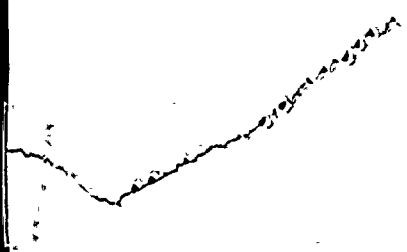
Volume 7

BROWNS FERRY NUCLEAR PLANT UNITS 1-3

TENNESSEE VALLEY AUTHORITY

RESPONSE TO NRC IE BULLETIN 79-01B

ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT



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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0001
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 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
Model 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 Material Requirement	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
Location: 14							
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 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: J. F. Wagner 10/24/80
QA Acceptance: _____

Attachment A

EEB-63-0001

Rev 0

System: 63
Unit: 1

Component: Cable 1/c, #14, PN
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1PL5103	14	SLC Storage Tank	A	1 Year
1PL5102	14	TNK Heater Control	A	1 Year

EEB -63-0001

Rev 0

ATTACHMENT B

Mark WCA

Contract No.	Type	Manufacturer
72C7-75128	PN	Plastic Wire & Cable Corp
72X7-74885-1	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
67C3-91618	PN	Brand-Rex
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex
TR 822378) Sequoyah 822639) 72C7-75228-1 822915)	PN	Plastic Wire & Cable Corp
72C7-83874-1		Plastic Wire & Cable Corp

Sheet No.: EEB-63-0001

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0002
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WDF 1/c, #4, CPJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	153	325	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	6.9×10^7	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J. F. Wagner 10/24/80
QA Acceptance: _____

Attachment A

EEB -63-0002

Rev 0

System: 63
Unit: 1

Component: Cable 1/c, #4, CPJ
Mark: WDF.

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1PL5100	14	TANK HEATER SUPPLY	A	1 Year

EEB 63-0002

Rev 0

ATTACHMENT B

Mark WDF

Contract No.	Type	Manufacturer
67C7-91619	CPJ	General Cable Corp
71C7-54180-1	CPJ	Phelps Dodge Cable Wire
72C7-75328-3	CPJ	Rome

Sheet No.: EEB-63-0002

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0003
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WDG 1/c, #2, CPJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	153	325	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	6.9×10^7	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J. F. Wagner 10/24/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 1

EEB 63-0003
Rev 0

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1PL754	14	PMP SUPPLY	A	1 Year
1PL769	14	PMP SUPPLY	A	1 Year

EEB 63-0003

Rev 0

ATTACHMENT B

Mark WDG

Contract No.	Type	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

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/DSH

Reviewed by: _____

QA Acceptance: _____

8

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0004
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WGB 2/c, #12, PNJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	174	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
	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: R. L. Mills
Reviewed by: J. F. Wagner 10/24/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 1

EEB 63-0004
Rev 0

Component: Cable
Mark: WGB

2/c, #12, PNJ

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1PL790	12	Injection Flow	A	1 Year

EEB 63-0004

Rev 0

ATTACHMENT B

Mark WGB

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Brand-Rex
73C7-84528	PJJ	Rome Cable
75K7-86150-1	PJJ	Cyprus
75K5-86506-1	PJJ	American Insulated Wire
74C7-85069-1	PJJ	Rome
70C7-54179-2	PNJ	Plastic Wire & Cable Corp
71X7-54761-1	PNJ	General Cable
72C7-54872	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	Brand-Rex

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° 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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0005
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGB 2/c, #12, PNJ Manufacturer: Attachment B	Temperature (°F)	153	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)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
Location: 14							
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 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: J. F. Wegner 10/24/80
QA Acceptance: _____

Attachment A

EEB 63-0005

Rev 0

System: 63
Unit: 1

Component: Cable 2/c, No. 12, PNJ
Mark: WGB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1PL2175	14	Trace Heater	A	1 Year
1PL2182	14	Heater	A	1 Year
1PL2187	14	Trace Heater	A	1 Year
1PL2194	14	Heater	A	1 Year

ESD 63-0005

Rev O

ATTACHMENT B

Mark WGB

Contract No.	Type	Manufacturer
[illegible]	PNJ	Brand-Rex
73C7-84528	PJJ	Rome Cable
75K7-86150-1	PJJ	Cyprus
75K5-86506-1	PJJ	American Insulated Wire
74C7-85069-1	PJJ	Rome
70C7-54179-2	PNJ	Plastic Wire & Cable Corp
71X7-54761-1	PNJ	General Cable
72C7-54872	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-63-0005

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° 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:_____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0006
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WGD 4/c, #12, PNJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	153	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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: J. T. Wagner et al.
QA Acceptance: _____

Attachment A

System: 63
Unit: 1

EEB 63-0006

Rev 0

Component: Cable 4/c, #12, PNJ
Mark: WGD

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1PL758	14	Stby Liquid Control	A	1 Year
1PL773	14	Stby Liquid Control	A	1 Year

EEB 63-0006

Rev 0

ATTACHMENT B

Mark WGD

Contract No.	Type	Manufacturer
73C7-84528	PJJ	Rome Cable
67C3-91618	PNJ	Plastic Wire & Cable Corp
72C7-75228-1	PJJ	Plastic Wire & Cable Corp
72C7-54762-2	PNJ	Plastic Wire & Cabel Corp
74C7-85069	PJJ	Rome
70C7-54179-1	PNJ	Brand-Rex

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

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:_____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0007
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WGG 7/c, #12, PNJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	153	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0007

Rev 0

System: 63
Unit: 1

Component: Cable 7/c, #12, PNJ
Mark: WGG

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1PL755	14	Stdby Lqid Pmp 2A Cont	A	1 Year
1PL770	14	Stdby Lqid Pmp 2A Cont	A	1 Year

EEB 63-0007

Rev 0

ATTACHMENT B

Mark WGG

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable Corp
71X7-54761-1	PNJ	General Cable
70C7-54179-1	PNJ	Brand-Rex
72C7-75328-2	PNJ	Tamaqua
69C7-64923	PNJ	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

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0008
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WHG 5/c, #14, PNJ Manufacturer: Attachment B	Temperature (°F)	153	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)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
Location: 14	Submergence	N/A	N/A	(4)	N/A	N/A	None
Flood Level Elev: 552' Above Flood Level: Yes X 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. Mills
Reviewed by: J. F. Wagner 10/24/80
QA Acceptance: _____

Attachment A

EEB 63-0008

Rev 0

System: 63
Unit: 1

Component: Cable 5/c, #14, PNJ
Mark: WHG

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1PL5101	14	Tnk Heater Control	A	1 Year

EEB 63-0008

Rev 0

ATTACHMENT B

Mark WHG

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	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

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: _____

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

(3)
Sheet No. EEB-63-0009
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA 2/c, #16, CSPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (^{o}F)	153	250	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^{4}	5×10^{7}	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	None
	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: R. L. Mills
Reviewed by: J F Wagner 10/24/80
QA Acceptance: _____

Attachment A

EEB 63-0009

Rev 0

System: 63
Unit: 1

Component: Cable 2/c, #16
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R986	14	Stdby Lqid Tnk Level	A	1 Year
1R985	14	Stdby Lqid Tnk Level	A	1 Year

EEB 63-0009

Rev 0

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

Sheet No.: EEB-63-0009

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: _____

QA Acceptance: _____

1.3

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0010
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA 2/c, #16, XLPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	153	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^{4}	2×10^{8}	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J. F. Wagan 10/22/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 1

EEB 63-0010
Rev 0

Component: Cable 2/c, #16
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R986	14	Stdby Lqid Tnk Level	A	1 Year
1R985	14	Stdby Lqid Tnk Level	A	1 Year

EEB 63-0010

Rev 0

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0011
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVA 2/c, #16, PE Manufacturer: Attachment B	Temperature (°F)	153	203	(4)	IPCEA S-61-402 par 3.9 and Annendix D	Attachment C.2	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)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
Service: Attachment A	Aging	N/A	20 years	(2)	Attachment C.1	Oper. Experience	None
Location: 14							
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 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: J.T. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0011

Rev 0

System: 63
Unit: 1

Component: Cable 2/c, #16
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R986	14	Stdby Lqid Tnk Level	A	1 Year
1R985	14	Stdby Lqid Tnk Level	A	1 Year

EEB 63-0011

Rev 0

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

11C

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 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 6.25×10^6 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-63-0011

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: _____

14

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0012
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA-1 2/c, #18, CSPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (^{o}F)	174	250	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^{4}	5×10^{7}	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J F Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0012

Rev 0

System: 63
Unit: 1

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

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

EEB 63-0012

Rev 0

ATTACHMENT B

Mark WVA-1

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

Sheet No.: EEB-63-0012

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: _____

QA Acceptance: _____

13

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

(3)
Sheet No. EEB-63-0013
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA-1 2/c, #18, XLPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	174	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	None
	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: R. L. Mills
Reviewed by: J. F. Wayne 10/22/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 1

EEB 63-0013
Rev 0

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

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

EEB 63-0013

Rev 0

ATTACHMENT B

Mark WVA-1

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

Sheet No: EEB-63-0043

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0014
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA-1 2/c, #18, PE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (°F)	174	203	(4)	IPCEA S-61-402 par 3.9 and Appendix D	Attachment C.2	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	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 2.4 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. J. Mills
Reviewed by: J F Wagan 10/22/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 1

EEB 63-0014
Rev 0

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

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

EEB 63-0014

Rev 0

ATTACHMENT B

Mark WVA-1

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

11C

Sheet No: EEB-83-0014

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 6.25×10^6 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)

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0015
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable : WVA-1 2/c, #18, CSPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year.	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (^{o}F)	153	250	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	5×10^7	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J F Wagn 10/22/80
QA Acceptance: _____

Attachment A.

System: 63
Unit: 1

EEB 63-0015
Rev. 0

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

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

EEB 63-0015

Rev 0

ATTACHMENT B

Mark WVA-1

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

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: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0016
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF.		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA-1 2/c, #18, XLPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	153	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	None
	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: R. L. Mills
Reviewed by: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 1

EEB 63-0016
Rev 0

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

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

EEB 63-0016

Rev 0

ATTACHMENT B

Mark WVA-1

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

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.

Reviewed by: _____

Prepared by: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0017
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVA-1 2/c, #18, PE Manufacturer: Attachment B	Temperature (^{o}F)	153	203	(4)	IPCEA S-61-402 par 3.9 and Appendix D	Attachment C.2	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A	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)	3.1×10^{4}	4×10^{7}	(4)	NUREG-0588 Material List	Generic Material Tests	None
Location: 14	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 2.4 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: JZ Wagner 10/22/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 1

EEB 63-0017
Rev 0

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

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

EEB 63-0017

Rev 0

ATTACHMENT B

Mark WVA-1

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

11C

Sheet No: EEB-63-0017

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 6.25×10^6 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-63-0017

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:_____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0018
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVB 3/c, #18, CSPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (°F)	153	250	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	5×10^7	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 1

EEB 63-0018
Rev 0

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1A1471	14	Stdby Liquid Temp	A	1 Year

EEB 63-0018

Rev 0

ATTACHMENT B

Mark WVB

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

Sheet No.: EEB-63-0018

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: _____

QA Acceptance: _____

13

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0019
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVB 3/c, #18, XLPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	153	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 1

EEB 63-0019
Rev 0

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1A1471	14	Stdby Liquid Temp	A	1 Year

EEB 63-0019

Rev 0

ATTACHMENT B

Mark WVB

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

Sheet No: EEB-63-0019

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: _____

11

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

(3)
Sheet No. EEB-63-0020
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVB 3/c, #18, PE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (^{o}F)	153	203	(4)	IPCEA S-61-402 par 3.9 and Appendix D	Attachment C.2	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	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 2.4 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: J. F. Wagner 10/24/80

QA Acceptance: _____

Attachment A

EEB 63-0020

Rev 0

System: 63
Unit: 1

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1A1471	14	Stdby Liquid Temp	A	1 Year

EEB 63-0020

Rev 0

ATTACHMENT B

Mark WVB

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

11C

Sheet No: EEB-63-0020

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 6.25×10^6 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-63-0020

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0021
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WCA 1/c, #14, PN Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (^{o}F)	174	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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: J. H. Wagner 10/22/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 2

EEB 63-0021
Rev 0

Component: Cable 1/c, #14, PN
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2PL5103	14	SLC Storage Tank	A	1 Year
2PL5102	14	Tank Heater Control	A	1 Year

EEB 63-0021

Rev 0

ATTACHMENT B

Mark WCA

Contract No.	Type	Manufacturer
72C7-75128	PN	Plastic Wire & Cable Corp
72X7-74885-1	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
67C3-91618	PN	Brand-Rex
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex
TR 822378) 822639) 822915) Sequoyah 72C7-75228-1	PN	Plastic Wire & Cable Corp
72C7-83874-1		Plastic Wire & Cable Corp

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

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0022
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WDF 1/c, #4, CPJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	174	325	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	6.9×10^7	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J F Wagner 10/22/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 2

EEB 63-0022
Rev 0

Component: Cable 1/c, #4, CPJ
Mark: WDF

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2PL5100	14	Tnk Heater Supply	A	1 Year

EEB 63-0022

Rev 0

ATTACHMENT B

Mark WDF

Contract No.	Type	Manufacturer
67C7-91619	CPJ	General Cable Corp
71C7-54180-1	CPJ	Phelps Dodge Cable Wire
72C7-75328-3	CPJ	Rome

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/DSH

Reviewed by: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0023
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WDG 1/c, #2, CPJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	153	325	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^{4}	6.9×10^{7}	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J. H. Wagner 10/24/8
QA Acceptance: _____

Attachment A

System: 63
Unit: 2

EEB 63-0023
Rev 0

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2PL754	14	Pmp Supply	A	1 Year
2PL769	14	Pmp Supply	A	1 Year

EEB 63-0023

Rev 0

ATTACHMENT B

Mark WDG

Contract No.	Type	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

Sheet No.: EEB- 63-0023

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 10/7/

Reviewed by: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0024
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component . Cable WGB 2/c, #12, PNJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (^{o}F)	199	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Mill
Reviewed by: J Hughes 10/24/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 2

EEB 63-0024
Rev 0

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2PL790	12	Injection Flow	A	1 Year

ECR 63-0024

Rev 0

ATTACHMENT B

Mark WGB

Contract No.	Type	Manufacturer
67C3 Weld	PNJ	Brand-Rex
73C7-84528	PJJ	Rome Cable
75K7-86150-1	PJJ	Cyprus
75K5-86506-1	PJJ	American Insulated Wire
74C7-85069-1	PJJ	Rome
70C7-54179-2	PNJ	Plastic Wire & Cable Corp
71X7-54761-1	PNJ	General Cable
72C7-54872	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	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° 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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0025
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGB 2/c, #12, PNJ Manufacturer: Attachment B	Temperature (^{o}F)	153	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)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3.1×10^{4}	4×10^{7}	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
Location: 14							
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 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: J. F. Wagner 10/24/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 2

EEB 63-0025

Rev 0

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2PL2175	14	Trace Heater	A	1 Year
2PL2182	14	Heater	A	1 Year
2PL2187	14	Trace Heater	A	1 Year
2PL2194	14	Heater	A	1 Year

ECR 63-0025

Rev 0

ATTACHMENT B

Mark WGB

Contract No.	Type	Manufacturer
[illegible]	PNJ	[illegible]-Rex
73C7-84528	PJJ	Rome Cable
75K7-86150-1	PJJ	Cyprus
75K5-86506-1	PJJ	American Insulated Wire
74C7-85069-1	PJJ	Rome
70C7-54179-2	PNJ	Plastic Wire & Cable Corp
71X7-54761-1	PNJ	General Cable
72C7-54872	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-63-0025

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:_____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0026
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WGD 4/c, #12, PNJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	174	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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: J. F. Wagner 10/24/80
QA Acceptance: _____

Attachment A

EEB 63-0026

Rev 0

System: 63
Unit: 2

Component: Cable 4/c, #12, PNJ
Mark: WGD

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2PL758	14	Stby Liquid Control	A	1 Year
2PL773	14	Stby Liquid Control	A	1 Year

EEB 63-0026

Rev 0

ATTACHMENT B

Mark WGD

Contract No.	Type	Manufacturer
73C7-84528	PJJ	Rome Cable
67C3-91618	PNJ	Plastic Wire & Cable Corp
72C7-75228-1	PJJ	Plastic Wire & Cable Corp
72C7-54762-2	PNJ	Plastic Wire & Cabel Corp
74C7-85069	PJJ	Rome
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-63-0026

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0027
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WGG 7/c, #12, PNJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year.	(1)	Attachment C.4	Engineering Analysis.	None
	Temperature (°F)	174	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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: J. H. Wagner 10/24/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 2

EEB 63-0027
Rev 0

Component: Cable
Mark: WGG

7/3, #12, PNJ

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2PL755	14	Stdby Lqid Pmp 2A Cont	A	1 Year
2PL770	14	Stdby Lqid Pmp 2A Cont	A	1 Year

EEB 63-0027

Rev 0

ATTACHMENT B

Mark WGG

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable Corp
71X7-54761-1	PNJ	General Cable
70C7-54179-1	PNJ	Brand-Rex
72C7-75328-2	PNJ	Tamaqua
69C7-64923	PNJ	Rockbestos

Sheet No.: EEB-63-0027

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

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0028
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WHG 5/c, #14, PNJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	174	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
	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: R. L. Mill
Reviewed by: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 2

EEB 63-0028
Rev 0

Component: Cable 5/c, #14, PNJ
Mark: WHG

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2PL5101	14	Tank Heater Control	A	1 Year

EEB 63-0028

Rev 0

ATTACHMENT B

Mark WHG

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-63-0028

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0029
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year.	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVA 2/c, #16, CSPE Manufacturer: Attachment B	Temperature (°F)	174	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 Accuracy: Req'd: N/A Demon: N/A	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	3.1×10^4	5×10^7	(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 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: R. L. Mills
Reviewed by: J. F. Wagner 10/24/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 2

EEB 63-0029
Rev 0

Component: Cable 2/c, #16
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2R986	14	Stdby Lqid Tnk Level	A	1 Year
2R985	14	Stdby Lqid Tnk Level	A	1 Year

EEB 63-0029

Rev 0

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

Sheet No.: EEB-63-0029

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: _____

QA Acceptance: _____

13

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0030
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA 2/c, #16, XLPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	174	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	None
	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: R. L. Mills
Reviewed by: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 2

EEB 63-0030

Rev 0

Component: Cable 2/c, #16
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2R986	14	Stdby Lqid Tnk Level	A	1 Year
2R985	14	Stdby Lqid Tnk Level	A	1 Year

EEB 63-0030

Rev 0

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

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: _____

Prepared by: _____

QA Acceptance: _____

11

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)

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

Sheet No. EEB-63-0031
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVA 2/c, #16, PE Manufacturer: Attachment B	Temperature (°F)	174	203	(4)	IPCEA S-61-402 par 3.9 and Appendix D	Attachment C.2	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)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
Service: Attachment A	Aging	N/A	20 years	(2)	Attachment C.1	Oper. Experience	None
Location: 14							
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 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: J. F. Wagner 10/22/80

QA Acceptance: _____

Attachment A

System: 63
Unit: 2

EEB 63-0031
Rev 0

Component: Cable 2/c, #16
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2R986	14	Stdby Lqid Tnk Level	A	1 Year
2R985	14	Stdby Lqid Tnk Level	A	1 Year

EEB 63-0031

Rev 0

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

11C

Sheet No: EEB-83-0031

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 6.25×10^6 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-63-0031

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0032
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WA-1 2/c, #18, CSPE Manufacturer: Attachment B	Temperature (^{o}F)	199	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	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3.1×10^{4}	5×10^{7}	(4)	Attachment C.1	Generic Sequential Test	None
Service: Attachment A	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	None
Location: 12							
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 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: J. F. Wagner 11/22/80
QA Acceptance: _____

Attachment A

EEB 63-0032

Rev. 0

System: 63
Unit: 2

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2A1479	]2	Injection Flow	A	1 Year

EEB 63-0032

Rev 0

ATTACHMENT B

Mark WVA-1

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

Sheet No.: EEB-63-0032

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: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0033
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable HVA-1 2/c, #18, XLPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	199	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0033

Rev. 0

System: 63
Unit: 2

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2A1479	]2	Injection Flow	A	1 Year

EEB 63-0033

Rev 0

ATTACHMENT B

Mark WVA-1

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

Sheet No: EEB 63-0033

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: _____

11

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0034
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA-1 2/c, #18, PE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (°F)	199	203	(4)	IPCEA S-61-402 par 3.9 and Appendix D	Attachment C.2	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	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 2.4 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: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0034

Rev 0

System: 63
Unit: 2

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2A1479	12	Injection Flow	A	1 Year

EEB 63-0034

Rev 0

ATTACHMENT B

Mark WVA-1

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

Sheet No: EEB-63-0034

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 6.25×10^6 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-63-0034

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: _____

Reviewed by: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0035
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA-1 2/c, #18, CSPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year.	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (^{o}F)	174	250	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	5×10^7	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J.H. Wagner 10/24/80
QA Acceptance: _____

Attachment A

EEB 63-0035

Rev 0

System: 63
Unit: 2

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2A1470	14	Stdby Liquid Temp	A	1 Year

EEB 63-0035

Rev 0

ATTACHMENT B

Mark WVA-1

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

Sheet No.: EEB-63-0035

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: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0036
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA-1 2/c, No. 18, XLPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	174	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J F Wagner 10/22/80

QA Acceptance: _____

Attachment A

EEB 63-0036

Rev 0

System: 63
Unit: 2

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2A1470	14	Stdby Liquid Temp	A	1 Year

EEB 63-0036

Rev 0

ATTACHMENT B

Mark WVA-1

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

13C

Sheet No: EEB-62-00356

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: _____

11

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0037
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA-1 2/c, No. 18, PE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (^{o}F)	174	203	(4)	IPCEA S-61-402 par 3.9 and Appendix D	Attachment C.2	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	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 2.4 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: L. L. Mills
Reviewed by: J. F. Wegner 10/22/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 2

EEB 63-0037
Rev 0

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2A1470	14	Stdby Liquid Temp	A	1 Year

ATTACHMENT B

Mark WVA-1

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

11C

Sheet No: EEB-63-003>

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. 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 6.25×10^6 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-63-0037

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: _____

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

Sheet No. EEB 63-0038 (3)
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVB 3/c, No. 18, CSPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A, Demon: N/A Category: Attachment A Service: Attachment A Location: 14 Flood Level Elev: 552' Above Flood Level: Yes X, No	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (^{o}F)	174	250	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	5×10^7	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	None
	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: R. L. Mills
Reviewed by: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 2

EEB 63-0038
Rev 0

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2A1471	14	Stdby Liquid Temp	A	1 Year

EEB 63-0038

Rev 0

ATTACHMENT B

Mark WVB

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

Sheet No.: EEB-63-0038

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: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0039
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVB 3/c, No. 18, XLPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	174	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J. F. Wagner 10/24/80
QA Acceptance: _____

Attachment A

EEB 63-0039

Rev 0

System: 63
Unit: 2

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2A1471	14	Stdby Liquid Temp	A	1 Year

EEB 63-0039

Rev 0

ATTACHMENT B

Mark WVB

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

Sheet No: EEB-63-0039

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/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: _____

11

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0040
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVB 3/c, No. 18, PE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (°F)	174	203	(4)	IPCEA S-61-402 par 3.9 and Appendix D	Attachment C.2	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	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 2.4 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. I. Mills
Reviewed by: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 2

EEB 63-0040
Rev 0

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2A1471	14	Stdby Liquid Temp	A	1 Year

EEB 63-0040

Rev 0

ATTACHMENT B

Mark WVB

Contract No.	Type	Manufacturer
72C7-83849	CSPE/CSPE	BIW
72C7-74910-2	XLPE/CSPE	Okonite
69C3-64863-1	PE/PVC	Rockbestos
TR 822675 from WBN 74C7-85259	XLPE/CSPE	Belden Corporation
TR 820907 from 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 6.25×10^6 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-63-0040

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0041
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WCA 1/c, No. 14, PN Manufacturer: Attachment B	Temperature (^{o}F)	174	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)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
Location: 14 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 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: J. T. Wagner 10/24/80
QA Acceptance: _____

Attachment A

EEB 63-0041

Rev 0

System: 63
Unit: 3

Component: Cable 1/c, #14, PN
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3PL5103	14	SLC Storage Tank	A	1 Year
3PL5102	14	TNK Heater Control	A	1 Year

EEB 63-0041

Rev 0

ATTACHMENT B

Mark WCA

Contract No.	Type	Manufacturer
72C7-75128	PN	Plastic Wire & Cable Corp
72X7-74885-1	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
67C3-91618	PN	Brand-Rex
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex
TR 822378) 822639) 822915) Sequoyah 72C7-75228-1	PN	Plastic Wire & Cable Corp
72C7-83874-1		Plastic Wire & Cable Corp

Sheet No.: EEB-63-004

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: _____

1 9

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0042
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WDF 1/c, No. 4, CPJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	174	325	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	6.9×10^7	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0042

Rev 0

System: 63
Unit: 3

Component: Cable
Mark: WDF

1/c, #14, CPJ

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3PL5100	14	TNK Heater Supply	A	1 Year

EEB 63-0042

Rev 0

ATTACHMENT B

Mark WDF

Contract No.	Type	Manufacturer
67C7-91619	CPJ	General Cable Corp
71C7-54180-1	CPJ	Phelps Dodge Cable Wire.
72C7-75328-3	CPJ	Rome

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: _____

1 9

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0043
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WDG 1/c, No. 2, CPJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	153	325	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	6.9×10^7	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J.T. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0043

Rev 0

System: 63
Unit: 3

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3PL754	14	Pmp Supply	A	1 Year
3PL769	14	Pmp Supply	A	1 Year

EEB 63-0043

ATTACHMENT B

Rev 0

Mark WDG

Contract No.	Type	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

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 10/31

Reviewed by: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0044
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGB 2/c, No. 12, PNJ Manufacturer: Attachment B	Temperature (°F)	199	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)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A Location: 12	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 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: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0044

Rev 0

System: 63
Unit: 3

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3PL790	12	Injection Flow	A	1 Year

LCO 63-0044

Rev 0

ATTACHMENT B

Mark WGB

Contract No.	Type	Manufacturer
[illegible]	[illegible]	Brand-Rex
73C7-84528	PJJ	Rome Cable
75K7-86150-1	PJJ	Cyprus
75K5-86506-1	PJJ	American Insulated Wire
74C7-85069-1	PJJ	Rome
70C7-54179-2	PNJ	Plastic Wire & Cable Corp
71X7-54761-1	PNJ	General Cable
72C7-54872	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-63-0044

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0045
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WGB 2/c, No. 12, PNJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (^{o}F)	153	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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: L. L. Mills
Reviewed by: J. F. Wagner 11/24/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 3

EEB 63-0045
Rev 0

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3PL2175	14	Trace Heater	A	1 Year
3PL3182	14	Heater		
3PL2187	14	Trace Heater		
3PL2194	14	Heater		

LLB 63-0045

Rev 0

ATTACHMENT B

Mark WGB

Contract No.	Type	Manufacturer
[illegible]	PNJ	Brand-Rex
73C7-84528	PJJ	Rome Cable
75K7-86150-1	PJJ	Cyprus
75K5-86506-1	PJJ	American Insulated Wire
74C7-85069-1	PJJ	Rome
70C7-54179-2	PNJ	Plastic Wire & Cable Corp
71X7-54761-1	PNJ	General Cable
72C7-54872	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-63-0045

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0046
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGD 4/c, No. 12, PNJ Manufacturer: Attachment B	Temperature (^{o}F)	174	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)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3.1×10^{4}	4×10^{7}	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
Location: 14							
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 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: J. F. Waghu 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0046

Rev 0

System: 63
Unit: 3

Component: Cable 4/c, #12, PNJ
Mark: WGD

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3PL758	14	Stdby Liquid Control	A	1 Year
3PL773	14	Stdby Liquid Control	A	1 Year

EEB 63-0046

Rev 0

ATTACHMENT B

Mark WGD

Contract No.	Type	Manufacturer
73C7-84528	PJJ	Rome Cable
67C3-91618	PNJ	Plastic Wire & Cable Corp
72C7-75228-1	PJJ	Plastic Wire & Cable Corp
72C7-54762-2	PNJ	Plastic Wire & Cabel Corp
74C7-85069	PJJ	Rome
70C7-54179-1	PNJ	Brand-Rex

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

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:_____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0047
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WGG 7/c, No. 12, PNJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (^{o}F)	174	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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: J. F. Wagner 10/24/80
QA Acceptance: _____

Attachment A

System: 63
Unit: 3

EEB 63-0047
Rev 0

Component: Cable, 7/c, #12, PNJ
Mark: WGG

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3PL755	14	Standby Liquid Pump 2A Cont	A	1 Year
3PL770	14	Standby Liquid Pump 2B Cont	A	1 Year

EEB 63-0047

Rev 0

ATTACHMENT B

Mark WGG

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable Corp
71X7-54761-1	PNJ	General Cable
70C7-54179-1	PNJ	Brand-Rex
72C7-75328-2	PNJ	Tamaqua
69C7-64923	PNJ	Rockbestos

Sheet No.: EEB-63-0047

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

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0048
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WHG 5/c, No. 14, PNJ Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	174	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
	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: R. L. Miela
Reviewed by: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0848

Rev 0

System: 63
Unit: 3

Component: Cable
Mark: WHG

5/c, #14, PNJ

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3PL5101	14	Tnk Heater Control	A	1 Year

EEB 63-0048

Rev 0

ATTACHMENT B

Mark WHG

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	Brand-Rex

8C

Sheet No.: EEB-63-0048

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0049
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA 2/c, No. 16, CSPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (^{o}F)	174	250	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	5×10^7	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J.D. Wagner 10/24/80
QA Acceptance: _____

Attachment A

EEB 63-0049

Rev 0

System: 63
Unit: 3

Component: Cable 2/c, #16
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R986	14	Stdby Lqid Tnk Level	A	1 Year
3R985	14	Stdby Lqid Tnk Level	A	1 Year

EEB 63-0049

Rev 0

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

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: _____

Reviewed by: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0050
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA 2/c, No. 16, XLPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	174	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0050

Rev 0

System: 63
Unit: 3

Component: Cable 2/c, #16
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R986	14	Stdby Lqid Tnk Level	A	1 Year
3R985	14	Stdby Lqid Tnk Level	A	1 Year

EEB 63-0050

Rev 0

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

Sheet No: EEB-63-005A

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: _____

11

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0051
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable / WVA 2/c, No. 16, PE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (°F)	174	203	(4)	IPCEA S-61-402 par 3.9 and Appendix D	Attachment C.2	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	Aging	N/A	20 years	(2)	Attachment C.1	Oper. Experience	None
	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: R. L. Mills
Reviewed by: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0051

Rev 0

System: 63
Unit: 3

Component: Cable 2/c, #16
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R986	14	Stdby Lqid Tnk Level	A	1 Year
3R985	14	Stdby Lqid Tnk. Level	A	1 Year

EEB 63-0051

Rev 0

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

Sheet No: EEB-63-0051

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 6.25×10^6 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-63-0051

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: _____

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

(3)
Sheet No. EEB 63-0052
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA-1 2/c, No. 18, CSPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (°F)	199	250	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	5×10^7	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	None
	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: R. L. Mills
Reviewed by: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0052

Rev 0

System: 63
Unit: 3

Component: Cable
Mark: WVA-1

2/c, #18

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

EEB 63-0052

Rev 0

ATTACHMENT B

Mark WVA-1

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

Sheet No.: EEB-63-0052

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0053
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA-1 2/c, No. 18, XLPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	199	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J. T. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0053

Rev 0

System: 63
Unit: 3

Component: Cable
Mark: WVA-1

2/c, #18

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

EEB 63-0053

Rev 0

ATTACHMENT B

Mark WVA-1

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

Sheet No: EEB-63-00853

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: _____

11

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0054
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA-1 2/c, No. 18, PE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (°F)	199	203	(4)	IPCEA S-61-402 par 3.9 and Appendix D	Attachment C.2	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	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 2.4 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: J Fiskgren 10/22/80
QA Acceptance:

Attachment A

EEB 63-0054

Rev 0

System: 63
Unit: 3

Component: Cable
Mark: WVA-1

2/c, #18

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

EEB 63-0054

Rev 0

ATTACHMENT B

Mark WVA-1

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

11C

Sheet No: EEB-63-0054

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 6.25×10^6 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: _____

14

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0055
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVA-1 2/c, No. 18, CSPE Manufacturer: Attachment B	Temperature (°F)	174	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	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3.1×10^4	5×10^7	(4)	Attachment C.1	Generic Sequential Test	None
Service: Attachment A 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 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: R. L. Mills
Reviewed by: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0055

Rev 0

System: 63
Unit: 3

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

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

EEB 63-0055

Rev 0

ATTACHMENT B

Mark WVA-1

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

14C

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: _____

Reviewed by: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0056
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA-1 2/c, No. 18, XLPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	174	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	None
	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: R. L. Mill
Reviewed by: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0056

Rev 0

System: 63
Unit: 3

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

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

EEB 63-0056

Rev 0

ATTACHMENT B

Mark WVA-1

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

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: _____

11

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0057
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVA-1 2/c, No. 18, PE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (°F)	174	203	(4)	IPCEA S-61-402 par 3.9 and Appendix D	Attachment C.2	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	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 2.4 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: J F Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0057

Rev 0

System: 63
Unit: 3

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

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

EEB 63-0057

Rev 0

ATTACHMENT B

Mark WVA-1

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

11C

Sheet No: EEB-63-0057

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 6.25×10^6 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-83-0057

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: _____

14

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0058
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVB 3/c, No. 18, CSPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (°F)	174	250	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	5×10^7	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J Fulwagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0058

Rev 0

System: 63
Unit: 3

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

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

EEB 63-0058

Rev 0

ATTACHMENT B

Mark WVB

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

14C

Sheet No.: EEB-63-0058

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: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EER 63-0059
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVB 3/c, No. 18, XLPE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14 Flood Level Elev: 552' Above Flood Level: Yes No	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	174	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	None
	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: R. L. Mills
Reviewed by: J. F. Hagan 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0059

Rev 0

System: 63
Unit: 3

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

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

EEB 63-0059

Rev 0

ATTACHMENT B

Mark WVB

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

11

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 63-0060
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable WVB 3/c, No. 18, PE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 14	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (°F)	174	203	(4)	IPCEA S-61-402 par 3.9 and Appendix D	Attachment C.2	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	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 2.4 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: L. L. Mills
Reviewed by: J. F. Wagner 10/24/80
QA Acceptance: _____

Attachment A

EEB 63-0060

Rev 0

System: 63
Unit: 3

Component: Cable
Mark: WVB

3/c, #18

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

EEB 63-0060

Rev 0

ATTACHMENT B

Mark WVB

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

Sheet No: EEB-63-0060

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 6.25×10^6 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-63-0060

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0061
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Junction Box Manufacturer: N/A Model Number: N/A Function: Terminal Housing Accuracy: Req'd: N/A Demon: N/A Category: N/A Service: N/A Location: Attachment A	Operating Time	N/A	N/A	(1)	N/A	N/A	None
	Temperature (°F)	N/A	N/A	(4)	N/A	N/A	None
	Pressure (PSIA)	21.5 max.	21.5	(4)	Attachment B	Engineering Analysis	None
	Relative Humidity (%)	N/A	N/A	(4)	N/A	N/A	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	N/A	N/A	(4)	N/A	N/A	None
	Aging	N/A	N/A	(2)	N/A	N/A	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 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: J. Hebgen 10/22/80
QA Acceptance: _____

EEB 63-0061

Rev 0

ATTACHMENT A

Junction Boxes

System: 63
Unit: 1

Mark	Plant I.D. No.	Room
JOA	Box 3015	12

EEB 63-0061

Rev 0

ATTACHMENT B

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 12- and 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 Nuclear Plant
Unit: 2
Docket: 50-260

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0062
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	N/A	N/A	(1)	N/A	N/A	None
Component Junction Box Manufacturer: N/A	Temperature (°F)	N/A	N/A	(4)	N/A	N/A	None
Model Number: N/A	Pressure (PSIA)	21.5 max.	21.5	(4)	Attachment B	Engineering Analysis	None
Function: Terminal Housing	Relative Humidity (%)	N/A	N/A	(4)	N/A	N/A	None
Accuracy: Req'd: N/A Demon: N/A Category: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: N/A	Radiation (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' 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 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: [signature] 10/22/80
QA Acceptance: ____

EEB 63-0062

Rev 0

ATTACHMENT A

Junction Boxes

System: 63
Unit: 2

Mark	Plant I.D. No.	Room
J0A	Box 3016	12

EEB 63-0062

Rev 0

ATTACHMENT B

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 12- and 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 Nuclear Plant
Unit: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0063
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTAND ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Junction Box Manufacturer: N/A Model Number: N/A Function: Terminal Housing Accuracy: Req'd: N/A Demon: N/A Category: N/A Service: N/A Location: Attachment A	Operating Time	N/A	N/A	(1)	N/A	N/A	None
	Temperature (°F)	N/A	N/A	(4)	N/A	N/A	None
	Pressure (PSIA)	21.5 max.	21.5	(4)	Attachment B	Engineering Analysis	None
	Relative Humidity (%)	N/A	N/A	(4)	N/A	N/A	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	N/A	N/A	(4)	N/A	N/A	None
	Aging	N/A	N/A	(2)	N/A	N/A	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 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. Mill
Reviewed by: J. F. Wagier 10/22/80
QA Acceptance: _____

EEB 63-0063

Rev 0

ATTACHMENT A

Junction Boxes

System: 63
Unit: 3

Mark	Plant I.D. No.	Room
JOA	Box 3017	12

EEB 63-0063

Rev 0

ATTACHMENT B

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 12- and 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 Nuclear Plant
Unit: 2
Docket: 50-260

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EER-63-0064
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable, WVB 3/c, #18, CSPE Manufacturer: Attachment B	Temperature (^{o}F)	199	250	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	15.0		(4)			
Function: Signal/Instrumentation	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A Service: Attachment A	Radiation (RAD)	3.1×10^{4}	5×10^{7}	(4)	Attachment C.1	Generic Sequential Test	None
Location: 12	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J F Wagner 10/24/80
QA Acceptance: _____

EEB 63-0064

Rev 0

ATTACHMENT B

Mark WVB

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

Sheet No.: EEB-63-0064

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: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. FER-63-0065
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable, WVB 3/c, #18, XLPE Manufacturer: Attachment B	Temperature (^{o}F)	199	385	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	15.0		(4)			
Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Category: Attachment A Service: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
Location: 12	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0065

Rev 0

System: 63
Unit: 2

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2A1472	12	Stdby Liquid Temp	A	1 Year

EEB 63-0065

Rev 0

ATTACHMENT B

Mark WVB

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

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/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: _____

11

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-63-0066
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Cable, WVB 3/c, #18, PE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (^{o}F)	199	203	(4)	IPCEA S-61-402 par 3.9 and Appendix D	Attachment C.2	
	Pressure (PSIA)	15.0		(4)			
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	Aging	N/A	20 years	(2)	Attachment C.1	Oper. Experience	None
	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: R. L. Mills
Reviewed by: J. F. Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 63-0066

Rev 0

System: 63
Unit: 2

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2A1472	12	Stdby Liquid Temp	A	1 Year

EEB 63-0066

Rev 0

ATTACHMENT B

Mark WVB

Contract No.	Type	Manufacturer
72C7-83849	CSPE/CSPE	BIW
72C7-74910-2	XLPE/CSPE	Okonite
69C3-64863-1	PE/PVC	Rockbestos
TR 822675 from WBN 74C7-85259	XLPE/CSPE	Belden Corporation
TR 820907 from 74C7-85259	XLPE/CSPE	Belden Corporation
73C7-84211		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 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 6.25×10^6 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-63-0066

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EER 63-0067
Revision 0
Date 10-23-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Terminal Block Manufacturer: General Electric Company Model Number: EB-5 and CR15182 Function: Wire Termination Accuracy: Req'd: N/A Demon: N/A Category: N/A Service: N/A Location: Attachment A Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	1 Year	1 Year	(1)	N/A	N/A	None
	Temperature (°F)	325	340	(4)	Attachment B.3	Engineering Analysis	None
	Pressure (PSIA)	21.5	88	(4)	Attachment B.3	Engineering Analysis	None
	Relative Humidity (%)	100	100	(4)	Attachment B.3	Engineering Analysis	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^7	2×10^7	(4)	Attachment B.3	Engineering Analysis	None
	Aging	N/A	40 Years	(2)	Attachment B.3	Engineering Anal	None
	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. 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: L. L. Mills
Reviewed by: J. Wagner 10/23/80
QA Acceptance: _____

EEB 63-0067

Rev 0

Attachment A
Terminal Blocks

System: 63
Unit: 1

Mark	Plant I.D. No.	Room
PMB	F1S-63-11	12

EEB 63-0067

Rev 0

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 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.

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. FER 63-0068
Revision 0
Date 10-23-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Terminal Block Manufacturer: General Electric Company Model Number: EB-5 and CR15182 Function: Wire Termination Accuracy: Req'd: N/A Demon: N/A Category: N/A Service: N/A Location: Attachment A Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	1 Year	1 Year	(1)	N/A	N/A	None
	Temperature (°F)	325	340	(4)	Attachment B.3	Engineering Analysis	None
	Pressure (PSIA)	21.5	88	(4)	Attachment B.3	Engineering Analysis	None
	Relative Humidity (%)	100	100	(4)	Attachment B.3	Engineering Analysis	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^7	2×10^7	(4)	Attachment B.3	Engineering Analysis	None
	Aging	N/A	40 Years	(2)	Attachment B.3	Engineering Anal	None
	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. 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: [signature] 10/23/80
QA Acceptance: _____

EEB 63-0068
Rev 0

Attachment A
Terminal Blocks

System: 63
Unit: 2

Mark	Plant I.D. No.	Room
PMB	F1S-63-11	12

EEB 63-0068

Rev 0

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 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.

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Sheet No. (3) FER 63-0069
Revision 0
Date 10-23-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 63 Plant ID No. Attachment A Component Terminal Block Manufacturer: General Electric Company Model Number: EB-5 and CR15182 Function: Wire Termination Accuracy: Req'd: N/A Demon: N/A Category: N/A Service: N/A Location: Attachment A Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	1 Year	1 Year	(1)	N/A	N/A	None
	Temperature (°F)	325	340	(4)	Attachment B.3	Engineering Analysis	None
	Pressure (PSIA)	21.5	88	(4)	Attachment B.3	Engineering Analysis	None
	Relative Humidity (%)	100	100	(4)	Attachment B.3	Engineering Analysis	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^7	2×10^7	(4)	Attachment B.3	Engineering Analysis	None
	Aging	N/A	40 Years	(2)	Attachment B.3	Engineering Anal	None
	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. 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: J. Hughes 10/23/80
QA Acceptance: _____

EEB 63-0069

Rev 0

Attachment A
Terminal Blocks

System: 63
Unit: 3

Mark	Plant I.D. No.	Room
PMB	F1S-63-11	12

EEB 63-0069

Rev 0

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 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.

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0001
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 16AWG, 3/c, WVB, (PE) Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A, Demon: N/A Category: Attachment A Service: Attachment A Location: Ø	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (°F)	325	203	(4)	IPCEA S-61-402 par 3.9 and Appendix C.2	Standard Mat'l Long-Term Temp. Rating	None
	Pressure (PSIA)	69.7	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, & 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	$6.5 \times 10^7 \gamma$ $4 \times 10^9 \beta$ Attach. C.1	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	Aging	N/A	10 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 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. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0001
Rev

Component: Cable
Mark: WVB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2ES401	0	TE-64-52C DW TEMP	A	1 yr
2ES3276	0	TE-64-52A DW TEMP	A	1 yr
3ES401	0	TE-64-52C DW TEMP	A	1 yr
3ES3276	0	TE-64-52A DW TEMP	A	1 yr
1ES401	0	TE-64-52C DW TEMP	A	1 yr
1ES3276	0	TE-64-52A DW TEMP	A	1 yr

EEB 64-0001

Rev

ATTACHMENT B

Mark WVB

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

EEB 64-0001

Rev _____

ATTACHMENT B

Mark WVB

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

ATTACHMENT C

C.1 Integrated dose - 10 years plus accident

Beta Dose

References:

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 4×10^9 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 $.8 \times 10^7$ rads of beta.

Since the energy dissipation of gamma radiation occurs via ionizing processes, one can add the accident dose of 4×10^7 rads of gamma directly. The accumulated integrated gamma 10-year dose (the time presently assigned to connectors and penetrations) amounts to 2.5×10^7 rads which added directly gives a total dose of 7.3×10^7 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.

Since the above value of 7.3×10^7 is less than the values for which we have in-air test data for SROAJ types (1.2×10^8) and for XLPE types (2×10^8), 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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-64-0002
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Junction Box Manufacturer: N/A Model Number: N/A Function: Terminal Housing Accuracy: Req'd: N/A Demon: N/A Category: N/A Service: N/A Location: Attachment A	Operating Time	N/A	N/A	(1)	N/A	N/A	None
	Temperature (°F)	N/A	N/A	(4)	N/A	N/A	None
	Pressure (PSIA)	21.5 max.	21.5	(4)	Attachment B	Engineering Analysis	None
	Relative Humidity (%)	N/A	N/A	(4)	N/A	N/A	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	N/A	N/A	(4)	N/A	N/A	None
	Aging	N/A	N/A	(2)	N/A	N/A	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 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. Helster
QA Acceptance:

EEB -64-0002

Rev _____

ATTACHMENT A

Junction Boxes

System: 64
Unit: 1

Mark	Plant I.D. No.	Room
JOJ	JB-2882	9
JOJ	JB-2581	9
JOJ	JB-2891	8
JOD	JB-2802	12
JOH	JB-2343	15
JOH	JB-3344	15
JOH	JB-2802	12
JOH	JB-2801	12
JOO	JB-2279	12
JOJ	JB-2892	9
JOO	JB-2279	8
JOO	JB-2904	8
JOO	JB-2893	8
JQA	JB-2633	15
JQA	JB-2637	15
JQB	JB-2787	13
JQB	JB-2788	13
JQB	JB-2792	14
JQB	JB-2789	14
JQD	JB-2949	15
JQD	JB-515	15
JQD	JB-4788	8
JQD	JB-4780	8
JQD	JB-4790	8
JQD	JB-3647	14
JQD	JB-2954	14
JQN	JB-3651	14
JQN	JB-669	4
JJS	JB-658	5
JOC	JB-2619	12

EEB -64- 00-02

Rev _____

ATTACHMENT B

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 12- and 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 Nuclear Plant
Unit: 2
Docket: 50-260

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-64-0003
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTAND. ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A	Operating Time	N/A	N/A	(1)	N/A	N/A	None
Component Junction Box Manufacturer: N/A	Temperature (^{o}F)	N/A	N/A	(4)	N/A	N/A	None
Model Number: N/A	Pressure (PSIA)	21.5 max.	21.5	(4)	Attachment B	Engineering Analysis	None
Function: Terminal Housing	Relative Humidity (%)	N/A	N/A	(4)	N/A	N/A	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: N/A	Radiation (RAD)	N/A	N/A	(4)	N/A	N/A	None
Service: N/A Location: Attachment A	Aging	N/A	N/A	(2)	N/A	N/A	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 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. Webster
QA Acceptance: _____

EEB 64-0003

Rev _____

ATTACHMENT A

Junction Boxes

System: 64
Unit: 2

Mark	Plant I.D. No.	Room
JOJ	JB-2911	8
JOD	JB-2807	12
JOH	JB-2807	12
JOH	JB-2806	12
JOO	JB-2281	12
JOO	JB-2281	8
JOO	JB-2901	8
JOO	JB-2894	8
JQB	JB-2793	14
JQB	JB-2790	14
JQD	JB-517	15
JQD	JB-2950	15
JQD	JB-4792	8
JQD	JB-4793	8
JQD	JB-4794	8
JQN	JB-3652	14
JQN	JB-2260	4
JQG	JB-2296	5
JOC	JB-2795	12

EEB -64-0003

Rev _____

ATTACHMENT B

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 12- and 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.

8

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0004
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 14AWG, 1/c, WCA; (PN) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 2	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	158	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Helster
QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0004
Rev

Component: Cable
Mark: WCA (PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES1191-I	2	TS-64-68 Air	A	1 yr
1ES1198-I	2	TS-64-70 Air	A	1 yr
2ES1191-I	2	TS-64-68 Air	A	1 yr
2ES1198-I	2	TS-64-70 Air	A	1 yr

EEB 64-0004

Rev _____

ATTACHMENT B

Mark WCA

Contract No.	Type	Manufacturer
72C7-75128	PN	Plastic Wire & Cable Corp
72X7-74885-1	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
67C3-91618	PN	Brand-Rex
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex
TR 822378) 822639) 822915) Sequoyah 72C7-75228-1	PN	Plastic Wire & Cable Corp
72C7-83874-1		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° 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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0005
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 12AWG, 1/c, WBB, (PH) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 3	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (^{o}F)	297	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Smith
Reviewed by: J. R. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0005
Rev

Component: Cable
Mark: WBB (PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES807-I	3	TS-64-72 Air	A	1 yr
2ES807-I	3	TS-64-72 Air	A	1 yr
3ES807-I	3	TS-64-72 Air	A	1 yr

EEB 64-0005

Rev _____

ATTACHMENT B

Mark WBB

Contract No.	Type	Manufacturer
67C3-91618	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex

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° 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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0006
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64. Plant ID No. Attachment A Component Cable 14AWG, 1/c, WCA, (PN) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 4	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	294	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0006
Rev

Component: Cable
Mark: WCA (PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES3308-II	4	TS-64-73 CS CLR PMP	A	1 yr
2ES3308	4	TS-64-73 CS CLR PMP	A	1 yr
3ES3308	4	TS-64-73 CS CLR PMP	A	1 yr

EEB 64-0006

Rev _____

ATTACHMENT B

Mark WCA

Contract No.	Type	Manufacturer
72C7-75128	PN	Plastic Wire & Cable Corp
72X7-74885-1	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
67C3-91618	PN	Brand-Rex
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex
TR 822378) 822639) 822915) Sequoyah 72C7-75228-1	PN	Plastic Wire & Cable Corp
72C7-83874-1		Plastic Wire & Cable Corp

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

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:_____

1 8

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0007
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 14AWG, 1/c, WCA, (PN) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 5	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	294	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	LPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Mota
Reviewed by: D.R. Wilburn
QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0007
Rev

Component: Cable
Mark: WCA (PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES3746-II	5	TS-64-71 RHH PMP FAN	A	1 yr
2ES3674	5	TS-64-71 RHH PMP MTR D	A	1 yr

EEB 64-0007

Rev _____

ATTACHMENT B

Mark WCA

Contract No.	Type	Manufacturer
72C7-75128	PN	Plastic Wire & Cable Corp
72X7-74885-1	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
67C3-91618	PN	Brand-Rex
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex
TR 822378) 822639) 822915) Sequoyah 72C7-75228-1	PN	Plastic Wire & Cable Corp
72C7-83874-1		Plastic Wire & Cable Corp

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° 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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0008
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable WUB-1, (XLPE) 16AWG, 2/c, Type TX Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 6	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	220	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^7	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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. Ifita

Reviewed by: D. R. Webster

QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0008
Rev

Component: Cable
Mark: WUB-1

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R2744	6	TE-64-55A AIR	A	1 yr
1R2746	6	TE-64-55B AIR	A	1 yr
1R2748	6	TE-64-55C AIR	A	1 yr
1R2750	6	TE-64-55D AIR	A	1 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	1 yr
2R2744	6	TE-64-55A AIR	A	1 yr
2R2746	6	TE-64-55B AIR	A	1 yr
2R2748	6	TE-64-55C AIR	A	1 yr
2R2750	6	TE-64-55D AIR	A	1 yr
2R2757	6	TE-64-55E AIR	A	1 yr
2R2759	6	TE-64-55F AIR	A	1 yr
2R2742	6	TE-64-52B AIR	A	1 yr
3R2744	6	TE-64-55A AIR	A	1 yr
3R2746	6	TE-64-55B AIR	A	1 yr
3R2748	6	TE-64-55C AIR	A	1 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	1 yr
3R2742	6	TE-64-52B AIR	A	1 yr

EEB 64-0008

Rev _____

ATTACHMENT B

Mark WUB-1

Contract No.	Type	Manufacturer
74C7-85464	CSPE/PVC	Continental Wire & Cable
71C7-54336	XLPE/CSPE	Continental Wire & Cable
72C7-83427	CSPE/CSPE	Continental Wire & Cable
72C7-54994		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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0009
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WUB-1, (CSPE) 16AWG, 2/c, Type TX Manufacturer: Attachment B	Temperature (^{o}F)	220	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	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3.1×10^7	5×10^7	(4)	Attachment C.1	Generic Sequential Test	None
Service: Attachment A	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	None
Location: 6 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 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: O.R Webster
QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0009
Rev

Component: Cable
Mark: WUB-1

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R2744	6	TE-64-55A AIR	A	1 yr
1R2746	6	TE-64-55B AIR	A	1 yr
1R2748	6	TE-64-55C AIR	A	1 yr
1R2750	6	TE-64-55D AIR	A	1 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	1 yr
2R2744	6	TE-64-55A AIR	A	1 yr
2R2746	6	TE-64-55B AIR	A	1 yr
2R2748	6	TE-64-55C AIR	A	1 yr
2R2750	6	TE-64-55D AIR	A	1 yr
2R2757	6	TE-64-55E AIR	A	1 yr
2R2759	6	TE-64-55F AIR	A	1 yr
2R2742	6	TE-64-52B AIR	A	1 yr
3R2744	6	TE-64-55A AIR	A	1 yr
3R2746	6	TE-64-55B AIR	A	1 yr
3R2748	6	TE-64-55C AIR	A	1 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	1 yr
3R2742	6	TE-64-52B AIR	A	1 yr

EEB 64-0009

Rev _____

ATTACHMENT B

Mark WUB-1

Contract No.	Type	Manufacturer
74C7-85464	CSPE/PVC	Continental Wire & Cable
71C7-54336	XLPE/CSPE	Continental Wire & Cable
72C7-83427	CSPE/CSPE	Continental Wire & Cable
72C7-54994		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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-64-0010
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDI ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Junction Box Manufacturer: N/A Model Number: N/A Function: Terminal Housing Accuracy: Req'd: N/A Demon: N/A Category: N/A Service: N/A Location: Attachment A	Operating Time	N/A	N/A	(1)	N/A	N/A	None
	Temperature (°F)	N/A	N/A	(4)	N/A	N/A	None
	Pressure (PSIA)	21.5 max.	21.5	(4)	Attachment B	Engineering Analysis	None
	Relative Humidity (%)	N/A	N/A	(4)	N/A	N/A	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	N/A	N/A	(4)	N/A	N/A	None
	Aging	N/A	N/A	(2)	N/A	N/A	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 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. Helster
QA Acceptance:

EEB -64-0010

Rev _____

ATTACHMENT A

Junction Boxes

System: 64
Unit: 3

Mark	Plant I.D. No.	Room
JOF	JB-2892	8
JOD	JB-2911	12
JOH	JB-2811	12
JOH	JB-2810	12
JOO	JB-2282	12
JOO	JB-2282	8
JOO	JB-2921	8
JOO	JB-2895	8
JQA	JB-2638	15
JQB	JB-2794	14
JQB	JB-2791	14
JQD	JB-2951	15
JQD	JB-519	15
JQD	JB-4796	8
JQD	JB-4797	8
JQD	JB-4798	8
JQD	JB-2955	14
JQN	JB-3653	14
JQN	JB-3448	4
JQG	JB-3535	5
JOC	JB-2796	12

EEB -69-0010

Rev _____

ATTACHMENT B

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 12- and 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 Nuclear Plant
Unit: 2
Docket: 50-260

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0012
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 14AWG, 2/c, WHB, (PNJ) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 8	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	147	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0012
Rev

Component: Cable
Mark: WHB (PNJ)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1PC351-I	8	PDIS-64-20 AIR	A/B	1 hr/1 yr
1PC357-I	8	PDIS-64-21 AIR	A/B	1 hr/1 yr

EEB 64-0012

Rev _____

ATTACHMENT B

Mark WHB

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable
87148 XFR From SQN 72C7-75228-1	PJJ	Plastic Wire & Cable
75K7-86150-1	PJJ	Cyprus
73C7-84528	PJJ	Rome Cable
75K5-86506-1	PJJ	AIW
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-64-0012

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: _____

8

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0013
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 14AWG, 1/c, WCA, (PN) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 8	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (^{o}F)	157	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0013
Rev

Component: Cable
Mark: WCA (PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2PC595-I	8	FCV-64-32 Air	A	1 yr
2PC596-I	8	FCV-64-32 Air	A	1 yr
2PC597-I	8	FCV-64-32 Air	A	1 yr
2PC339-I	8	FCV-64-34 Air	A	1 yr
2PC340-I	8	FCV-64-34 Air	A	1 yr
3PC341-I	8	FCV-64-34 Air	A	1 yr
2PC577-I	8	FCV-64-18 Air	A	1 yr
2PC578-I	8	FCV-64-18 Air	A	1 yr
2PC579-I	8	FCV-64-18 Air	A	1 yr
2PC583-I	8	FCV-64-19 Air	A	1 yr
2PC584-I	8	FCV-64-19 Air	A	1 yr
2PC585-I	8	FCV-64-19 Air	A	1 yr
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 Air	A	1 yr
2PC360-I	8	FCV-64-21 Air	A	1 yr
2PC361-I	8	FCV-64-21 Air	A	1 yr
2PC362-I	8	FCV-64-21 Air	A	1 yr
2PL3812	8	FCV-64-141 Air	A	1 yr
2PL3813	8	FCV-64-141 Air	A	1 yr
2PL3814	8	FCV-64-141 Air	A	1 yr
1PL5189	8	FCO-64-60A Air	A/B	1 hr/1 yr
1PC583-I	8	FCV-64-19 Air	A	1 yr
1PC584-I	8	FCV-64-19 Air	A	1 yr
1PC585-I	8	FCV-64-19 Air	A	1 yr
1PC353-I	8	FCV-64-20 Air	A	1 yr
1PC354-I	8	FCV-64-20 Air	A	1 yr
1PC355-I	8	FCV-64-20 Air	A	1 yr
1PC360-I	8	FCV-64-21 Air	A	1 yr
1PC361-I	8	FCV-64-21 Air	A	1 yr
1PC362-I	8	FCV-64-21 Air	A	1 yr
1PL3812	8	FCV-64-141 Air	A	1 yr
1PL3813	8	FCV-64-141 Air	A	1 yr
1PL3814	8	FCV-64-141 Air	A	1 yr
3PL5186	8	FCO-64-60A Air	A/B	1 hr/1 yr
3PC595-I	8	FCV-64-32 Air	A	1 yr
3PC596-I	8	FCV-64-32 Air	A	1 yr
3PC597-I	8	FCV-64-32 Air	A	1 yr
3PC339-I	8	FCV-64-34 Air	A	1 yr
3PC340-I	8	FCV-64-34 Air	A	1 yr
3PC341-I	8	FCV-64-34 Air	A	1 yr
3ES1907-I	8	PDCO-64-16 Air	A	1 yr
3ES1909-I	8	PDCO-64-16 Air	A	1 yr

Attachment A

System: 64
Unit: 2

EEB-64-0013
Rev

Component: Cable
Mark: WCA (PN) (Continued)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2PC339-I	8	FSV-64-34 Air	A/B	1 hr/1 yr
2PC340-I	8	FSV-64-34 Air		
2PC341-I	8	FSV-64-34 Air		
2PC614-II	8	FSV-64-17 Air		
2PC615-II	8	FSV-64-17 Air		
2PC616-II	8	FSV-64-17 Air		
2PC577-I	8	FSV-64-18 Air		
2PC578-I	8	FSV-64-18 Air		
2PC579-I	8	FSV-64-18 Air		
2PC583-I	8	FSV-64-19 Air		
2PC584-I	8	FSV-64-19 Air		
2PC585-I	8	FSV-64-19 Air		
2PC353-I	8	FSV-64-20 Air		
2PC354-I	8	FSV-64-20 Air		
2PC355-I	8	FSV-64-20 Air		
2PC360-I	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-I	8	FSV-64-32 Air		
3PC596-I	8	FSV-64-32 Air		
3PC597-I	8	FSV-64-32 Air		
3PC339-I	8	FSV-64-34 Air		
3PC340-I	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		
3PC578-I	8	FSV-64-18 Air		
3PC579-I	8	FSV-64-18 Air		
3PC583-I	8	FSV-64-19 Air		
3PC584-I	8	FSV-64-19 Air		
3PC585-I	8	FSV-64-19 Air		
3PC353-I	8	FSV-64-20 Air		
3PC354	8	FSV-64-20 Air		
3PC355	8	FSV-64-20 Air		
3PC360-I	8	FSV-64-21 Air		
3PC361-I	8	FSV-64-21 Air		
3PC362-I	8	FSV-64-21 Air		
3PL3812	8	FSV-64-141 Air		
3PL3813	8	FSV-64-141 Air		
3PL3814	8	FSV-64-141 Air		

System: 64
Unit: 2

EEB-64-0013
Rev

Component: Cable
Mark: WCA (PN) (Continued)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3PC577-I	8	FCV-64-18 Air	A	1 yr
3PC578-I	8	FCV-64-18 Air	A	1 yr
3PC579-I	8	FCV-64-18 Air	A	1 yr
3PC583-I	8	FCV-64-19 Air	A	1 yr
3PC584-I	8	FCV-64-19 Air	A	1 yr
3PC585-I	8	FCV-64-19 Air	A	1 yr
3PC353-I	8	FCV-64-20 Air	A	1 yr
3PC354-I	8	FCV-64-20 Air	A	1 yr
3PC355-I	8	FCV-64-20 Air	A	1 yr
3PC360-I	8	FCV-64-21 Air	A	1 yr
3PC361-I	8	FCV-64-21 Air	A	1 yr
3PC362-I	8	FCV-64-21 Air	A	1 yr
3ES1191-I	8	TS-64-68 Air	A	1 yr.
3ES1198-I	8	TS-64-70 Air	A	1 yr
3PL3812	8	FCV-64-141 Air	A	1 yr
3PL3813	8	FCV-64-141 Air	A	1 yr
3PL3814	8	FCV-64-141 Air	A	1 yr
1PC595-I	8	FSV-64-32 Air	A/B	1 hr/1 yr
1PC596-I	8	FSV-64-32 Air	A/B	1 hr/1 yr
1PC597-I	8	FSV-64-32 Air	A/B	1 hr/1 yr
1PC339-I	8	FSV-64-34 Air	A/B	1 hr/1 yr
1PC340-I	8	FSV-64-34 Air	A/B	1 hr/1 yr
1PC341-I	8	FSV-64-34 Air	A/B	1 hr/1 yr
1PC614-II	8	FSV-64-17 Air	A/B	1 hr/1 yr
1PC615-II	8	FSV-64-17 Air	A/B	1 hr/1 yr
1PC616-II	8	FSV-64-17 Air	A/B	1 hr/1 yr
1PC577-I	8	FSV-64-18 Air	A/B	1 hr/1 yr
1PC578-I	8	FSV-64-18 Air	A/B	1 hr/1 yr
1PC579-I	8	FSV-64-18 Air	A/B	1 hr/1 yr
1PC583-I	8	FSV-64-19 Air	A/B	1 hr/1 yr
1PC584-I	8	FSV-64-19 Air	A/B	1 hr/1 yr
1PC585-I	8	FSV-64-19 Air	A/B	1 hr/1 yr
1PC353-I	8	FSV-64-20 Air	A/B	1 hr/1 yr
1PC354-I	8	FSV-64-20 Air	A/B	1 hr/1 yr
1PC355-I	8	FSV-64-20 Air	A/B	1 hr/1 yr
1PC360-I	8	FSV-64-21 Air	A/B	1 hr/1 yr
1PC361-I	8	FSV-64-21 Air	A/B	1 hr/1 yr
1PC362-I	8	FSV-64-21 Air	A/B	1 hr/1 yr
1PL3812	8	FSV-64-141 Air	A/B	1 hr/1 yr
1PL3813	8	FSV-64-141 Air	A/B	1 hr/1 yr
1PL3814	8	FSV-64-141 Air	A/B	1 hr/1 yr
2PC595-I	8	FSV-64-32 Air	A/B	1 hr/1 yr
2PC596-I	8	FSV-64-32 Air	A/B	1 hr/1 yr
2PC597-I	8	FSV-64-32 Air	A/B	1 hr/1 yr

EEB 64-0013

Rev _____

ATTACHMENT B

Mark WCA

Contract No.	Type	Manufacturer
72C7-75128	PN	Plastic Wire & Cable Corp
72X7-74885-1	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
67C3-91618	PN	Brand-Rex
72C7-75328-1	PN.	Brand-Rex
70C7-54179-1	PN	Brand-Rex
TR 822378) Sequoyah 822639) 72C7-75228-1 822915)	PN	Plastic Wire & Cable Corp
72C7-83874-1		Plastic Wire & Cable Corp

Sheet No.: EEB-64-0013

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-64-0014
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. EB Component Electrical Penetrations Assembly Manufacturer: General Electric Company Model Number: NS04 Function: Low voltage power and control primary containment penetration Accuracy: Req'd: N/A Demon: N/A Category: See Attach. A Service: See Attachment A Location: 0	Operating Time	ATTACH. A	1 Year	(1)	Attachment C	Engineering Analysis	None
	Temperature (°F)	325	Attach. B.2	(4)	Attachment B.5	Simultaneous Test	None
	Pressure (PSIA)	67	Attach. B.3	(4)	Attachment B.5	Simultaneous Test	None
	Relative Humidity (%)	100	100	(4)	Attachment B.5	Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	6.5×10^7 4×10^9 Attach. B.1	6.5×10^7 4×10^9	(4)	Attachment B.6 Attachment C	1. Test 2. Engineering Analysis	None
	Aging	N/A	Attach. B.4	(2)	Attachment B.7	Test	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 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: D.L. Webster
QA Acceptance:

EEB- 64-0014

Rev 0

ATTACHMENT A

Electrical Penetrations

System: 64
Unit: 3

Mark	Plant I.D. No.	Room
EB	DW TEMP/3ES401	0
EF	DW TEMP/3ES3276	0
FA	FCV/FSV-64-28A	00
	-28B	
	-28C	
	-28D	
	-28E	
	-28F	
	-28G	
	-28H	
	-28J	
	-28K	
	-28L	
	-28M	

Attachment B

EEB - 64-0014

Rev

1. Integrated dose - 10 years normal operations plus one LOCA.

2. Penetrations - 352
   Connectors - 325
   Cable - 340

3. Penetrations - 136.7
   Connectors - 93
   Cable - 77.7

4. Penetrations - 40 years
   Connectors - 10 years
   Cable - 40 years

5. Penetrations and Cable - GE Report EPAQ-055, Low Voltage, Emergency Environmental Test
   GE Report EPAQ-060, Maximum Emergency Environmental Test-Signal
   GE Report EPAQ-061, Maximum Emergency Environmental Test-Low Voltage
   Connectors - Wyle Laboratory Report 43854-2, Browns Ferry Connectors Sandia Report

6. Penetrations - TVA Engineering Report EEB 1921
   Connectors - TVA Engineering Report EEB 1921
   Cable - TVA Engineering Report EEB 1921

7. Penetrations - GE Prototype Test Data - Epoxy Life Tests
   Connectors - Wyle Laboratory Report 4385-2, Browns Ferry Connectors
   Cable - NRC o588 Materials List (Crosslinked Polyethylene)

8. Penetrations - Material tests
   Connectors - Sequential tests
   Cable - Generic Material tests

EEB -64-0014

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 1.05×10^8 rads gamma and the 10-year plus LOCA dose would be about 4.9×10^7 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 1×10^8 rads gamma (see the NRC 0588 materials list for acknowledgement of this). The connectors have been qualified for 6.9×10^7 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 10^0 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.

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.

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-64-0015
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. EF Component Electrical Penetrations Assembly Manufacturer: General Electric Company Model Number: NS04 Function: Low voltage power and control primary containment penetration Accuracy: Req'd: N/A Demon: N/A Category: See Attach. A Service: See Attachment A Location: O	Operating Time	Attach. A	1 Year	(1)	Attachment C	Engineering Analysis	None
	Temperature (°F)	325	Attach. B.2	(4)	Attachment B.5	Test	None
	Pressure (PSIA)	67	Attach. B.3	(4)	Attachment B.5	Test	None
	Relative Humidity (%)	100	100	(4)	Attachment B.5	Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	6.5×10^7 4×10^9 Attach. B.1	6.5×10^7 4×10^9	(4)	Attachment B.6 Attachment C	1. Test 2. Engineering Analysis	None
	Aging	N/A	Attach. B.4	(2)	Attachment B.7	Test	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 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: D R Webster

QA Acceptance:

EEB- 64-0015

Rev 0

ATTACHMENT A

Electrical Penetrations

System: 64
Unit: 3

Mark	Plant I.D. No.	Room
EB	DW TEMP/3ES401	0
EF	DW TEMP/3ES3276	0
FA	FCV/FSV-64-28A	00
	-28B	
	-28C	
	-28D	
	-28E	
	-28F	
	-28G	
	-28H	
	-28J	
	-28K	
	-28L	
	-28M	

Attachment B

EEB -64-0015

Rev

1. Integrated dose - 10 years normal operations plus one LOCA.

2. Penetrations - 352
   Connectors - 325
   Cable - 340

3. Penetrations - 136.7
   Connectors - 93
   Cable - 77.7

4. Penetrations - 40 years
   Connectors - 10 years
   Cable - 40 years

5. Penetrations and Cable - GE Report EPAQ-055, Low Voltage, Emergency Environmental Test
   GE Report EPAQ-060, Maximum Emergency Environmental Test-Signal
   GE Report EPAQ-061, Maximum Emergency Environmental Test-Low Voltage
   Connectors - Wyle Laboratory Report 43854-2, Browns Ferry Connectors Sandia Report

6. Penetrations - TVA Engineering Report EEB 1921
   Connectors - TVA Engineering Report EEB 1921
   Cable - TVA Engineering Report EEB 1921

7. Penetrations - GE Prototype Test Data - Epoxy Life Tests
   Connectors - Wyle Laboratory Report 4385-2, Browns Ferry Connectors
   Cable - NRC o588 Materials List (Crosslinked Polyethylene)

8. Penetrations - Material tests
   Connectors - Sequential tests
   Cable - Generic Material tests

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 1.05×10^8 rads gamma and the 10-year plus LOCA dose would be about 4.9×10^7 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 1×10^8 rads gamma (see the NRC 0588 materials list for acknowledgement of this). The connectors have been qualified for 6.9×10^7 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 10^0 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.

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.

11

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0016
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable WVA, (PE) 16AWG, 2/c, Type MS Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 9	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (°F)	211	203	(4)	IPCEA S-61-402 par 3.9 and Attachment C.2	Attachment C.2	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	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 2.4 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: D.R. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0016
Rev

Component: Cable
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R2870	9	PT-64-67 Air	A	1 yr
2P2870	9	PT-64-67 Air	A	1 yr
3R2870	9	PT-64-67 Air	A	1 yr

EEB 64-0016

Rev

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

Sheet No: EEB- 64-0016

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 6.25×10^6 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.

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0017
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable NVA, (XL/EP) 16AWG, 2/c, Type MS Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 9	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	211	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	2.1×10^7	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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. Helster
QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0017
Rev

Component: Cable
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R2870	9	PT-64-67 Air	A	1 yr
2P2870	9	PT-64-67 Air	A	1 yr
3R2870	9	PT-64-67 Air	A	1 yr

EEB 64-0017

Rev _____

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

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: _____

1 8

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0018
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable WCA, (PN) 14AWG, 1/c Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 9	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (^{o}F)	211	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Smith
Reviewed by: D.R. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0018
Rev

Component: Cable
Mark: WCA (PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1RP23-IA	9	PS-64-56A Air	A	1 day
1RP97-IIA	9	PS-64-56C Air		
1RP97-IIA	9	PS-64-56C Air		
1RP322-IIB	9	PS-64-56D Air		
1RP260-IB	9	PS-64-56B Air		
1RP322-IIB	9	PS-64-56D Air		
2RP23-IA	9	PS-64-56A Air		
2RP97-IIA	9	PS-64-56C Air		
2RP97-IIA	9	PS-64-56C Air		
2RP322-IIB	9	PS-64-56D Air		
2PP260-IB	9	PS-64-56B Air		
2RP322-IIB	9	PS-64-56D Air		
3RP23-IA	9	PS-64-56A Air		
3RP97-IIA	9	PS-64-56C Air		
3RP97-IIA	9	PS-64-56C Air		
3RP322-IIB	9	PS-64-56D Air		
3RP260-IB	9	PS-64-56B Air		
3RP322-IIB	9	PS-64-56D Air		

EEB 64-0.018

Rev _____

ATTACHMENT B

Mark WCA

Contract No.	Type	Manufacturer
72C7-75128	PN	Plastic Wire & Cable Corp
72X7-74885-1	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
67C3-91618	PN	Brand-Rex
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex
TR 822378) 822639) 822915) Sequoyah 72C7-75228-1	PN	Plastic Wire & Cable Corp
72C7-83874-1		Plastic Wire & Cable Corp

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.

Prepared by: _____

Reviewed by: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0019
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGB, (PNJ) 12AWG, 2/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)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
Location: 9							
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 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. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0019
Rev

Component: Cable
Mark: WGB (PNJ)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES750-I	9	PS-64-58B Air	A	1 yr
1ES991-I	9	PS-64-58B Air		
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		
2ES3253-II	9	PS-64-58C Air		
3ES750-I	9	PS-64-58B Air		
3ES991-I	9	PS-64-58B Air		
3ES992-I	9	PS-64-58D Air		
3ES753-I	9	PS-64-58D Air		

EEB 64-0019

Rev _____

ATTACHMENT B

Mark WGB

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Brand-Rex
73C7-84528	PJJ	Rome Cable
75K7-86150-1	PJJ	Cyprus
75K5-86506-1	PJJ	American Insulated Wire
74C7-85069-1	PJJ	Rome
70C7-54179-2	PNJ	Plastic Wire & Cable Corp
71X7-54761-1	PNJ	General Cable
72C7-54872	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-64-0019

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: _____

3

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0020
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WHB, (PNJ) 14AWG, 2/c 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
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A 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 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. Smith
Reviewed by: O.R. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0020
Rev

Component: Cable
Mark: WHB (PNJ)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES5-I	9	PS-64-57B Air	A	30 days
1ES21-I	9	PS-64-57D Air		
2ES2678-II	9	PS-64-57A Air		
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		
2ES3492-II	9	PS-64-58C Air		

EEB 64-0020

Rev _____

ATTACHMENT B

Mark WHB

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable
87148 XFR From SQN 72C7-75228-1	PJJ	Plastic Wire & Cable
75K7-86150-1	PJJ	Cyprus
73C7-84528	PJJ	Rome Cable
75K5-86506-1	PJJ	AIW
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-64-0020

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Sheet No. EEB 64-0021 (3)
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 14AWG, 2/c, WHB, (PNJ) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (^{o}F)	174	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Webster
QA Acceptance: _____

Attachment A

System: 64
Unit: 2

EEB-64-0021
Rev

Component: Cable
Mark: WHB (PNJ)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1PL3805	12	FSV-64-31 Air	A/B	1 hr/1 yr
2PL3805	12	FSV-64-31 Air	A/B	1 hr/1 yr
3PL3805	12	FSV-64-31 Air	A/B	1 hr/1 yr
1PL3805	12	FCV-64-31 Air	A	1 yr
2PL3805	12	FCV-64-31 Air	A	1 yr
3PL3805	12	FCV-64-31 Air	A	1 yr

EEB 64-0021

Rev _____

ATTACHMENT B

Mark WHB

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable
87148 XFR From SQN 72C7-75228-1	PJJ	Plastic Wire & Cable
75K7-86150-1	PJJ	Cyprus
73C7-84528	PJJ	Rome Cable
75K5-86506-1	PJJ	AIW
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-64-0021

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

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:_____

11

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0022
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable WVA, (PE) 16AWG, 2/c, Type MS Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (^{o}F)	199	203	(4)	IPCEA S-61-402 par 3.9 and Attachment C.2	Attachment C.2	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	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 2.4 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: D.R. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64-0022
Rev

Component: Cable
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R2726	12	PX-64-51 Air	A/B	1 hr/1 yr
1R2725	12	PX-64-51 Air		
2R2726	12	PX-64-51 Air		
2R2725	12	PX-64-51 Air		
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		

EEB 64-0022

Rev _____

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

Sheet No: EEB-64-0022

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0023
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WVA; (XL/EP) 16AWG, 2/c, Type MS Manufacturer: Attachment B	Temperature (°F)	199	385	(4)	Attachment C.1	Generic Simultaneous Test	None
Model 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
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A Service: Attachment A	Radiation (RAD)	3.1×10^4	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
Location: 12	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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. Yojita

Reviewed by: G.R. Webster

QA Acceptance:

Attachment A

System: 64
Unit: 2

EEB-64 0023
Rev

Component: Cable
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R2726	12	PX-64-51 Air	A/B	1 hr/1 yr
1R2725	12	PX-64-51 Air		
2R2726	12	PX-64-51 Air		
2R2725	12	PX-64-51 Air		
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		

EEB 64-0023

Rev _____

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

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: _____

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

(3)
Sheet No. EEB 64-0024
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 16AWG, 3/c, NVB, (PE) Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A. Service: Attachment A Location: $\emptyset$	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (^{o}F)	325	203	(4)	IPCEA S-61-402 par 3.9 and Appendix C.2	Standard Mat'l Long-Term Temp. Rating	None
	Pressure (PSIA)	69.7	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, & 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	$6.5 \times 10^{7}\gamma$ $4 \times 10^{9}\beta$ Attach. C.1	4×10^{7}	(4)	NUREG-0588 Material List	Generic Material Tests	None
	Aging	N/A	10 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 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. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64-0024
Rev

Component: Cable
Mark: WVB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
IES401	0	7E-64-52C DW TEMP	A	1 Year
IES3276	0	7E-64-52A DW TEMP	↓	↓

EEB 64-0024

Rev _____

ATTACHMENT B

Mark WVB

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

ATTACHMENT C

C.1 Integrated dose - 10 years plus accident

Beta Dose

References:

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 4×10^9 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 $.8 \times 10^7$ rads of beta.

Since the energy dissipation of gamma radiation occurs via ionizing processes, one can add the accident dose of 4×10^7 rads of gamma directly. The accumulated integrated gamma 10-year dose (the time presently assigned to connectors and penetrations) amounts to 2.5×10^7 rads which added directly gives a total dose of 7.3×10^7 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.

Since the above value of 7.3×10^7 is less than the values for which we have in-air test data for SROAJ types (1.2×10^8) and for XLPE types (2×10^8), 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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-64-0025.
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. EE Component Electrical Penetration Assembly Manufacturer: General Electric Company Model Number: Series 100 Function: Low voltage power and control primary containment penetration Accuracy: Req'd: Demon: Category: See Attachment A Service: See Attachment A Location: 0 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 Year	(1)	Attachment C	Engineering Analysis	None
	Temperature (°F)	325	Attach. B.2	(4)	Attachment B.4	Simultaneous Test	None
	Pressure (PSIA)	67	Attach. B.3	(4)	Attachment B.4	Simultaneous Test	None
	Relative Humidity (%)	100	100	(4)	Attachment B.4	Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	6.5×10^7 4×10^9 Attach. B.1	6.9×10^7 4×10^9	(4)	Attachment B.5 Attachment C	1. Test 2. Engineering Analysis	None
	Aging	N/A	40 years	(2)	Attachment B.6	Attachment B.7	None
	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. 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. Syita
Reviewed by: D.R. Webster
QA Acceptance:

EEB- 64-0025

Rev 0

ATTACHMENT A

Electrical Penetrations

System: 64
Unit: 1

Mark	Plant I.D. No.	Room
EB	DW/TEMP/1ES401	0
EF	DW/TEMP/1ES3276	0
FA	FCV/FSV-64-28A	00
	-28B	
	-28C	
	-28D	
	-28E	
	-28F	
	-28G	
	-28H	
	-28J	
	-28K	
	-28L	
	-28M	

Attachment B

EEB -64-0025

Rev _____

1. Integrated dose - 10 years normal operation plus one LOCA

2. Penetrations 340
   Cable 340
   Splices 358

3. Penetration 103
   Cable 103
   Splices 134

4. Penetrations and Cable - GE 100 Series Low Voltage Qualification Test Report dated January 1974 and Addendum No. 1 dated March 1974

   Splices - FIRL Final Report F-C4033-3

5. Penetrations - TVA Engineering Report EEB 1926
   Cable - TVA Engineering Report EEB 1926
   Splices - TVA Engineering Report EEB 1926

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
   Cable - Generic Material Tests
   Splices - Tests and Analysis

EEB -64-0025

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 1.05×10^8 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.

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Sheet No. EEB-64-0026 (3)
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. EE Component Electrical Penetration Assembly Manufacturer: General Electric Company Model Number: Series 100 Function: Low voltage power and control primary containment penetration Accuracy: Req'd: Demon: Category: See Attachment A Service: See Attachment A Location: 0 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 Year	(1)	Attachment C	Engineering Analysis	None
	Temperature (°F)	325	Attach. B.2	(4)	Attachment B.4	Simultaneous Test	None
	Pressure (PSIA)	67	Attach. B.3	(4)	Attachment B.4	Simultaneous Test	None
	Relative Humidity (%)	100	100	(4)	Attachment B.4	Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	6.5×10^7 4×10^9 Attach. B.1	6.9×10^7 4×10^9	(4)	Attachment B.5 Attachment C	1. Test 2. Engineering Analysis	None
	Aging	N/A	40 years	(2)	Attachment B.6	Attachment B.7	None
	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. 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. Wilburn
QA Acceptance:

EEB- 64-0026

Rev 0

ATTACHMENT A

Electrical Penetrations

System: 64
Unit: 2

Mark	Plant I.D. No.	Room
EB	DW TEMP/2ES401	0
EF	DW TEMP/2ES3276	0
FA	FCV/FSV-64-28A	00
	-28B	
	-28C	
	-28D	
	-28E	
	-28F	
	-28G	
	-28H	
	-28J	
	-28K	
	-28L	
	-28M	

Attachment B

EEB -64-0026

Rev _____

1. Integrated dose - 10 years normal operation plus one LOCA

2. Penetrations 340
   Cable 340
   Splices 358

3. Penetration 103
   Cable 103
   Splices 134

4. Penetrations and Cable - GE 100 Series Low Voltage Qualification Test Report dated January 1974 and Addendum No. 1 dated March 1974

   Splices - FIRL Final Report F-C4033-3

5. Penetrations - TVA Engineering Report EEB 1926
   Cable - TVA Engineering Report EEB 1926
   Splices - TVA Engineering Report EEB 1926

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
   Cable - Generic Material Tests
   Splices - Tests and Analysis

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 1.05×10^8 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.

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0027
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 14AWG, 1/c, WCA, (PN) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 2	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	292	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Webster

QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64-0027
Rev

Component: Cable
Mark: WCA(PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES1191-I	2	TS-64-68 AIR	A	1 Year
1ES1198-I	2	TS-64-70 AIR	A	1 Year
2ES1191-I	2	TS-64-68 AIR	A	1 Year
2ES1198-I	2	TS-64-70 AIR	A	1 Year

EEB 64-0027

Rev _____

ATTACHMENT B

Mark WCA

Contract No.	Type	Manufacturer
72C7-75128	PN	Plastic Wire & Cable Corp
72X7-74885-1	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
67C3-91618	PN	Brand-Rex
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex
TR 822378) 822639) 822915) Sequoyah 72C7-75228-1	PN	Plastic Wire & Cable Corp
72C7-83874-1		Plastic Wire & Cable Corp

8C

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

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:_____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0028
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable 12AWG, 1/c, WBB, (PN) Manufacturer: Attachment B	Temperature (^{o}F)	297	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)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
Location: 3	Submergence	N/A	N/A	(4)	N/A	N/A	None
Flood Level Elev: 552' Above Flood Level: Yes X 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: W. Smith
Reviewed by: D.R. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64-0028
Rev

Component: Cable
Mark: WBB(PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES807-I	3	TS-64-72 AIR	A	1 Year
2ES807-I	3	TS-64-72 AIR	A	1 Year
3E8807-I	3	TS-64-72 AIR	A	1 Year

EEB 64-0028

Rev _____

ATTACHMENT B

Mark WBB

Contract No.	Type	Manufacturer
67C3-91618	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex

Sheet No.: EEB-64-0028

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: _____

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

(3)
Sheet No. EEB 64-0029
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	1 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)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
Location: 4							
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 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. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64-0029
Rev

Component: Cable
Mark: WCA(PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES3308-II	4	TS-64-73 CS COOLER PMPS	A	1 Year
2ES3308	4	TS-64-73 CS COOLER PMPS	A	1 Year
3ES3308	4	TS-64-73 CS COOLER PMPS	A	1 Year

EEB 64-0029

Rev _____

ATTACHMENT B

Mark WCA

Contract No.	Type	Manufacturer
72C7-75128	PN	Plastic Wire & Cable Corp
72X7-74885-1	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
67C3-91618	PN	Brand-Rex
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex
TR 822378) 822639) 822915) Sequoyah 72C7-75228-1	PN	Plastic Wire & Cable Corp
72C7-83874-1		Plastic Wire & Cable Corp

Sheet No.: EEB-64-0029

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0030
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	1 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)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
Location: 5							
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 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. Miita
Reviewed by: D.R. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64 0030
Rev

Component: Cable
Mark: WCA(PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES3746-II	5	TS-64-71 RHH PMP FAN	A	1 Year
2ES3674	5	TS-64-71 RHH PMP FAN	A	1 Year

EEB 64-0030

Rev

ATTACHMENT B

Mark WCA

Contract No.	Type	Manufacturer
72C7-75128	PN	Plastic Wire & Cable Corp
72X7-74885-1	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
67C3-91618	PN	Brand-Rex
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex
TR 822378) 822639) 822915) Sequoyah 72C7-75228-1	PN	Plastic Wire & Cable Corp
72C7-83874-1		Plastic Wire & Cable Corp

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

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0031
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 12AWG, 2/c, WGB, (PNJ) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 5	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	139	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IEEE S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64-0031
Rev

Component: Cable
Mark: WGB(PNJ)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES5738-II	5	TS-64-69 RHR PMP MTR B	A	1 Year
3ES3715	5	TS-64-69 RHR PMP MTR B	A	1 Year
3ES3723	5	TS-64-71 RHR PMP MTR B	A	1 Year

EEB 64-0031

Rev _____

ATTACHMENT B

Mark WGB

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Brand-Rex
73C7-84528	PJJ	Rome Cable
75K7-86150-1	PJJ	Cyprus
75K5-86506-1	PJJ	American Insulated Wire
74C7-85069-1	PJJ	Rome
70C7-54179-2	PNJ	Plastic Wire & Cable Corp
71X7-54761-1	PNJ	General Cable
72C7-54872	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-64-0031

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: _____

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

(3)
Sheet No. EEB 64-0032
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable WVA, (XL/EP) 16AWG, 2/c, Type MS Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 6	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	217	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^7	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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.A. Webster

QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB -64-0032

Rev _____

Component: Cable
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R2725	6	PT-64-51 AIR	A/B	1 Hr - 1 Yr
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

EEB 64-0032

Rev _____

ATTACHMENT 8

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

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.

Reviewed by: _____

Prepared by: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0033
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDI ITEMS
	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 (^{o}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/A	(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
Accuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3.1×10^7	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
Service: Attachment A	Aging	N/A	20 years	(2)	Attachment C.1	Oper. Experience	None
Location: 6							
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 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. Nyita
Reviewed by: D.R. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB 64-0033

Rev

Component: Cable
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R2725	6	PT-64-51 AIR	A/B	1 Hr - 1 Yr
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

EEB 64-0033

Rev _____

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0036
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WUB-1, (CSPE) 18AWG, 2/c, Type TX Manufacturer: Attachment B	Temperature (^{o}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	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Category: Attachment A	Radiation (RAD)	3.1×10^7	5×10^7	(4)	Attachment C.1	Generic Sequential Test	None
Service: Attachment A	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	None
Location: 6							
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 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. Mijte
Reviewed by: D.R. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64 0036
Rev

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		
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-64-55D		
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-64-52B		

EEB 64-0036

Rev _____

ATTACHMENT B

Mark WUB-1

Contract No.	Type	Manufacturer
74C7-85464	CSPE/PVC	Continental Wire & Cable
71C7-54336	XLPE/CSPE	Continental Wire & Cable
72C7-83427	CSPE/CSPE	Continental Wire & Cable
72C7-54994		Boston Ins. Wire

14C

Sheet No.: GEB-64-0036

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: _____

13

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

(3)
Sheet No. EEB 64-0037
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable NUB-1, (XLPE) 16AWG, 2/c, Type TX Manufacturer: Attachment B	Temperature (^{o}F)	217	385	(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 Accuracy: Req'd: N/A Demon: N/A	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	3.1×10^{7}	2×10^{8}	(4)	Attachment C.1	Generic Sequential Test	None
Location: 6	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64-0037
Rev

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		
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-64-55D		
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-64-52B		

EEB 64-0037

Rev _____

ATTACHMENT B

Mark WUB-1

Contract No.	Type	Manufacturer
74C7-85464	CSPE/PVC	Continental Wire & Cable
71C7-54336	XLPE/CSPE	Continental Wire & Cable
72C7-83427	CSPE/CSPE	Continental Wire & Cable
72C7-54994		Boston Ins. Wire

Sheet No: EEB - 49-0037

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0038
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 14AWG, 2/c, WHB, (PNJ) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 8 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (^{o}F)	147	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
	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: W. Mita
Reviewed by: D.R. Webster
QA Acceptance: _____

Attachment A

System: 64
Unit: 1

EEB-4-0038
Rev

Component: Cable
Mark: WHB(PNJ)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
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-I	8	PDIS-64-20	A/B	1 Yr - 1 Hr
2PC358-I	8	PDIS-64-21	A/B	1 Yr - 1 Hr

EEB 64-0038

Rev _____

ATTACHMENT B

Mark WHB

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable
87148 XFR From SQN 72C7-75228-1	PJJ	Plastic Wire & Cable
75K7-86150-1	PJJ	Cyprus
73C7-84528	PJJ	Rome Cable
75K5-86506-1	PJJ	AIW
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	Brand-Rex

8C

Sheet No.: EEB-64-0038

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-64-0039
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A	Operating Time	1 YEAR	1 Year	(1)	N/A	N/A	None
Component Terminal Block Manufacturer: General Electric Company	Temperature (°F)	325	340	(4)	Attachment B.3	Engineering Analysis	None
Model Number: EB-5 and CR15182	Pressure (PSIA)	21.5	88	(4)	Attachment B.3	Engineering Analysis	None
Function: Wire Termination Accuracy: Req'd: N/A Demon: N/A	Relative Humidity (%)	100	100	(4)	Attachment B.3	Engineering Analysis	None
Category: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: N/A	Radiation (RAD)	$3.1x10^7$	$2x10^7$	(4)	Attachment B.3	Engineering Analysis	None
Location: Attachment A	Aging	N/A	40 Years	(2)	Attachment B.3	Engineering Anal	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 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. Webster
QA Acceptance:

EEB -64-0039

Rev

Attachment A
Terminal Blocks

System: 64
Unit: 1

Mark	Plant I.D. No.	Room
PMA	FCO-64-60D	15
PMB	PDS-64-61D	15
	PDS-64-61A	15
	FCO/FSV-64-45	13
	FCO/FSV-64-44	13
	FCO/FSV-64-40	14
	FCO/FSV-64-41	14
	FCO/FSV-64-36	12
	FCO/FSV-64-29	12
	FCO/FSV-64-30	12
	FCO/FSV-64-31	12
	PDS-64-62C	14
PMC	FCO-64-65A	9
	FCO-64-65B	9
	FCO-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
	PDS-64-61A	15
	FCO/FSV-64-9	15
	FCO/FSV-64-10	15
	FCO/FSV-64-43	15
	FCO/FSV-64-42	15
	TS-64-73	5
	TS-64-69	5
	TS-64-71	5

EEB -64-0039

Rev _____

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 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.

8

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0040
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 12AWG, 1/c, WBB, (PN) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 8 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	147	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA-S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
	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: W. Mita
Reviewed by: D.R. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64-0040
Rev

Component: Cable
Mark: WBB (PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3PC803-II	8	FCV-64-139	A	1 Year
3PC804-II	8	FCV-64-139	A	1 Year
3PC805-II	8	FCV-64-139	A	1 Year
3PC807-II	8	FCV-64-140	A	1 Year
3PC808-II	8	FCV-64-140	A	1 Year
3PC809-II	8	FCV-64-140	A	1 Year
1ES1844-I	8	PDCO-64-64	A	1 Year
1ES1906-I	8	PDCO-64-10	A	1 Year
2ES1906-I	8	PDCO-64-16	A	1 Year
3ES1906-I	8	PDCO-64-16	A	1 Year
1PC803-II	8	FCV-64-139	A	1 Year
1PC804-II	8	FCV-64-139	A	1 Year
1PC805-II	8	FCV-64-139	A	1 Year
1PC807-II	8	FCV-64-140	A	1 Year
2ES1915-I	8	FCO-64-36	A	1 Year
2ES1916-I	8	FCO-64-36	A	1 Year
1PC808-II	8	FCV-64-140	A	1 Year
2PC803-II	8	FCV-64-139	A	1 Year
2PC804-II	8	FCV-64-139	A	1 Year
2PC807-II	8	FCV-64-140	A	1 Year
2PC808-II	8	FCV-64-140	A	1 Year
2PC809-II	8	FCV-64-140	A	1 Year
1PC803-II	8	FSV-64-139	A/B	1 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-II	8	FSV-64-140	A/B	1 Year 1 Hour
2PC803-II	8	FSV-64-139	A/B	1 Year 1 Hour
2PC804-II	8	FSV-64-139	A/B	1 Year 1 Hour
2PC805-II	8	FSV-64-139	A/B	1 Year 1 Hour
2PC807-II	8	FSV-64-140	A/B	1 Year 1 Hour
2PC808-II	8	FSV-64-140	A/B	1 Year 1 Hour
2PC809-II	8	FSV-64-140	A/B	1 Year 1 Hour
3PC803-I	8	FSV-64-139	A/B	1 Year 1 Hour
3PC804-I	8	FSV-64-139	A/B	1 Year 1 Hour
3PC805-I	8	FSV-64-139	A/B	1 Year 1 Hour
3PC808-I	8	FSV-64-140	A/B	1 Year 1 Hour
3PC809-I	8	FSV-64-140	A/B	1 Year 1 Hour
3PC807-I	8	FSV-64-140	A/B	1 Year 1 Hour
1PC809-II	8	FCV-64-140	A	1 Year
2PC805-II	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

EEB 64-0040

Rev _____

ATTACHMENT B

Mark WBB

Contract No.	Type	Manufacturer
67C3-91618	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex

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° 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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0041
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 14AWG, 1/c, NCA, (PN) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 8	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (^{o}F)	147	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64-0041
Rev

Component: Cable
Mark: WCA (PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2PC577-I	8	FCV-64-18	A	1 Year
2PC578-I		FCV-64-18		
2PC579-I		FCV-64-18		
2PC583-I		FCV-64-19		
2PC584-I		FCV-64-19		
2PC585-I		FCV-64-19		
2PC353-I		FCV-64-20		
2PC354-I		FCV-64-20		
2PC360-I		FCV-64-21		
2PC355-I		FCV-64-20		
2PC361-I		FCV-64-21		
3PC362-I		FCV-64-21		
2PC363-I		FCV-64-21		
2PL3812	8	FCV-64-141	A	1 Year
2PL3813	8	FCV-64-141	A	1 Year
2PL3814	8	FCV-64-141	A	1 Year
1PL5189	8	FCO-64-60A	A/B	1 Year 1 Hour
1PC583-I	8	FCV-64-19	A	1 Year
1PC584-I				
1PC585-I				
1PC353-I	8	FCV-64-20		
1PC354-I				
1PC355-I				
1PC60-I	8	FCV-64-21		
1PC361-I				
1PC362-I				
1PL3812	8	FCV-64-141	A	1 Year
1PL3813				
1PL3814				
3PL5186	8	FCO-64-60A	A/B	1 Year 1 Hour
3PC595-I	8	FCV-64-32	A	1 Year
3PC596-I				
3PC597-I				
3PC339-I	8	FCV-64-34		
3PC340-I				
3PC341-I				
3ES1907-I	8	PDCO-64-16		
3ES1909-I	8	PDCO-64-16		
3PC577-I	8	FCV-64-18	A	1 Year
3PC578-I				
3PC579-I				
3PC583-I		FCV-64-19		
3PC584-I				
3PC585-I				
3PC353-I		FCV-64-20		
3PC354-I				
3PC355-I				
3PC360-I		FCV-64-21		
3PC361-I				

Attachment A

System: 64
Unit: 1

EEB-64-0041
Rev

Component: Cable
Mark: WCA (PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3PC362-I	8	FCV-64-21	A	1 Year
3PL3812	8	FCV-64-141		
3PL3813		FCV-64-141		
3PL3814	8	FCV-64-141		
1PC595-I	8	FSV-64-32	A/B	1 Year 1 Hour
1PC596-I				
1PC597-I				
1PC339-I		FSV-64-34		
1PC340-I				
1PC341-I				
1PC614-II		FSV-64-17		
1PC615-II				
1PC616-II				
1PC577-I		FSV-64-18		
1PC578-I				
1PC579-I				
1PC583-I		FSV-64-19		
1PC585-I				
1PC585-I				
1PC353-I		FSV-64-20		
1PC354-I				
1PC355-I				
1PC360-I		FSV-64-21		
1PC361-I				
1PC362-I				
1PL3812		FSV-64-141		
1PL3813				
1PL3814				
2PC595-I	8	FSV-64-32	A/B	1 Year 1 Hour
2PC596-I				
2PC597-I				
2PC339-I	8	FSV-64-34	A/B	1 Year 1 Hour
2PC340-I				
2PC341-I				
2PC614-II	8	FSV-64-17		
2PC615-II				
2PC616-II				
2PC577-II	8	FSV-64-18		
2PC578-I				
2PC579-I				
2PC583-I	8	FSV-64-19		
2PC584-I				
2PC585-I				

Attachment A

System: 64
Unit: 1

EEB-64-0041
Rev

Component: Cable
Mark: WCA (PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2PC353-I	8	FSV-64-20	A/B	1 Year 1 Hour
2PC354-I				
2PC355-I				
2PC360-I	8	FSV-64-21		
2PC361-I				
2PC362-I				
2PL3812	8	FSV-64-141		
2PL3813				
2PL3814				
3PC595-I	8	FSV-64-32	A/B	1 Year 1 Hour
3PC596-I				
3PC597-I				
3PC339-I		FSV-64-34		
3PC340-I				
3PC341-I				
3PC614-II		FSV-64-17		
3PC615-II				
3PC616-II				
3PC577-I		FSV-64-18		
3PC578-I				
3PC579-I				
3PC583-I		FSV-64-19		
3PC584-I				
3PC585-I				
3PC353-I		FSV-64-20		
3PC354				
3PC355				
3PC360-I		FSV-64-21		
3PC361-I				
3PC362-I				
3PL3812		FSV-64-141		
3PL3813				
3PL3814				

EEB 64-0041

Rev _____

ATTACHMENT B

Mark WCA

Contract No.	Type	Manufacturer
72C7-75128	PN	Plastic Wire & Cable Corp
72X7-74885-1	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
67C3-91618	PN	Brand-Rex
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex
TR 822378) 822639) 822915) Sequoyah 72C7-75228-1	PN	Plastic Wire & Cable Corp
72C7-83874-1		Plastic Wire & Cable Corp

Sheet No.: EEB-64-0041

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0042
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 12AWG, 2/c, WGB, (PNJ) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 9	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	214	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Webster

QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64-0042
Rev

Component: Cable
Mark: WGB (PNJ)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES750-I	9	PS-64-58B	A	1 Year
1ES991-I	9	PS-64-58B	A	1 Year
1ES992-I	|	PS-64-58D	|	|
1ES753-I	|	|	|	|
2ES750-I	|	PS-64-58B	|	|
2ES991-I	|	|	|	|
2ES992-I	|	PS-64-58D	|	|
2ES753-I	|	|	|	|
2ES3253-II	|	PS-64-58C	|	|
3ES750-I	|	PS-64-58B	|	|
3ES991-I	|	|	|	|
3ES992-I	|	PS-64-58D	|	|
3ES753-I	|		|	|

EEB 64-0042

Rev _____

ATTACHMENT B

Mark WGB

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Brand-Rex
73C7-84528	PJJ	Rome Cable
75K7-86150-1	PJJ	Cyprus
75K5-86506-1	PJJ	American Insulated Wire
74C7-85069-1	PJJ	Rome
70C7-54179-2	PNJ	Plastic Wire & Cable Corp
71X7-54761-1	PNJ	General Cable
72C7-54872	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	Brand-Rex

8C

Sheet No.: EEB-64-0042

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0043
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 14AWG, 1/c, WCA, (PN) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 9	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (^{o}F)	214	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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: O.R. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64 0043
Rev

Component: Cable
Mark: WCA (PN)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1RP23-IA	9	PS-64-56A	A	1 Day
1RP97-IIA	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-IIB	9	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-IIB	9	PS-64-56D	A	1 Day
2RP260-IB	9	PS-64-56B	A	1 Day
2RP322-IIB	9	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
3RP322-IIB	9	PS-64-56D	A	1 Day
3RP260-IB	9	PS-64-56B	A	1 Day
3RP322-IIB	9	PS-64-56D	A	1 Day

EEB 64-0043

Rev _____

ATTACHMENT B

Mark WCA

Contract No.	Type	Manufacturer
72C7-75128	PN	Plastic Wire & Cable Corp
72X7-74885-1	PN	Brand-Rex
73C7-84528	PN	Plastic Wire & Cable Corp
67C3-91618	PN	Brand-Rex
72C7-75328-1	PN	Brand-Rex
70C7-54179-1	PN	Brand-Rex
TR 822378) 822639) 822915) Sequoyah 72C7-75228-1	PN	Plastic Wire & Cable Corp
72C7-83874-1		Plastic Wire & Cable Corp

8C

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

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0044
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable WVA, (XL/EP) 16AWG, 2/c, Type MS Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 9	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	214	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	2.1×10^7	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64 0044
Rev

Component: Cable
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R2870	9	PT-64-67	A	1 Year
2P2870	9	PT-64-67	A	1 Year
3R2870	9	PT-64-67	A	1 Year

EEB 64-0094

Rev _____

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

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: _____

Prepared by: _____

QA Acceptance: _____

11

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0045
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable HVA, (PE) 16AWG, 2/c, Type MS Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 9	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (°F)	214	203	(4)	IPCEA S-61-402 par 3.9 and Attachment C.2	Attachment C.2	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	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 2.4 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: D.R. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64-0045
Rev

Component: Cable
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R2870	9	PT-64-67	A	1 Year
2P2870	9	PT-64-67	A	1 Year
3R2870	9	PT-64-67	A	1 Year

EEB 64-0045

Rev _____

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0046
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 14AWG, 2/c, WHB, (PNJ) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 9	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°F)	214	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64-0046
Rev

Component: Cable
Mark: WHB (PNJ)

Plant I. D. No.	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-II	9	PS-64-57A	A	30 Days
2ES5-I		PS-64-57B		
2ES21-I		PS-64-57D		
2ES2681-I		PS-64-57C		
2ES3250-II		PS-64-58A		
2ES 3491-II		PS-64-58A		
2ES3492-II		P-64-58C		

EEB 64-0046

Rev _____

ATTACHMENT B

Mark WHB

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable
87148 XFR From SQN 72C7-75228-1	PJJ	Plastic Wire & Cable
75K7-86150-1	PJJ	Cyprus
73C7-84528	PJJ	Rome Cable
75K5-86506-1	PJJ	AIW
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	Brand-Rex

8C

Sheet No.: EEB-64-0046

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

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: _____

8

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0047
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable 14AWG, 2/c, WHB, (PJJ) Manufacturer: Attachment B Model Number: N/A Function: Control/Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 9	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (^{o}F)	214	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	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 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. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-CA-0047
Rev

Component: Cable
Mark: WHB (PJJ)

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES2678-II	9	PS-64-57A	A	30 Days
1ES2681-II		PS-64-57C		
1ES3250-II		PS-64-58A		
1ES3491-II		PS-69-58A		
1ES3253-II		PS-64-58C		
1ES3492-II		PS-64-58C		
1ES3492-II		PS-64-58C		
3ES2678-II		PS-64-57A		
3ES5-I		PS-64-57B		
3ES21-I		PS-64-57D		
3ES2681-II		PS-64-57C		
3ES3250-II		PS-64-58A		
3ES3491-II		PS-64-58A		
3ES3253-II		PS-64-58C		
3ES-3492-II		PS-64-58C		

EEB 64-0042

Rev _____

ATTACHMENT B

Mark WHB

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable
87148 XFR From SQN 72C7-75228-1	PJJ	Plastic Wire & Cable
75K7-86150-1	PJJ	Cyprus
73C7-84528	PJJ	Rome Cable
75K5-86506-1	PJJ	AIW
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	Brand-Rex

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

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: _____

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

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:_____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0048
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable WVA; (XL/EP) 16AWG, 2/c, Type MS Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	174	385	(4)	Attachment C.1	Generic Simultaneous Test	None
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
	Aging	N/A	40 years	(2)	Attachment C.2	Generic Mat'l Test	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 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. Nyita
Reviewed by: D.R. Wheeler
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64-0048
Rev

Component: Cable
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2R2726	12	PX-64-51	A/B	1 Year 1 Hour
2R2725		PX-64-51		
2R2725		PT-64-51		
2R2726		PT-64-51		
2R2716		LT-64-54		
3R2726		PX-64-51		
3R2725		PX-64-51		
1R2726		PX-64-51		
1R2725		PX-64-51		

EEB 64-0048

Rev _____

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT

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: _____

Prepared by: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 64-0049
Revision
Date

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 64 Plant ID No. Attachment A Component Cable WVA; (PE) 16AWG, 2/c, Type MS Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: 12	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
	Temperature (^{o}F)	174	203	(4)	IPCEA S-61-402 par 3.9 and Attachment C.2	Attachment C.2	
	Pressure (PSIA)	15	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3, 6.7	Standard Material Requirement	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
	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 2.4 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: D.R. Webster
QA Acceptance:

Attachment A

System: 64
Unit: 1

EEB-64-0049
Rev

Component: Cable
Mark: WVA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
2R2726	12	PX-64-51	A/B	1 Year 1 Hour
2R2725		PX-64-51		
2R2725		PT-64-51		
2R2726		PT-64-51		
2R2716		LT-64-54		
3R2726		PX-64-51		
3R2725		PX-64-51		
1R2726		PX-64-51		
1R2725		PX-64-51		

EEB 64-0049

Rev _____

ATTACHMENT B

Mark WVA

Contract No.	Type	Manufacturer
77K5-823265	FRXLPE/CSPE	Rockbestos
72C7-83944	FRXLPE/CSPE	Continental Wire & Cable
69C3-64863-1	PE/PVC	Rockbestos
72C7-74910-1	XLPE/CSPE	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		Boston Ins. Wire
73C7-84211		ITT