSTAND
	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation		
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	Year ·	· · · (1) ·	Attachment C.3	Engineering Analysis	None •
Component Cable WVA; (PE) 16AWG, 2/c, Type MS Manufacturer: Attachment B	Temperature (°F)	217	203	(4)	IPCEA S-61-402 par 3.9 and Attachment C.2	Attachment C.2	None
Model Number: N/A	Pressure (PSIA)	15.0	N V	(4)	N/A	N/A	None
Function: Signal/Instrumentation	Relative Humidity (%)	100	100	. (4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
Category: Attachment A	Chemical Spray	N/A _	N/A	(4)	Ň/A	N/A	· ·None
Service: Attachment A	Radiation (RAD)	$3.1 \times 10^7$	4x107	(4)	NUREG-0588 Material List	Generic Material Tests	None
Location: b	Aging	N/A	20 years	(2)	Attachment C.1	Oper. Experience	None
Flood Level Elev: 552' Above Flood Level: Yes X No	Submergence	N/A	N/A	(4)	N/A	. N/A	None
Notes: (1) See Section 2	2.4 in 79-01B re	eport.		•		Prepared by: _	V. Mita
(2) See Section 4 (3) All notes and	.1.2 in 79-01B	report. tion not on t	:hese ı			Reviewed by:	R. Webster
sheets are of (4) See Section 3	the attached a .0 and/or Appen	appendix shee ndix B in 79-	olb report.		•••••	QA Acceptance:	·
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# Attachment A

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System: 64		·· · ·		EEB 64-0033
Component: Cable Mark: WVA	•		·. ·	Rev
<u>Plant I. D. No.</u>	<u>Room</u>	Function/Service	Category	<u>Operatiný Time</u>

102725		c	DT 66 51 ATD		A /17	i 11 - 1 - 1
182725		D	PI-64-51 AIK		A/ B	Tur-Tir "
1R2726	•	6	PT-64-51 AIR	. •	'A/B	1 Hr - 1 Yr
1R2715	•	6	LT-64-54 AIR		A/B	1 Hr - 1 Yr
1R3886		6	• LT-64-66 AIR		A	1. Hr
3R2856		° 6	LT-64-66 AIR ,		A	1`Hr
3R2725	. ,	6	PT-64-51 AIR		A/B	1 Hr - 1 Yr
3R2726.		6	PT-64-51 AIR		A/B	1 Hr - 1 Yr
3R2715	,	6	LT-64-54 AIR		A/B	1 Hr - 1 Yr

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## EEB <u>64-0033</u>

Rev \_\_\_\_\_

#### ATTACHMENT B

Mark WVA

Contract No.

#### Type

FRXLPE/CSPE

FRXLPE/CSPE

PE/PVC

XLPE/CSPE

FREP/CPE

FREP/CPE

FREP/CPE

77K5-823265 72C7-83944 69C3-64863-1 72C7-74910-1

TR 822676 from SQN 76K5-87232

TR 827773 from BLN 78K5-824447.

TR 826953 from BLN 78K5-824447

> 77K5-820991 73C7-84211

Manufacturer

Rockbestos Continental Wire & Cable Rockbestos Continental Wire & Cable

Continental Wire & Cable

Anaconda

Anaconda

Boston Ins. Wire

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# SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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Sheet No.	EEB 64-0036
Revision	
Date	

Facility: Browns Ferry Nuclear Plant Unit: 1 Cocket: 50-259

		ENVIRONMENT		DOCUMEN	TATION REF	QUALIFICATION METHOD	OUTSTANDING ITEMS
EQUIPMENT DESCRIPTION	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation		•
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year ·	(1)	• Attachment C.3	Engineering Analysis	None
Component Cable WUB-1, (CS 18AWG, 2/c, Type TX Manufacturer: Attachment B	PE) Temperature (°F)	217	250	(4)	Attachment C.1	Generic Simultaneous Test	None ·
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Signal/Instrumentation	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Accuracy: Req'd: N/A Demon: N/A Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	$3.1 \times 10^{7}$	5x10 <sup>7</sup>	. (4)	Attachment C. ?	Generic Sequential Test	None
_ocation: 6	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	None
Flood Level Elev: 552' Above Flood Level: Yes X	Submergence	N/A	N/A	(4)	N/A	N/A	None
Votes: (1) See Section	2.4 in 79-018 r	eport.	,	•		· Prepared by: <u>l</u>	U. Mite
<ul><li>(2) See Section (3) All notes an</li></ul>	4.1.2 in 79-01B d other informa	report. tion not on a	these	· · · ·	• • •	Reviewed by: <u>2</u>	P.R. Walster
sheets are o	n the attached 3.0 and/or Appe	appendix she ndix B in 79-	QA Acceptance:	 			

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Attachment A

System: 64 Unit: 1				EEB-6 <b>4</b> 0036 Rev
Component: Cal Mark: wu	51e 3-1	•	•-	
<u>Plant I. D. No.</u>	Room	Function/Service	Category	Operating Time
1R2744 1R2746 1R2748 1R2750 1R2757 1R2759 1R2742 2R2744 2R2746 2R2748 2R2750 2R2757 2R2759 2R2759 2R2742 3R2744 3R2746 3R2748 3R2748 3R2750 3R2759 3R2759 3R2759	6	TE-64-55A $TE-64-55B$ $TE-64-55C$ $TE-64-55E$ $TE-64-55F$ $TE-64-55B$ $TE-64-55B$ $TE-64-55D$ $TE-64-55D$ $TE-64-55F$ $TE-64-55F$ $TE-64-55F$ $TE-64-55B$ $TE-64-55B$ $TE-64-55B$ $TE-64-55B$ $TE-64-55B$ $TE-64-55B$ $TE-64-55B$ $TE-64-55B$ $TE-64-55E$ $TE-64-55E$ $TE-64-55E$ $TE-64-55E$ $TE-64-55E$ $TE-64-55E$ $TE-64-55E$ $TE-64-55E$ $TE-64-52B$		1 Year ;

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## ATTACHMENT B

Mark WUB-1

Contract No.

Type

• <u>Manufacturer</u>



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Revision:

#### ATTACHMENT C-

C.1 TVA Engineering Report No. 1947

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test, Report F-C5120 dated May 1980.

These cable are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Prepared by:	ł	
Reviewed by:		×
QA Acceptance:		
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- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

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## Attachment A

Component:       Cable         Mark:       WUB-1         Plant I. D. No.       Room       Function/Service       Category       Operating Time         1R2744       6       TE-64-55A       A       1 Year         1R2746       TE-64-55B       Image: Second Se	System: Unit:	64 1	1							EEB- <b>64 00 3</b> Rev	7
Plant I. D. No.         Room         Function/Service         Category         Operating Time           1R2744         6         TE-64-55A         A         1 Year           1R2746         TE-64-55B         Image: Second S	Component Mark:	t:	Cable WUB-1	μ					r.		
1R2744       6       TE-64-55A       A       1 Year         1R2746       TE-64-55B       IR2748       IR2748       IR2750       IR264-55C         1R2750       TE-64-55E       IR2759       IR264-55F       IR2744       IR2744       IR264-55A         1R2742       TE-64-55B       IR2744       IR264-55A       IR2744       IR264-55B       IR2744         2R2746       TE-64-55B       IR2757       IR264-55C       IR2757       IR264-55C       IR2757         2R2748       TE-64-55F       IR2757       IR264-55F       IR2757       IR264-55F       IR2757         2R2750       TE-64-55F       IR2757       IR264-55F       IR2757       IR264-55F       IR2744       IR264-55F       IR2744       IR264-55F       IR2742       IR264-55F       IR2744       IR264-55F       IR2744       IR264-55F       IR2744       IR264-55A       IR2744       IR264-55B       IR2744       IR264-55B       IR2746       IR2746       IR264-55B       IR2748       IR264-55D       IR2748       IR264-55E       IR2748       IR264-55E       IR2748       IR264-55E       IR2748       IR264-55E       IR2757       IR264-55E       IR2757       IR264-55E       IR2757       IR264-55E       IR2757       IR264-55E <td< th=""><th><u>Plant I.</u></th><th><u>D.</u></th><th><u>No.</u></th><th>Room</th><th></th><th>Function/S</th><th>ervice</th><th></th><th>Category</th><th>Operating Time</th><th></th></td<>	<u>Plant I.</u>	<u>D.</u>	<u>No.</u>	Room		Function/S	ervice		Category	Operating Time	
1R2746       TE-64-55B         1R2748       TE-64-55C         1R2750       TE-64-55D         1R2757       TE-64-55E         1R2759       TE-64-55F         1R2742       TE-64-55A         2R2744       TE64-55A         2R2746       TE-64-55B         2R2748       TE-64-55C         2R2750       TE-64-55E         2R2757       TE-64-55E         2R2759       TE-64-55E         2R2742       TE-64-55E         2R2742       TE-64-55E         2R2744       TE-64-55E         3R2744       TE-64-55E         3R2746       TE-64-55B         3R2748       TE-64-55B         3R2746       TE-64-55C         3R2750       TE-64-55C         3R2750       TE-64-55E         3R2750       TE-64-55E         3R2750       TE-64-55E         3R2759       TE-64-55E	1R2744			6		TE-64-55A			A,	1 Year	
1R2748 $TE-64-55C$ $1R2750$ $TE-64-55D$ $1R2757$ $TE-64-55E$ $1R2759$ $TE-64-55F$ $1R2742$ $TE-64-52B$ $2R2744$ $TE64-55A$ $2R2746$ $TE-64-55B$ $2R2748$ $TE-64-55C$ $2R2750$ $TE-64-55E$ $2R2757$ $TE-64-55F$ $2R2759$ $TE-64-55F$ $2R2742$ $TE-64-55F$ $2R2744$ $TE-64-55F$ $3R2746$ $TE-64-55B$ $3R2748$ $TE-64-55E$ $3R2748$ $TE-64-55E$ $3R2750$ $TE-64-55E$ $3R2757$ $TE-64-55E$ $3R2759$ $TE-64-55E$ $3R2742$ $TE-64-52B$	1R2746					TE-64-55B			1		
IR2750TE-64-55DIR2757TE-64-55EIR2759TE-64-55FIR2742TE-64-52B2R2744TE64-55A2R2746TE-64-55B2R2748TE-64-55C2R2750TE-64-55E2R2757TE-64-55E2R2759TE-64-55F2R2742TE-64-55A3R2744TE-64-55B3R2746TE-64-55B3R2748TE-64-55C3R2750TE-64-55C3R2750TE-64-55E3R2759TE-64-55E3R2759TE-64-55E3R2742TE-64-55E3R2742TE-64-55E	1R2748			1		TE-64-55C				4	
IR2757TE-64-55EIR2759TE-64-55FIR2742TE-64-52B2R2744TE64-55A2R2746TE-64-55B2R2748TE-64-55C2R2750TE-64-55E2R2757TE-64-55F2R2759TE-64-55F2R2742TE-64-55A3R2744TE-64-55B3R2748TE-64-55C3R2750TE-64-55C3R2750TE-64-55C3R2750TE-64-55C3R2750TE-64-55C3R2759TE-64-55E3R2759TE-64-55E3R2742TE-64-55E3R2742TE-64-55E	1R2750					TE-64-55D	,				
1R2759 $TE-64-55F$ $1R2742$ $TE-64-52B$ $2R2744$ $TE64-55A$ $2R2746$ $TE-64-55B$ $2R2748$ $TE-64-55C$ $2R2750$ $TE-64-55E$ $2R2757$ $TE-64-55F$ $2R2759$ $TE-64-55F$ $2R2742$ $TE-64-55B$ $3R2744$ $TE-64-55B$ $3R2746$ $TE-64-55B$ $3R2748$ $TE-64-55C$ $3R2750$ $TE-64-55C$ $3R2750$ $TE-64-55E$ $3R2759$ $TE-64-55E$ $3R2759$ $TE-64-55F$ $3R2742$ $TE-64-55F$	1R2757			÷		TE-64-55E			ļ	í.	
1R2742       TE-64-52B         2R2744       TE64-55A         2R2746       TE-64-55B         2R2748       TE-64-55C         2R2750       TE-64-55E         2R2757       TE-64-55F         2R2742       TE-64-55A         3R2744       TE-64-55B         3R2746       TE-64-55B         3R2748       TE-64-55B         3R2748       TE-64-55B         3R2750       TE-64-55C         3R2750       TE-64-55C         3R2759       TE-64-55E         3R2759       TE-64-55E         3R2759       TE-64-55E         3R2759       TE-64-55E         3R2759       TE-64-55E         3R2742       TE-64-55E	1R2759			•		TE-64-55F		•	1		
2R2744       TE64-55A         2R2746       TE-64-55B         2R2748       TE-64-55C         2R2750       TE-64-55D         2R2757       TE-64-55E         2R2759       TE-64-55F         2R2742       TE-64-55A         3R2744       TE-64-55B         3R2746       TE-64-55B         3R2748       TE-64-55C         3R2750       TE-64-55D         3R2750       TE-64-55E         3R2757       TE-64-55E         3R2759       TE-64-55F         3R2742       TE-64-55E         3R2759       TE-64-55F         3R2742       TE-64-55E	1R2742					TE-64-52B					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2R2744			:		TE64-55A			1	1	
2R2748 $TE-64-55C$ $2R2750$ $TE-64-55D$ $2R2757$ $TE-64-55E$ $2R2759$ $TE-64-55F$ $2R2742$ $TE-64-52B$ $3R2744$ $TE-64-55A$ $3R2746$ $TE-64-55B$ $3R2748$ $TE-64-55C$ $3R2750$ $TE-64-55D$ $3R2757$ $TE-64-55E$ $3R2759$ $TE-64-55F$ $3R2742$ $TE-64-55F$	2R2746					TE-64-55B			1	4	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2R2748			1		TE-64-55C			}	5	
2R2757 $TE-64-55E$ $2R2759$ $TE-64-55F$ $2R2742$ $TE-64-52B$ $3R2744$ $TE-64-55A$ $3R2746$ $TE-64-55B$ $3R2748$ $TE-64-55C$ $3R2750$ $TE-64-55D$ $3R2757$ $TE-64-55E$ $3R2759$ $TE-64-55F$ $3R2742$ $TE-64-52B$	2R2750			:		TE-64-55D			1	1	
2R2759 $TE-64-55F$ $2R2742$ $TE-64-52B$ $3R2744$ $TE-64-55A$ $3R2746$ $TE-64-55B$ $3R2748$ $TE-64-55C$ $3R2750$ $TE-64-55D$ $3R2757$ $TE-64-55E$ $3R2759$ $TE-64-55F$ $3R2742$ $TE-64-52B$	2R2757					TE-64-55E					
2R2742       TE-64-52B         3R2744       TE-64-55A         3R2746       TE-64-55B         3R2748       TE-64-55C         3R2750       TE-64-55D         3R2757       TE-64-55E         3R2759       TE-64-55F         3R2742       TE-64-52B	2R2759			3		TE-64-55F			1		
3R2744       TE-64-55A         3R2746       TE-64-55B         3R2748       TE-64-55C         3R2750       TE-64-55D         3R2757       TE-64-55E         3R2759       TE-64-55F         3R2742       TE-64-52B	2R2742			1		TE-64-52B		1	•		
3R2746     TE-64-55B       3R2748     TE-64-55C       3R2750     TE-64-55D       3R2757     TE-64-55E       3R2759     TE-64-55F       3R2742     TE-64-52B	3R2744			:		TE-64-55A				i	
3R2748     TE-64-55C       3R2750     TE-64-55D       3R2757     TE-64-55E       3R2759     TE-64-55F       3R2742     TE-64-52B	3R2746		,			TE-64-55B			ł		
3R2750     TE-64-55D       3R2757     TE-64-55E       3R2759     TE-64-55F       3R2742     TE-64-52B	, 3R2748					TE-64-55C					
3R2757     TE-64-55E       3R2759     TE-64-55F       3R2742     TE-64-52B	3R2750			1		TE-64-55D			ţ	į	
3R2759 TE-64-55F SR2742 TE-64-52B	3R2757					TE-64-55E			ł	}	
3R2742 TE-64-52B	3R2759			k .	u.	TE-64-55F				<pre>t</pre>	
	3R2742			<b>4</b>		TE-64-52B					

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# ATTACHMENT B

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# Mark WUB-1

Contract No.	Type		Manufacturer
74C7-85464 71C7-54336 72C7-83427 72C7-54994	CSPE/PVC XLPE/CSPE CSPE/CSPE	••	Continental Wire & Cable Continental Wire & Cable Continental Wire & Cable Boston Ins. Wire

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Sheet No: EEB - 44-0037

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#### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980. .

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Reviewed by:	u
Prepared by:	
QA Acceptance:	

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(3) SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) Facility: Browns Ferry Nuclear Plant Sheet No. EEB 64-0038 Jnit: 1 Revision )ocket: 50-259 Date ENVIRONMENT DOCUMENTATION REF QUALIFICATION OUTSTANDING EQUIPMENT DESCRIPTION METHOD ITEMS Specifi-Oualifi-Specifi-Qualifi-Parameter cation cation cation cation Engineering None Attachmen 1 Year ystem: 64 Operating Attachment A Analysis C.4 'lant ID No. Attachment A Time (1)Cable ' Component 14AWG, 2/c, WHB, (PNJ) None Attachments Temperature anufacturer: Attachment B 153 C.1 and C.2Attachment C.3  $(^{0}F)$ 147 (4) Pressure odel Number: N/A (PSIA) (4) 15 N/A N/A N/A None · unction: Control/Power IPCEA S-61-402 Standard par 3.9, 3.7.3 Relative Material Humidity (%)6.7 Reauirement None (4) 100 100 ccuracy: Req'd: N/A Demon: N/A Chemical Spray stegory: Attachment A N/A (4) N/A N/A N/A None ervice: Attachment A NUREG-0588 Generic Radiation Materials Material  $2.1 \times 10^7$ 4x107 (RAD) (4) List · Test None ocation: 8 -Aging N/A (2)20 years Attachment C.2 Oper. Experience None lood Level Elev: 552' pove Flood Level: Yes X Submergence N/A N/A N/A N/A None (4) No Prepared by: W. mila ites: (1)See Section 2.4 in 79-01B report. (2) See Section 4.1.2 in 79-01B report. Reviewed by: DR. Helster

(3) All notes and other information not on these

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sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report. QA Acceptance:

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.'	System: 64 Unit: 1				EEB- <b>64-0038</b> Rev
	Component: Mark:	Cable WHB(PNJ)			
	<u>Plant I. D. No.</u>	Room	Function/Service	<u>Category</u>	<u>Operating Time</u>
	1PC351-I	8	PDIS-64-20	A/B	1 Yr - 1 Hr
	1PC357-I	8	PDIS-64-21	A/B	1  Yr - 1  Hr
	2PC351-1	.8	PDIS-64-20	A/B	1 Yr - 1 Hr
	2PC358-I	8	PDIS-64-21	A/B	1 Yr - 1 Hr

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# ATTACHMENT B

Mark WHB

Contract No.	Туре
67C3-91618	PNJ
87148 XFR From SQN 72C7- 75228-1	рјј
75K7-86150-1	PJJ.
73C7-84528	PJJ
75K5-86506-1	pjj
7207-75328-2	PNJ
70C7-54179-1	PNJ '

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#### Manufacturer

Plastic Wire & Cable .

Plastic Wire & Cable

Cyprus Rome Cable AIW Tamaqua Brand-Rex

Sheet	No.	:	EEB-	6	4	-00	) <u>3</u>	8
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Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of 75°C continuous, 95°C ( $203^{\circ}$  F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

<b>C.4</b>	The post-HELB conditions are le	ess than the normal cable rating and	١,
	in our judgment, the cables cou	uld operate satisfactorily for a	
	post-accident of a year.		

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Reviewed by:	·
QA Acceptance:	! ;

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otes: (1) See Section 2.4 in 79-01B report.

(2) See Section 4.1. in 79-01B report.

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

\* Prepared by: W. Mita

Reviewed by: O.R. Webety

QA Acceptance:

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# Attachment A Terminal Blocks

System: 64 Unit: 1

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Mark	<u>Plant I.D. No.</u>	Room
DMA	FC0-64-60D	15
PMB	PDS-64-61D	15
	PDS-64-61A	15
	FC0/FSV-64-45	13
	FC0/FSV-64-44	13
	FC0/FSV-64-40	14
	FC0/FSV-64-41	14
y y	FC0/FSV-64-36	12
	FC0/FSV-64-29	12
,	FC0/FSV-64-30	12
<i>k</i>	FC0/FSV-64-31	12
	PDS-64-62C	14
PMC	FC0-64-65A	9
	FCO-64-65B	9
	FC0-64-65C	9
	FCO-64-65D	9
·	FCV/FSV-64-33	12
	FCV-FSV-64-32	8
	FCV-FSV-64-34	8
	FCV/FSV-64-141	8
	FCV/FSV-64-139	8
	FCV/FSV-64-140	8
	PDS-64-62C	14
PMD	PDS-64-61D	15
1	PDS-64-61A	15
	FC0/FSV-64-9	15
	FC0/FSV-64-10	15
	FC0/FSV-64-43	15
	FC0/FSV-64-42	15
	TS-64-73	5
	TS-64-69	5
4	TS-64-71	5
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#### Attachment B.3 Terminal Block GE Type EB-5 and CR-151B

Test Information and Data - Letter GE Company to H. J. Green of TVA dated 3 February 1978 supplied test data for Terminal Block GE Company catalog No. CR-151B.

- Letter Westinghouse to F. W. Chandler of TVA dated 9 Harch 1978 supplied data for Terminal Block Westinghouse Style No. 80530 series.

- BWR Owner's Group Report 081-A-01 dated 23 September 1980 supplied test data for Terminal Block GE Company Type No. EB-25.

The above test information includes aging, radiation, LOCA temperature and pressure testing, and is sufficient in our judgement to warrant conficence that the type EB-5, of the same material (cellulose phenolic) and same size as the tested type EB-25, and larger than, the tested type CR-151B will itself perform as well, and is satisfactory for continued service since they are located similarly in protective boxes. However, in connection with additional cable LOCA tests to be performed at Wyle Laboratories in Huntsville, Alabama, we will include the type EB-5 terminal block to fully confirm its similarity. 8

Facility: Browns Jnit: 1	Ferry Nuclear Plant	SYSTEM COMPON
JIII Li X		

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Facility: Browns Ferry Nucl Jnit: 1 Jocket: 50-259	lear Plant	SYSTEM COMP	ONENT EVALUA	NTION WORK SH	HEET (Rev 2)	(3) Sheet No. <u>EEB</u> Revision Date	64-0040
FOULDMENT DESCRIPTION		ENVIRONMENT		DOCUME	NTATION REF	QUALIFICATION	OUTSTANDING
	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation		1 Turio
System: 64 'Tant ID No. Attachment A	Operating Time	Attachment A	l Year	(1)	C. 4	Analysis	
Component Cable 12AWG, 1/c, WBB, (PN) Manufacturer:Attachment B	Tomperature ( <sup>o</sup> F)	147	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
lodel Number: N/A	Pressure (PSIA)	15.0	N/A	·(4)	N/A	N/A	None
unction: Control/Power	Relative Humidity (%)	100	100	. (4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Demon: N/A ategory: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
ervice: Attachment A	Radiation (RAD)	$2.1 \times 10^7$	4x10 <sup>7</sup>	. (4)	NUREG-0588 Materials List	Generic Material Test	None
ocation: 8	Aging	N/A	20 years	(2)	Attachment C.2	Oper, Experience	None
lood Level Elev: 552' bove Flood Level: Yes X No	Submergence	N/A	N/A	(4)	N/A	. N/A	None

stes: See Section 2.4 in 79-018 report. (1)

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

Reviewed by: <u>W. Wita</u> Reviewed by: <u>B.R. Welsten</u>

QA Acceptance:



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Attachment A

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System: Unit:	64 1	•
Componer	+.	Call.

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Component: Cable Mark: WBB (PN)

<u>Plant I. D. No.</u>	Room	Function/Service	<u>Category</u>	<u>Operating Time</u>
3PC803-11	8	FCV-64-139	A	l Year
3PC804-11	8.	FCV-64-139	A	1 Year
3PC805-11	8	FCV-64-139	A	l Year
3PC807-11	8	FCV-64-140	Α	1 Year
3PC808-11	8	FCV-64-140	A	1 Year
3PC809-11	8	FCV-64-140	A	1 Year
1ES1844–I	8	PDC0-64-64	A	1 Year
1ES1906-I	8	PDC0-64-10	A	1 Year
2ES1906-I	8	PDC0-64-16	A	l Year
3ES1906-I	8	PDC0-64-16	A	l Year
1PC803-11	8	FCV-64-139	Α	l Year
1PC804-11	8	FCV-64-139	Α	l Year
1PC805-II	8	FCV-64-139	Α	1 Year
1PC807-11	8	FCV-64-140	A	1 Year
2ES1915-1	8	FCO -64-36	Α	l Year
2ES1916-I	8	FC0-64-36	Α	1 Year
1PC808-11	8	FCV-64-140	A	1 Year
2PC803-11	8	FCV-64-139	A	1 Year
2PC804-II	8	FCV-64-139	Α	l Year
2PC807-11	8	FCV-64-140	A .	1 Year
2PC808-11	8	FCV-64-140	Α	1 Year
2PC809-11	8	FCV-64-140	A	1 Year
1PC803-11	8	FSV-64-139	A/B	l Year 1 Hour
1PC804-II	8	FSV-64-139	A/B	1 Year 1 Hour
1PC807-II	8	FSV-64-140	A/B	1 Year 1 Hour
1PC808-11 ·	8	FSV-64-140	A/B	1 Year 1 Hour
2PC803-II	8	FSV-64-139	A/B	1 Year 1 Hour
2PC804-11	8	FSV-64-139	A/B	1 Year 1 Hour
2PC805-II	8	FSV-64-139	A/B	l Year l Hour
2PC807-II	8	FSV-64-140	A/B	1 Year 1 Hour
2PC808-11	8	FSV-64-140.	A/B	1 Year 1 Hour
2PC809-11	8	FSV-64-140 '	A/B	1 Year 1 Hour
3PC803-1	8	FSV-64-139	A/B	1 Year 1 Hour
3PC804-I	8	FSV-64-139	A/B	1 Year 1 Hour
3PC805-1	8	FSV-64-139	A/B	1 Year 1 Hour.
3PC808-1	8	FSV-64-140	A/B	1 Year 1 Hour
3PC809-1	8	FSV-64-140	A/B	1 Year 1 Hour
3PC807-1	8	FSV-64-140	A/B	1 Year 1 Hour
1PC809-II	8	FCV-64-140	Ā	1 Year
2PC805-11	8	FCV-64-139	A	1 Year
1PC805-II	8	FSV-64-139	A/B	1 Year 1 Hour
1PC809-II	8	FSV-64-140	A/B	1 Year 1 Hour
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#### EEB-**64-**00**4**0 Rev
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# EEB 64-0040

## ATTACHMENT B

# Mark WBB

Contract No.

6

67C3-91618 73C7-84528 72C7-75328-1 70C7-54179-1 Type

PN PN PN PN Manufacturer

Rev

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Brand-Rex Plastic Wire & Cable Corp Brand-Rex Brand-Rex

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Sheet No.: EEB-64-0040

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4	The post-HELB conditions are less	s than the normal cable rating and,
	in our judgment, the cables could	l operate satisfactorily for a
	post-accident of a year.	

Prepared	by:
Reviewed	by:
QA Accept	tance:
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Facility: Browns Ferry Nucl Jnit: 1 Jocket: 50-259	lear Plant	SYSTEM COMP	ONENT EVALU/ -	NTION WORK SH	IEET (Rev 2)	(3) Sheet No. <u>EEB</u> Revision Date	64-0041
FOULDNENT DESCOLDTION	· · · · · ·	ENVIRONMENT	*	DOCUMENTATION REF		QUALIFICATION	OUTSTANDING
EQUIFIENT DESCRIPTION	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation	. MEIHUD ., Engineering	ITEMS .
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	i tear	(1)	C.4	Analysis	• •
Component Cable ' 14AWS, 1/c, WCA, (PN) Manufacturer:Attachment B	Temperature (°F)	147	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
odel Number: N/A	Pressure (PSIA)		N/A	(4)	NZA	N/A	None ·
unction: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Demon: N/A ategory: Attachment A	Chemical Spray	N/A	N/A	· (4) .	N/A	N/A	None
ervice: Attachment A	Radiation (RAD)	$2.1 \times 10^7$	4x10 <sup>7</sup>	(4)	NUREG-0588 Materials List	Generic Material Test	None
ocation: 8	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
lood Level Elev: 552' bove Flood Level: Yes X No	Submergence	N/A	N/A	. (4)	N/A	. N/A	None

otes: (1) See Section 2.4 in 79-01B report.

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: W. Mita

Reviewed by: DR. Helster

QA Acceptance:

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Attachment A

System: 64 Unit: 1				EEB- <i>G4- 00 <b>f</b>1</i> Rev
Component: C Mark: W	able CA (PN)			-
" <u>Plant I. D. N</u>	o. Room	Function/Service	Category	Operating Time
2PC577-I 2PC578-I 2PC579-I 2PC583-I 2PC584-I 2PC585-I	8.	FCV-64-18 FCV-64-18 FCV-64-18 FCV-64-19 FCV-64-19 FCV-64-19	A	1 Year
2PC353-1 2PC354-I 2PC360-I 2PC355-I 2PC361-I 3PC362-I 2PC363-I		FCV-64-20 FCV-64-20 FCV-64-21 FCV-64-21 FCV-64-21 FCV-64-21 FCV-64-21		
2PL3812 2PL3813 2PL3814 1PL5189 1PC583-1 1PC584-1	8 8 8 8 8	FCV-64-141 FCV-64-141 FCV-64-141 FCO-64-60A FCV-64-19	A A A/B A .	l Year l Year l Year l Year l Hour l Year
1PC585-1 1PC353-1 1PC355-1 1PC355-1 1PC60-1 1PC361-1	8.8	FCV-64-20   FCV-64-21		
1PC362-I 1PL3812 1PL3813 1PL3814	8	FCV-64-141	A	; 1 Year
3PL5186 3PC595-1 3PC596-1	8 8	FC0-64-60A FCV-64-32	A/B A	l Year l Hour l Year
3PC339-1 3PC339-1 3PC340-1 3PC341-1	8	FCV-64-34	•	Ĩ
3ES1907-I 3ES1909-I 3PC577-I 3PC578-I 3PC578-I	8 8 8	PDCO-64-16 PDCO-64-16 FCV-64-18	A	l Year
3PC583-I 3PC583-I 3PC585-I 3PC353-I	6	FCV-64-19   FCV-64-20	4 4 9 4 4 1 1	
3PC354-I 3PC355-I 3PC360-I 3PC361-I	;	FCV-64-21 .		2



Attachment A

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System: 64 Unit: 1					EEB- <b>64-004/</b> Rev
Component: Mark:	Cable WCA ()	PN)		•	
<u>Plant I. D.</u>	No.	Room	Function/Service	<u>Category</u>	Operating Time
3PC362-1	٠	8	FCV-64-21	Α.,	1 Year
3PL3812		8	FCV-64-141		
3PL3813		ž ·	FCV-64-141		1
3PL3814		8 .	FCV-64-141	· .	ŧ
1PC595-I		.8	FSV-64-32	A/B	1 Year 1 Hour
1PC596-1				l I	
1PC597-I				1	
1PC339-I			FSV-64-34	1	
1PC340-1					
1PC341-1					
1PC614-11		į	FSV-64-17		
1PC615-11		1	· ·		
1PC616-11					
1PC577-1		Ì	FSV-64-18		
1PC578-1	-	1			
1PC5/9-1	•			1	
1PC583-1			FSV-64-19	l	•
1PC585-1					
1PC585-1		1			
1PC353-1		Í	FSV-64-20	1	
1PC354-1		1		1	3
1PC355-1			×	1	2
1PC360-1		1	FSV-64-21	ł	1
1PC361-1		i			
1PC362-1		Į			10
1PL3812	a		FSV-64-141		
1PL3813			,	1	
1PL3814	k.	i		. (5	
2PC595-1		8.	FSV-64-32 .	A/B	1 Year 1 Hour
2PC596-1		1			
2PC597-1					J Vacua 1 Vacua
2PC339-1		'8 '	FSV-04-34	A/B	1 lear 1 hour
2PC340-1			:		
2PC341-1 2DC614 TT		;			
2PC014-11		0	r5v-04-17	1	2
2rC013-11 2pc616 TT			I		i di seconda
280010-11 280677 TT		0	ECV 6/ 19	1	5
2r63//-11		,°	r 3v-04-10	ł	ļ
2ru3/8-1			i	Į	1
2PU5/9-1		0		1	
2r0303-1 2nc50/ T		•	rov-04-19	ţ	- ,
286384-1 200585 T		•		•	· ·
220303-1					i i

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System: 64 Unit: 1 EEB-**6A- 00 #1** Rev

Component: Cable Mark: WCA (PN)

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64

<u>Plant I. D. No.</u>	Room	Function/Service	<u>Category</u>	Operating Time
2PC353-I	. 8	FSV-64-20	A/B	1 Year 1 Hour
220334-1	1			}
200350-1	8 4	FSV-64-21		
2PC361_T	0	1		
2PC362-T	•			i
2PL3812	8	FSV-64-141		:
2PI.3813		1		•
2PL3814	}		1	•
3PC595-I	8	FSV-64-32	A/B	l Year l Hour
3PC596-1			1	1
3PC597-1	1			
3PC339-I	i	FSV-64-34		
3PC340-1	1	1 1		
3PC341-1	1		1	
3PC614-II	{	FSV64-17		
3PC615-II	1	•		
3PC616-II	ļ		1 .	
3PC577-1	Ì	FSV-64-18		
3PC578-I	ĩ	:		
3PC579-1	}	i		
3PC583-I .	1	FSV-64-19		
3PC584-I	ž	1	1	
3PC585-I		-	ł	' I
3PC353-I	3	FSV-64-20		
3PC354	ł	4.		
3PC355	1			
3PC360-1	Į.	FSV-64-21	1	
3PC361-T	{	ť		£
3PC362-1				
3PL3812	1	FSV-64-141		
3PL3813		i	l	
3PL3814	4	ł	· 1	Ę



EEB <u>67-034</u>

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### ATTACHMENT B

Mark NCA

Type

PN

PN PN

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PN.

PN

PN

<u>Contract No</u>. 72C7-75128 72X7-74885-1 73C7-84528 67C3-91618 72C7-75328-1 70C7-54179-1 TR 822378) Sequoyah 822639) 72C7-75228-1 822915) 72C7-83874-1 Manufacturer

Rev

Plastic Wire & Cable Corp Brand-Rex Plastic Wire & Cable Corp Brand-Rex Brand-Rex Brand-Rex

Plastic Wire & Cable Corp Plastic Wire & Cable Corp •

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Sheet No.: EEB-64-0041

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Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

80

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_\_\_

Reviewed by:

QA Acceptance:

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SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)



OUTSTANDING

ITEMS

None

None

None

Facility: Browns Ferry Nuclear Plant Jnit: 1 Jocket: 50-259 DOCUMENTATION REF ENVIRONMENT EQUIPMENT DESCRIPTION Oualifi-Qualifi-Specifi-Specification cation Parameter cation cation Attachment System: 64 1 Year Operating Attachment A C.4 -Plant ID No. Attachment A Time (1)Cable ' Component 12AWG, 2/c, WGB, (PNJ) Attachments Temperature (°F) Manufacturer: Attachment B C.1 and C.2 153 (4)214 Pressure todel Number: N/A (PSIA) (4) 15 N/A N/A IPCEA S-61-402 function: Control/Power

par 3.9, 3.7.3 Materia] Relative Requirement ` None 6.7 Humidity (%) (4) 100 100 Accuracy: Reg'd: N/A Demon: N/A Chemical . Spray lategory: Attachment A (4) None N/A N/A • N/A N/A Generic NUREG-0588 Service: Attachment A  $2.1 \times 10^{7}$ Radiation Materials Material 4x107 (RAD) (4)Test None List .ocation: 9 (2)Attachment C.2 Oper. Experience None Aging N/A 20 years 'lood Level Elev: 552' N/A bove Flood Level: Yesx Submergence N/A N/A N/A None (4) No

lotes: (1) See Section 2.4 in 79-01B report.

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by:  $\omega$ .

(3)

Revision

QUALIFICATION

Engineering

Analysis

Attachment C.3

N/A

Standard

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METHOD

Date

Sheet No. EEB 64-0042

Reviewed by: D.R. Webster

QA Acceptance:

Mita



 System:
 64
 EEB-64-0042\_

 Unit:
 1
 Rev

Component: Cable · Mark: WGB (PNJ)

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<u>Plant I. D. No.</u>	Room	Function/Service	<u>Category</u>	<u>Operating Time</u>
1ES750-1	9	PS-64-58B ·	A	1 Year
1ES991-I	9	PS-64-58B	А	1 Year
1ES992-I	1 I	PS-64-58D	1	1
1ES753-I		I		•
2ES750-I	ļ	PS-64-58B		
2ES991-I		1		
2ES992-I	1	PS-64-58D		
2ES753-I	2	1		
2ES3253-II	)	PS-64-58C		
3ES750-I		PS-64-58B		l l
3ES991-I	1	1.		1
3ES992-I	i	PS-64-58D		1
3ES753-I	1		I	1

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# EEB 64-0042

Rev \_\_\_\_\_

# ATTACHMENT B

Mark WGB

<u>Contract No</u>. 67C3-91618 73C7-84528 75K7-86150-1 75K5-86506-1 74C7-85069-1 70C7-54179-2 71X7-54761-1 72C7-54872 70C7-54179-1

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### Manufacturer

Brand-Rex Rome Cable Cyprus American Insulated Wire Rome Plastic Wire & Cable Corp General Cable Plastic Wire & Cable Corp Brand-Rex

Sheet No.: EEB- 64-0042

Revision: 0

### ATTACHMENT C

C.] IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

80

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of  $121^{\circ}$  C (250° F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

Facility: Browns Ferry Nucl Unit: 1 Docket:50-259	ear Plant .	SYSTEM COMP	ONENT EVALUA -	TION WORK SH	EET (Rev 2)	(3) Sheet No. <u>EEB</u> Revision Date	64-0043
CONTONENT DECODIDITION	ENVIRONMENT			DOCUMEN	TATION REF	QUALIFICATION	OUTSTANDING
EQUIPMENT DESCRIPTION	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation	ME INOD	11200
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	] Year	. (1)	Attachment C.4	Engineering Analysis	None
Component Cable 14AWG, 1/c, WCA, (PN) Ianufacturer:Attachment B	Temperature (°F)	214	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
'odel Number: N/A	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
unction: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
ccuracy: Req'd: N/A Demon: N/A ategory: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
ervice: Attachment A	Radiation (RAD)	$2.1 \times 10^7$	4x10 <sup>7</sup>	. (4)	NUREG-0588 Materials List	Generic Material Test	None
cation: 9	Aging	<u>N/A</u>	20 véars	(2)	Attachment C.2	Oper. Experience	None
lood Level Elev: 552' bove Flood Level: Yes X No	Submergence	N/A	N/A	(4)	N/A	N/A	None
ites: (1) See Section 2	2.4 in 79-018 r	eport.		• .	•	· Prepared by: _/	V. mita
<ul><li>(2) See Section 4</li><li>(3) All notes and sheets are or</li></ul>	1.2 in 79-018 other informa the attached	report. tion not on t appendix shee	these	· ·	• •	Reviewed by: 🖉	R. Welster_
(4) See Section 3	.0 and/or Anne	ndix B in 79-	018 report.			QA Acceptance;	· · · · · · · · · · · · · · · · · · ·

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Attachment A

System: 64 Unit: 1				EEB <b>-64 004</b> Rev
Component: Cable Mark: WCA (	(PN)			
<u>Plant I. D. No.</u>	Room	Function/Service	<u>Category</u>	<u>Operating Time</u>
1RP23-IA	9	PS-64-56A	A	1 Day
IRP97-IIA i	9.	PS-64-56C	A	1 Day
1RP97-IIA	9	PS-64-56C	A	1 Day
1RP322-IIB	9	PS-64-56D	A	1 Day
1RP260-IIB	9	PS-64-56B	A	1 Day
1RP322-11B	9 <sup>.</sup>	PS-64-56D	A	1 Day
2RP23-IA	9	PS-64-56A	A	1`Day
2RP97-IIA	9	PS-64-56C	A	1 Day
2RP97–IIA ·	9	PS-64-56C	A	1 Day
2RP322-11B'	9	PS-64-56D	A	1 Day
2RP260-1B	9	PS-64-56B	А	1 Day
2RP322-11B	9 ·	PS-64-56D	Α	1 Day
2RP23-IA	9	PS-64-56A	Α	1 Day
2RP97-IIA	9	PS-64-56C	A	1 Day
2RP97-IIA	9	PS-64-56C	A	1 Day
3RP322-11B	9	PS-64-56D	A	1 Day
3RP260-1B	9	PS-64-56B	A	1 Day
3RP322-IIB	9	PS-64-56D ·	A	1 Day

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# EEB 64-0043

Rev \_\_\_\_\_

# ATTACHMENT B

Mark WCA

Туре

PN

PN PN PN PN,

PN

PN

	Contract No.	
	72C7-75128 72X7-74885-1 73C7-84528	-
	67C3-91618 72C7-75328-1	,
TR	822378) Sequoyah 822639) 72C7-75228-1 822915)	
	72C7-83874-1	ŀ

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# Manufacturer

Plastic Wire & Cable Corp Brand-Rex Plastic Wire & Cable Corp Brand-Rex Brand-Rex Brand-Rex

Plastic Wire & Cable Corp

Plastic Wire & Cable Corp

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Sheet No.: EEB- 64-0043

Revision: 0

#### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

80

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

- C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_

QA Acceptance:\_\_\_\_\_

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Facility: Browns Ferry Nuclear Plant Init: 1 Jocket: 50-259		SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)				(3) Sheet No. <u>FFB 64-0044</u> Revision Date	
		ENVIRONMENT		DOCUMEN	TATION REF	QUALIFICATION	OUTSTANDING
EQUIPMENT DESCRIPTION	Parameter	Specifi- Qualifi- cation cation		Specifi- cation	Qualifi- cation		
ystem: 64 'lant ID No. Attachment A	Operating Time	Attachment A	lyear .	(1)	Attachment C3	Engineering Analysis and Test	None .
Component Cable WVA, (XL/ 16AWG, 2/c, Type MS Canufacturer: Attachment B	Temperature ( <sup>o</sup> F) .	214	385	(4)	Attachment C.1	Generic Simultaneous Test	None .
odel Number: N/A	Pressure (PSIA)	15	N/A	(4)	i:/A	. N/A	none
unction: Signal/Instrumentation	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Demon: N/A tegory:Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	. N/A	None
<pre>:rvice: Attachment A</pre>	Radiation (RAD)	$2.1 \times 10^{7}$	2x10 <sup>8</sup>	. (4)	Attachment C.1	Generic Sequential Test	None
cation: 9	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	None
ood Level Elev: 552' ove Flood Level: Yes X No	Submergence	N/A	N/A	(4)	N/A	. <sup>-</sup> N/A	None
tes: (1) See Section 2	2.4 in 79-01B r	eport.	r.	•		Prepared by: _/	V. Mita
<ul><li>(2) See Section 4</li><li>(3) All notes and</li></ul>	report. tion not on t	hese	• • •	· · ·	Reviewed by:	R. Welster	
sheets are or (4) See Section 3	n the attached 8.0 and/or Appen	appendix shee ndix B in 79-	ts. OlB report.		·.	QA Acceptance:	·



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Attachment A

System: 64 Unit: 1				EEB- <b>64 00<del>11</del></b> Rev
Component: Mark:	Cable WVA		• ,	
<u>Plant I. D. No</u>	. Room	Function/Service	Category	Operating Time
1R2870 '	9	PT-64-67	Α	l Year
2P2 870	9	PT-64-67	Α	1 Year
3R2870	9	PT-64-67	A	1 Year

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EEB <u>64-0044</u>

Rev \_\_\_\_\_

# ATTACHMENT B

### Mark WVA

<u>Contract No.</u>

Туре

FRXLPE/CSPE

FRXLPE/CSPE

XLPE/CSPE

FREP/CPE

FREP/CPE

FREP/CPE

1

PE/PVC'

77K5-823265 72C7-83944 69C3-64863-1 72C7-74910-1

TR 822676 from SQN 76K5-87232

TR 827773 from BLN 78K5-824447

TR 826953 from BLN 78K5-824447

> 77K5-820991 73C7-84211

Manufacturer

Rockbestos Continental Wire & Cable Rockbestos Continental Wire & Cable

Continental Wire & Cable

Anaconda

Anaconda

Boston Ins. Wire ITT





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Sheet No: EEB - 64 - 0044

Revision: 0

#### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Reviewed by: \_\_\_\_\_

QA Acceptance:

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Signal/Instrumentation

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Facility: Browns Ferry Nuclear Plant Unit: 1 Docket: 50-259

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3) Sheet No. EEB 64-0045 Revision

OUTSTANDING

ITEMS

None

None

Date **ENVIRONMENT** DOCUMENTATION REF **OUALIFICATION** EQUIPMENT DESCRIPTION METHOD Specifi-Qualifi-Specifi-Qualifi-Parameter cation cation cation cation System: 64 Attachment A Operating 1 Year . Attachment Engineering Plant ID No. Attachment A Time Analysis C.3 (1)Component Cable WVA, (PE) IPCEA S-61-402 .\* 16AWG, 2/c, Type MS par 3.9 and Temperature (°F) Manufacturer: Attachment B 214 203 Attachment C.2 None Attachment C.2 (4)N/A N/A N/A Pressure Model Number: N/A (PSIA)15 (4) Function: IPCEA S-61-402 Standard

Relative par 3.9, Material Humidity (%) Requirement None 100 100 (4)3.7.3, 6.7 Req'd: N/A Accuracy: Demon: N/A Chemical Spray Category: Attachment A (4) N/A N/A N/A N/A 🕚 None Service: Attachment A NUREG-0588 Generic Radiation Haterial Material 4x107 (RAD) <u>2.1 x 10<sup>7</sup></u> List (4)Tests None 9 Location: **Oper.** Experience 20 years Attachment C.1 None Aging N/A (2)Flood Level Elev: 552' Above Flood Level: Yes x Submergence N/A N/A N/A N/A (4) No

Notes: (1)See Section 2.4 in 79-01B report.

> See Section 4.1.2 in 79-01B report. (2)

(3) All notes and other information not on these sheets are on the attached appendix sheets.

See Section 3.0 and/or Appendix B in 79-01B report. (4)

QA Acceptance:

None Prepared by: W. Mita

Reviewed by: · A.R. Websta

Attachment A

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System: 6 Unit: 1	4 -	•		EEB- '64 -0045 Rev
Component: Nark:	Cable WVA			
<u>Plant I. D</u>	No. Room	Function/Service	Category	Operating Time
1R2870 2P2 870 3R2870	9 9 9	PT-64-67 PT-64-67 PT-64-67	A A · A	l Year 1 Year 1 Year

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## EEB 64-0045

Rev

### ATTACHMENT B

### Mark WVA

Contract No.

### Туре

77K5-823265 FRXLPE/CSPE FRXLPE/CSPE 72C7-83944 PE/PVC 69C3-64863-1 72C7-74910-1 XLPE/CSPE TR 822676 from SQN 76K5-87232 FREP/CPE FREP/CPE TR 827773 from BLN 78K5-824447 FREP/CPE TR 826953 from BLN 78K5-824447

77K5-820991 73C7-84211

### Manufacturer

Rockbestos Continental Wire & Cable Rockbestos Continental Wire & Cable

Continental Wire & Cable

Anaconda

Anaconda

Boston Ins. Wire ITT

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Facility: Browns Ferry Nuclear Plant Unit: 1 Cocket: 50-259		SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)			(3) Sheet No. <u>EEB 64-0046</u> Revision Date		
		ENVIRONMENT		DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING
EQUIPMENT DESCRIPTION	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation	· 'i	
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	, ,
Component Cable ' 14ANG, 2/c, WHB, (PNJ) lanufacturer:Attachment B	Temperature (°F)	214	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
odel Number: N/A	Pressure (PSIA)	15 ·	N/A	(4)	N/A -	N/A	None
unction: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
ccuracy: Req'd: N/A Demon: N/A ategory: Attachment A	Chemiçal Spray	· N/A ·	N/A	(4)	N/A	N/A	None
ervice: Attachment A	Radiation (RAD)	2.1 x 10 <sup>7</sup>	4x10 <sup>7</sup>	. (4)	NUREG-0588 Materials List	Generic Material Test	None
ocation: 9	Aging	N/A	20 years	(2)	Attachment C,2	Oper, Experience	None
lood Level Elev: 552' bove Flood Level: Yes X No	Submergence	N/A	N/A -	(4)	N/A *	. N/A	None

stes: (1) See Section 2.4 in 79-018 report.

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(2) See Section 4.1.2 in 79-01B report.

(3) All notes and other information not on these sheets are on the attached appendix sheets.

(4) See Section 3.0 and/or Appendix B in 79-01B report.

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Prepared by:  $\underline{W}$ .

Reviewed by: A. W. elaton

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QA Acceptance:

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System: 64 Unit: 1			·	ÉEB- <b>64-00 4 6</b> Rev
Component: Cable Mark: WHB (I	PNJ)			
<u>Plant I. D. No.</u>	Room	Function/Service	Category	Operating Time
1ES5-I	9	PS-64-57B	A	30 Days
1ES21-I	9.	PS-64-57D	A	30 Days
2ES2678-11	9.	PS-64-57A	A	30 Days
2ES5-I	1	PS-64-57B 🔹	1	
2ES21-1	1	PS-64-57D		
2ES2681-I	{ .	PS-64-57C	Į	
2ES3250-II	1	PS-64-58A	4	1
2ES <b>3491–</b> II	ļ	PS-64-58A		
2ES3492-II	1	P-64-58C	1	l

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# EEB 64-0046

Rev \_\_\_\_\_

### ATTACHMENT B

Mark WHB

Type `

PNJ

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PJJ. PJJ PJJ PNJ PNJ

	Contract No.
•	67C3-91618 87148 XFR From SQN 72C7- 75228-1
	75K7-86150-1 73C7-84528 75K5-86506-1 72C7-75328-2 70C7-54179-1

### Manufacturer

Plastic Wire & Cable

Plastic Wire & Cable

Cyprus Rome Cable AIW Tamaqua Brand-Rex

Sheet	No.:	EEB-	64	- 004	6

Revision:

### n: 0

### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous,  $95^{\circ}$  C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

<b>C.4</b>	The post-HELB conditions are less than the normal cable rating and,	,
	in our judgment, the cables could operate satisfactorily for a	
	post-accident of a year.	

Prepared by:\_\_\_\_\_

Reviewed by:

QA Acceptance:\_\_\_\_\_

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Facility: Browns Ferry Nucl Unit: 1 Docket: <sup>50-259</sup>	ear Plant .	SYSTEM COMP	ONENT EVALUA	TION WORK SH	EET (Rev 2)	(3) Sheet No. <u>EEE</u> Revision Date	3 64-0047
EQUIDMENT DESCOLDTION	ENVIRONMENT			DOCUMENTATION REF -		QUALIFICATION	OUTSTANDING
	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation		
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	l Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable 14AWG, 2/c, WHB, (PJJ) Manufacturer:Attachment B	Temperature (°F)	. 214	153	(4)	Attachments C.1 and C.2	Attachment C.3	None .·
Model Number: N/A	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	$2.1 \times 10^{7}$	4x10 <sup>7</sup>	. (4)	NUREG-0588 Materials List	Generic Material Test	None
Location: 9	Aging	N/A	20 years	(2)	Attachment C,2	Oper Experience	None
Flood Level Elev: 552' Above Flood Level: 'Yes X No	Submergence	N/A	N/A	(4)	N/A	. N/A	None
Notes: (1) See Section 2	.4 in 79-01B r	eport.		• .		Prepared by:	W. Mita
(2) See Section 4 (3) All notes and	.1.2 in 79-01B I other informat	report. tion not on t	hese			Reviewed by:	D. R. Hilster
<ul> <li>sheets are or</li> <li>(4) See Section 3</li> </ul>	the attached a 0.0 and/or Apper	appendix shee ndix B in 79 <del>.</del>	olb report.	. i		QA Acceptance:	

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System: 64 Unit: 1				Rev
Component: Cable Mark: WHB	2 (PJJ)			
<u>Plant I. D. No.</u>	Room	Function/Service	Category	Operating Time
1ES2678-II	9	PS-64-57A	А	30 Days
1ES2681-II	1	PS-64-57C		
1ES3250-II		PS-64-58A		
1ES3491-II	1	PS-69-58A		
1ES3253-II	1	PS-64-58C		
1ES3492-II	{ ·	' PS-64-58C ,	ł	
1ES3492-II	1	PS-64-58C		}
3ES2678-II		PS-64-57A		
3ES5-I		PS-64-57B		*
3ES21-I		PS-64-57D	\$	
3ES2681-II		PS-64-57C		Ĩ
3ES3250-II		PS-64-58A		
3ES3491-11	1	PS-64-58A		
3ES3253-11		PS-64-58C	Į	
3ES-3492-II	ŧ	PS-64-58C	i	t '

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# EEB <u>64-0047</u>

Rev

# ATTACHMENT B

Mark WHB

Contract No.	Туре	Manufacturer
67C3-91618	pnj	Plastic Wire & Cable
87148 XFR From SQN 72C7- 75228-1 :	рјј	Plastic Wire & Cable
75K7-86150-1 73C7-84528 75K5-86506-1 72C7-75328-2 70C7-54179-1	PJJ. PJJ PNJ PNJ PNJ	Cyprus Rome Cable AIW Tamaqua Brand-Rex

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Sheet No.: EEB-64-0047

Revision: 0

### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

80

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of 75° C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121°C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

- C.3 Temperature Qualification Method
  - C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4 The post-HELB conditions are less than the normal cable rating and, in our judgment, the cables could operate satisfactorily for a post-accident of a year.

Prepared by:

Reviewed by:\_\_\_\_\_

QA Acceptance:\_\_\_\_\_

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Sheet No.:_	EEB- 64-0047
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### ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.2 TVA Engineering Report No. 1943

Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

80

This class of cables was purchased under TVA Standard Specification No. 25.013, based on IPCEA S-61-402 (NEMA WC5). These standards provide a product with an operating rating of  $75^{\circ}$  C continuous, 95° C (203° F), 500-hour overload rating total in a normal lifetime. They are constructed of polyethylene insulation with Nylon and PVC jacketing.

The jacket material has a higher retention of strength at elevated temperatures, as the material was subjected to air oven aging of 121° C ( $250^{\circ}$  F) for 7 days. Only compartments 1, 2, 3, 6, 9, 10, and 11 show HELB profiles which more than briefly surpass the softening temperature of the insulation. However, owing to the thermal time lags in the cable material and cable installation, the insulation nor even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-6821 dated October 1980, of these cables under a temperature profile which envelopes all the HELB profiles. Following this exposure these samples sustained a dielectric test immersed in water of 660 volts ac for 6 minutes, 960 volts ac for 5 minutes, and 2200 volts for 5 minutes in succession.

It is therefore our engineering judgment that this test confirms the above and justifies interim operation until these types can be fully qualified by our Wyle Laboratory tests to be concluded next April or replaced at the next refueling outage.

- C.3 Temperature Qualification Method
  - C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

C.4	The post-HELB conditions are less than the normal cable rating and,
	in our judgment, the cables could operate satisfactorily for a
	post-accident of a year.

Prepared by:\_\_\_\_\_

Reviewed by:\_\_\_\_\_

QA Acceptance:



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Facility: Browns Ferry Nuclear Plant . Unit: 1 Socket: 50-259

ENVIRONMENT DOCUMENTATION REF QUALIFICATION . OUTSTANDING EQUIPMENT DESCRIPTION METHOD ITEKS Specifi-Qualifi-Specifi-Qualifi-Parameter cation cation cation cation System: 64 Engineering Operating lyear Attachment C.3 None Attachment A Plant ID No. Attachment A Time Analysis and (1)Test Component Cable WVA; (XL/EP) : Generic 16AWG, 2/c, Type MS Simultaneous Temperature Manufacturer: Attachment B (<sup>0</sup>F) 385 (4) Attachment C-1| Test None 174 • N/A None N/A N/A Pressure {odel Number: N/A (PSIA) (4) 15 unction: Generic Signal/Instrumentation Relative Simultaneous Humidity (%) (4) 100 100 Attachment C.1| Test None Accuracy: Reg'd: N/A Demon: N/A Chemical Spray **Category:**Attachment A (4) N/A N/A · None N/A N/A. Service: Attachment A Generic Radiation Sequential 7.  $3.1 \times 10^4$ 2x10<sup>8</sup> (RAD) (4) Attachment C. Test None .ocation: 12 Attachment C.2 Generic Mat'l Test None Aging N/A 40 years (2)Flood Level Elev: 552' N/A ' Sove Flood Level: Yes x N/A None Submergence N/A N/A (4)<sup>°</sup> \* No

lotes: (1) See Section 2.4 in 79-01B report.

- (2) See Section 4.1.2 in 79-01B report.
- (3) All notes and other information not on these sheets are on the attached appendix sheets.
- (4) See Section 3.0 and/or Appendix B in 79-01B report.

QA Acceptance:

 $\cdot$  Prepared by: <u>W</u>.

Reviewed by: A. Helster

Visita

(3) Sheet No. EEB 64-0048

Revisión

Date

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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System: 64 Unit: 1		•		EEB- <b>64- 00 48</b> Rev
Component: Ca Mark: WV	ble A			
<u>Plant I. D. No.</u>	Room	Function/Service	Category	Operating Time
2R2726 2R2725 2R2725 2R2726 - 2R2716 3R2726 3R2725	12	PX-64-51 PX-64-51 PT-64-51 PT-64-51 LT-64-54 PX-64-51 PX-64-51	A/B	l Year l Hour
1R2726 1R2725	}	PX-64-51 PX-64-51	· ·	· •

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# EEB 64-0048

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# ATTACHMENT B

Mark WVA

	<u>Contract No</u> .	Туре	Manufacturer
	77K5-823265 72C7-83944 69C3-64863-1 72C7-74910-1	FRXLPE/CSPE FRXLPE/CSPE PE/PVC XLPE/CSPE	Rockbestos Continental Wire & Cable Rockbestos Continental Wire & Cable
TR	822676 from SQN 76K5-87232	FREP/CPE	Continental Wire & Cable
TR	827773 from BLN 78K5-824447	FREP/CPE	Anaconda
TR	826953 from BLN 78K5-824447	FREP/CPE	Anaconda
	77K5-820991 73C7-84211	<b>`</b>	Boston Ins. Wire ITT



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Sheet No: EEB-64-0048

Revision: 0

### ATTACHMENT C

C.1 TVA Engineering Report No. 1945

Cable types: Coax, Triax, and Signal Cables of Cross-Linked Polyethylene Construction

Rooms: 0-18

For signal cables which utilize cross-linked polyethylene insulation, and the jacket is chlorosulfonated polyethylene or neoprene. The following LOCA/SLB tests apply:

Wyle Laboratory Test Report 43854-3 dated April 26, 1978, LOCA and SLB Qualification Test of Cables and Cable Splices.

Franklin Institute Test Report F-C4113 dated May 1975.

Rockbestos Company Test Report dated July 1977, amended 1979.

Franklin Institute Test Report F-C5120 dated May 1980.

These cables are qualified by the above for all HELB areas and the LOCA/SLB of the containment.

- C.2 NUREG-0588 Material List
- C.3 Because of the conservatism of the tests for XLPE and for silicone insulation, including the severity of the mandrel bend and dielectric test in water after the combined LOCA/SLB profile, it is our engineering judgment that there is sufficient margin to give reasonable assurance of continued operability more than a year in the post-LOCA environment.

Reviewed by:	<u> </u>	
Prepared by:	·	·····
QA Acceptance:	· · · · · · · · · · · · · · · · · · ·	
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Facility: Browns Ferry Nuclear Plant Unit: 1 Docket: 50-259

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3) Sheet No. <u>EEB 64-0049</u> Revision Date \_\_\_\_\_

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION	OUTSTANDING
	Parameter	Specifi- cation	Qualifi- cation	Specifi- cation	Qualifi- cation	ME100 .	
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	· (1)	Attachment C.3	Engineering Analysis	None
Component Cable WVA; (PE) 16AWG, 2/c, Type MS Manufacturer: Attachment B	Temperature (°F)	174	203	(4)	IPCEA S-61-402 par 3.9 and Attachment C.2	Attachment C.2	
Model Number: N/A	Pressure (PSIA)	15	N/A	(4)	N/A		None
Function: Signal/Instrumentation	Relative Humidity (%)	100	100	.(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	3.1 x 10 <sup>4</sup>	4x10 <sup>7</sup>	. (4)	NUREG-0588 Material List	Generic Material Tests	None
Location: 12	Aging	N/A	20 years	. (2)	Attachment C.1	Oper. Experience	None
Flood Level Elev: 552' Above Flood Level: Yes X No	Submergence	N/A	N/A	(4).	N/A	. N/A ·	v . None
Votes: (1) See Section 2	2.4 in 79-01B re	port.	•	•	. ·	Prepared by: _/	D. Mila
<ul><li>(2) See Section 4</li><li>(3) All notes and sheets are or</li></ul>	.1.2 in 79-018 i other informat i the attached a	report. ion not on t ppendix shee	these	• • •	• • •	Reviewed by: A	R. Welster
·· (4) See Section 3	.0 and/or Annen	dix B in 79-	018 report			QA-Acceptance:	•

Attachment A

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System: 64 Unit: 1		· ;		EEB- <b>61- 00 49</b> . Rev
Component: Ca Mark: W	able VA		•	
•	•			•
Plant I. D. No.	Room	Function/Service	Category	<b>Operating Time</b>
		- ···· • •		· · · ·
2R2726	12	PX-64-51	. A/B	1 Year 1 Hour
2R2725	-	PX-64-51	Ì	
2R2725	.1	PT-64-51	• • •	
2R2726		PT-64-51		
2R2716		LT-64-54		
3R2726	1	PX-64-51		
3R2725	1	PX-64-51	· · ]	
1R2726		PX-64-51	{ ·	•
1R2725	ł	PX-64-51	t	•

## EEB 64-0049

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ATTACHMENT B

Mark WVA

<u>Contract No.</u>

Type

FRXLPE/CSPE

FRXLPE/CSPE

PE/PVC XLPE/CSPE\*

FREP/CPE

FREP/CPE

FREP/CPE

77K5-823265 72C7-83944 69C3-64863-1 . . 72C7-74910-1

TR 822676 from SQN 76K5-87232

TR 827773 from BLN 78K5-824447

TR 826953 from BLN 78K5-824447

> 77K5-820991 73C7-84211

Manufacturer

Rev

Rockbestos Continental Wire & Cable Rockbestos Continental Wire & Cable

Continental Wire & Cable

Anaconda

Anaconda

Boston Ins. Wire ITT



