1/1. 15

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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-74-0001
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable - WBB 1/c, #12 AWG (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: 0	Operating Time	Attachment A	1 Year	(1)	Attachment C.5	Engineering Analysis	None
	Temperature (°F)	325	153	(4)	Attachments C.2 and C.3	Attachment C.4	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)	6.5×10^7 γ 4×10^9 β Attach. C.1	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
	Aging	N/A	10 years	(2)	Attachment C.3	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: H D Gonsowski
Reviewed by: J F Wagner 10/22/80
QA Acceptance: _____

System: 74
Unit: 3

EEB -74-0001
Rev 0

Component: Cable, 1/C, #12 AWG PN
Mark: WBB

Plant I. D. No.	Room	Function/Service		Category	Operating Time
3ES1182-I		FCV-74-47	Control	A	1 Year
3ES3687-II		FCV-74-47			
3ES3678-II		FCV-74-47			

EEB -74-0001

Rev 0

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- 74-0001

Revision: 0

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.

Sheet No: EEB 74-00021

Revision:

ATTACHMENT C (Continued)

C.1 (Continued)

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 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.3 TVA Engineering Report No. 1943

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

Room: O

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 temperature. The in-containment SLB temperature and duration exceeds the cable ratings and the insulation and jacket distortion temperatures.

However, the service which these cable 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 insulated cable has demonstrated and is capable of withstanding the LOCA/ SLB and the post-LOCA environment of 1 year. Thus, continued operation is justified.

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.

C.4 Temperature Qualification Method

C.4.1 Standard material long-term overload temperature rating

C.4.2 Engineering analysis

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)

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

Sheet No. EEB 74-0002
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WBB 1/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (^{o}F)	292	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)	$3x10^7$	$4x10^7$	(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: Room 2							
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: H. D. Romanowski

Reviewed by: J. Bradley

QA Acceptance: _____

Attachment A

EEB 74-0002

Rev 0

System: 74
Unit: 3

Component: Cable 1/c #12
Mark: WBB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R3264	2	MIS-74-137A PMP RM Humidity Cont	A	1 Year
3R3263	2	ME-74-137A	↓	↓
3R3256	2	MIS-74-137B		
3R3262	2	TTS-74-136A A/C Temp Control		

EEB 74-0002

Rev 0

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-74-002

Revision: 0

ATTACHMENT C

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

C.2 TVA Engineering Report No. 1943

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

Rooms 1-18

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: _____

POOR ORIGINAL

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

(3)
Sheet No. EEB 74-0003
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WBB 1/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (°F)	294	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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: Room 5	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: H. D. Romanowski / [illegible]

Reviewed by: [signature]

QA Acceptance: ____________

Attachment A

EEB-74-0003
Rev 0

System: 74
Unit: 3

Component: Cable 1/c #12
Mark: WBB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R3254	5	TTS-74-136B B/C TEMP CONTROL	A	1 Year

EEB 74-0003

Rev 0

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-74-003

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 74-0004
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WBB 1/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (^{o}F)	157	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)	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: Room 8							
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: H. D. Romenowski
Reviewed by: J. M. Bradley
QA Acceptance: _____

Attachment A

System: 74
Unit: 3

EEB-74-0004
Rev 0

Component: Cable 1/c #12
Mark: WBB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3690-II	8	FCV-74-101FSV-23-56 SUPPLY	A	1 Year
3ES3687-II	8	FCV-74-47 Cont	A	1 Year

EEB 74-0004

Rev 0

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-74-0004

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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-74-0005
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.5	Engineering Analysis	None
Component Cable - WCA 1/c, #14 AWG (PN) Manufacturer: Attachment B	Temperature (^{o}F)	325	153	(4)	Attachments C.2 and C.3	Attachment C.4	None
Model Number: N/A	Pressure (PSIA)	69.7	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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	$6.5x10^{7}$ γ $4x10^{9}$ β Attach. C.1	$4x10^{7}$	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: 0	Aging	N/A	10 years	(2)	Attachment C.3	Oper. Experience	None
Flood Level Elev: 552' Above Flood Level: Yes ✗ No	Submergence	N/A	N/A	(4)	N/A	N/A	None

Notes: (1) See Section 2.4 in 79-01B 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: [signature]

Reviewed by: [signature]

QA Acceptance: ____________

Attachment A

EEB-74-0005
Rev 0

System: 74
Unit: 3

Component: Cable 1/c #14 AWG
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES540-I	0	FCV-74-52 Cont	A	1 Year
3ES541-I	0	FCV-74-52		
3ES547-I	0	FCV-74-52		
3ES3040-II	0	FCV-74-66		
3ES3029-II	0	FCV-74-67		
3ES3028-II	0	FCV-74-67		
3ES3041-II	0	FCV-74-66		
3ES3034-II	0	FCV-74-67		
3ES3041-II	0	FCV-74-66		
3ES528-I	0	FCV-74-53		
3ES529-II	0	FCV-74-53		
3ES1182-I	0	FCV-74-47		
3ES3687-II	0	FCV-74-47		
3ES3678-II	0	FCV-74-47		

EEB -74-0005

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-74-0005

Revision: 0

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.

Sheet No: EEB-74-0005

Revision: 0

ATTACHMENT C (Continued)

C.1 (Continued)

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 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.3 TVA Engineering Report No. 1943

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

Room: 0

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 temperature. The in-containment SLB temperature and duration exceeds the cable ratings and the insulation and jacket distortion temperatures.

However, the service which these cable 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 insulated cable has demonstrated and is capable of withstanding the LOCA/ SLB and the post-LOCA environment of 1 year. Thus, continued operation is justified.

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.

C.4 Temperature Qualification Method

C.4.1 Standard material long-term overload temperature rating

C.4.2 Engineering analysis

Sheet No: EEB-74-0005

Revision No: 0

ATTACHMENT C (Continued)

C.5 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: _____

8

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) (3)

Sheet No. EEB-74-0006
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable - WCA 1/c, #14 AWG (PN) Manufacturer: Attachment B	Temperature (^{0}F)	158	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)	$3x10^{7}$	$4x10^{7}$	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A Location: Room 2	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: H. D. Ramsewak
Reviewed by: J. Bradley
QA Acceptance: _____

Attachment A

EEB-74-0006
Rev 0

System: 74
Unit: 3

Component: Cable 1/c #14 AWG
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES552-I	2	FCV-74-1 Cont	A	1 Year
3ES553-I	2	FCV-74-1		
3ES554-I	2	FCV-74-1		
3ES565-I	2	FCV-74-12		
3ES566-I	2	FCV-74-12		
3ES567-I	2	FCV-74-12		
3ES577-I	2	FCV-78-2		
3ES578-I	2	FCV-74-2		
3ES579-I	2	FCV-74-2		
3ES590-I	2	FCV-74-13		
3ES591-I	2	FCV-74-13		
3ES592-I	2	FCV-74-13		
3ES1155-I	2	FCV-74-7		
3ES1156-I	2	FCV-74-7		
3ES1152-I	2	FCV-74-7		
2ES3714	2	FCV-74-96		
2ES3715	2	FCV-74-96		
3ES3737	2	FCV-74-97		
3ES3738	2	FCV-74-97		
3R3264	2	MIS-74-137A PMP RM HUMIDITY CONT	A	1 Year
3R3263	2	ME-74-137A		
3R3256	2	MIS-74-137B		
3R3255	2	ME-74-137B		
3R3262	2	TTS-74-136A A/C TEMP CONTROL		

EEB 74-0006

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-74-0006

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 _____

(3)

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

Sheet No. EEB 74-0007
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WCA 1/c, #14AWG, (PN) Manufacturer: Attachment B	Temperature (°F)	294	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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: Room 5	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: H. D. Romanowski/SAK

Reviewed by: J. Bradley

QA Acceptance: ____________

Attachment A

EEB-74-0007
Rev 0

System: 74
Unit: 3

Component: Cable 1/c #14 AWG
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3052-II	5	FCV-74-24 Cont	A	1 Year
3ES3053-II	5	FCV-74-24		
3ES3054-II	5	FCV-74-24		
3ES3065-II	5	FCV-74-35		
3ES3066-II	5	FCV-74-35		
3ES3067-II	5	FCV-74-35		
3ES3077-II	5	FCV-74-25		
3ES3078-II	5	FCV-74-25		
3ES3079	5	FCV-74-25		
3ES3090-II	5	FCV-74-36		
3ES3091-II	5	FCV-74-36		
3ES3092-II	5	FCV-74-36		
3ES3637	5	FCV-74-30		
3ES3662-II	5	FCV-74-99		
3ES3663-II	5	FCV-74-99		

EEB 74-0007

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-74-0007

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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0008
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WCA 1/c, #14AWG, (PN) Manufacturer: Attachment B	Temperature (°F)	220	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)	3.1×10^7	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: Room 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: H. D. Romanowski/AK
Reviewed by: J. M. Bradley
QA Acceptance: _____

Attachment A

EEB-74-0008
Rev 0

System: 74
Unit: 3

Component: Cable 1/c #14 AWG
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3682-II	6	FCV-74-46 Cont	A	1 year
3ES2979-II	6	FCV-7472		
3V2253	6	FSV-74-102 Supply	A	1 Hour
			B	1 Year
3V2254	6	FCV-74-102 Cont	A	1 Year
3V2255	6	FCV-74-102		
3V2264	6	FCV-74-103		
3V2265	6	FCV-74-103		
3V2256	6	FCV-74-119		
3V2257	6	FCV-74-119		
3V2258	6	FCV-74-119		
3V2267	6	FCV-74-103		
3V2268	6	FCV-74-120		
3V2269	6	FCV-74-120		
3ES3684-II	6	FCV-74-46		
3ES677-I	6	FCV-74-57		
3ES680-I	6	FCV-74-57		
3ES705-I	6	FCV-74-58		
3ES690-I	6	FCV-74-59		
3ES693-I	6	FCV-74-59		
3ES3177-II	6	FCV-74-71		
3ES3180-II	6	FCV-74-71		
3ES3627-II	6	FCV-74-70		
3ES3630-II	6	FCV-74-20		
3ES3190-II	6	FCV-74-73		
3ES3193-II	6	FCV-74-73		
3ES702-I	6	FCV-74-58		
3V2266	6	FCV-74-103		

EEB 74-0008

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-74-0008

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-81-681 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:_____

POOR ORIGINAL

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2) (3)

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

Sheet No. EEB 74-0009
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WCA 1/c, #14AWG, (PN) Manufacturer: Attachment B	Temperature (°F)	308	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
Model Number: N/A	Pressure (PSIA)	21.5	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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	2 x 10^6	4x10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: Room 7	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: H.D. Romanowski/SAK

Reviewed by: J.A. Bradley

QA Acceptance: ____________

Attachment A

EEB-74-0009
Rev 0

System: 74
Unit: 3

Component: Cable 1/c #14 AWG
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES528-I	7	FCV-74-53 Cont	A	1 Year
3ES529-II	7	FCV-74-53	|	|
3ES534-I	7	FCV-74-53		

EEB 74-0009

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-74-0009

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: _____

POOR ORIGINAL

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

(3)
Sheet No. EEB 74-0010
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WCA 1/c, #14AWG, (PN) Manufacturer: Attachment B	Temperature (°F)	157	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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: Room 8	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: H.D. Romanowski / [signature]

Reviewed by: [signature] Bradley

QA Acceptance: ____________

Attachment A

EEB-74-0010
Rev 0

System: 74
Unit: 3

Component: Cable 1/c #14 AWG
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3165-II	8	FCV-74-75 Cont	A	1 Year
3ES3692-II	8	FCV-24-101		
3ES3675-II	8	FCV-74-101		
		FCV-23-57		
3ES3654-II	8	FCV-74-101		
3ES3727	8	ECV-74-100		
3ES3728	8	FCV-74-100		
3ES540-I	8	FCV-74-52		
3ES541-I	8	FCV-74-52		
3ES528-I	8	FCV-74-58		
3ES529-II	8	FCV-74-53		
3ES547-I	8	FCV-74-52		
3ES534-I	8	FCV-74-53		
3ES2979-II	8	FCV-74-72		
3ES652-I	8	FCV-74-60		
3ES665-I	8	FCV-74-61		
3ES3040-II	8	FCV-74-66		
3ES3029-II	8	FCV-74-67		
3ES3028-II	8	FCV-74-67		
3ES3041-II	8	FCV-74-66		
3ES655-I	8	FCV-74-61		
3ES668-I	8	FCV-74-61		
3ES3034-II	8	FCV-74-67		
3ES3047-II	8	FCV-74-66		
3ES3091-II	8	FCV-74-30		

EEP 74-0010

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
72C7-75326-1	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-74-0010

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)

(3)

acility: Browns Ferry Nuclear Plant
nit: 3
ocket: 50-296

Sheet No. EEB 74-0011
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
ystem: 74 lant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
omponent Cable WCA 1/c, #14AWG, (PN) anufacturer: Attachment B	Temperature (°F)	211	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
odel Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
unction: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
ccuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
ategory: Attachment A	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
ervice: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
ocation: Room 9	Submergence	N/A	N/A	(4)	N/A	N/A	None
lood Level Elev: 552' bove Flood Level: Yes X No							

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

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

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

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

Prepared by: H. D. Romanowski 9/9K

Reviewed by: J. M. Bradley

QA Acceptance: _____

Attachment A

EEB-74-0011
Rev 0

System: 74
Unit: 3

Component: Cable 1/c #14 AWG
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3152-II	9	FCV-74-74 Cont	A	1 Year
3ES652-I	9	FCV-74-60		
3ES665-I	9	FCV-74-61		
3ES655-I	9	FCV-74-61		
3ES668-I	9	FCV-74-61		

EEB 74-004

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-74-0011

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: _____

POOR ORIGINAL

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0012
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WCA 1/c, #14AWG, (PN) 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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	3.1 x 10^4	$4x10^7$	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: Room 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: H.B. Romanowski / SAK

Reviewed by: J.A. Bradley

QA Acceptance: ____________

Attachment A

System: 74
Unit: 3

EEB-74-0012
Rev 0

Component: Cable 1/c #14 AWG
Mark: WCA

Piant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1169-I	12	FCV-74-77 Cont	A	1 Year
3ES1170-I	12	FCV-74-77 I	I	I

EEB 74-0012

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-74-0012

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Sheet No. EEB 74-0013 (3)
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WDD 1/c, #18AWG, (CPJ) Manufacturer: Attachment B	Temperature (°F)	157	325	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Accuracy: Req'd: N/A Demon: N/A Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	2.1×10^7	6.9×10^7	(4)	Attachment C.1	Generic Sequential Test	None
Location: Room 8	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: H. D. Romanowski / SAI

Reviewed by: J. Bradley

QA Acceptance: ______

Attachment A

System: 74
Unit: 3

EEB-74-0013
Rev 0

Component: Cable 1/c #8 AWG
Mark: WDD

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3163-II	8	FCV-74-75 Supply	A	1 Year
3ES3150-II	8	FCV-74-74	"	"

EEB 74-0013

Rev 0

ATTACHMENT B

Mark WDD

	Contract No.	Type	Manufacturer
TR	822936 Bellefonte 86150	CPJ	Plastic Wire & Cable Corp
	71C7-54180	CPJ	Phelps Dodge
	75C7-85744	CPJ	Triangle Conduit & Cable
	67C7-91619	CPJ	GE Cable Corp
	72C7-75328-3	CPJ	Rome
	72C7-75533-1	CPJ	Essex

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Sheet No. (3) EEB 74-0014
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WDD 1/c, #18AWG, (CPJ) Manufacturer: Attachment B	Temperature (°F)	211	325	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Accuracy: Req'd: N/A Demon: N/A Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	2.1×10^7	6.9×10^7	(4)	Attachment C.1	Generic Sequential Test	None
Location: Room 9	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: H.D. Romanowski/sw

Reviewed by: J.A. Bradley

QA Acceptance: ______

Attachment A

EEB-74-0014
Rev 0

System: 74
Unit: 3

Component: Cable 1/c #8 AWG
Mark: WDD

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3150-II	9	FCV-74-74 Supply	A	1 Year
3ES3163-II	9	FCV-74-75		

EEB 74-0014

Rev 0

ATTACHMENT B

Mark WDD

Contract No.	Type	Manufacturer
TR 822936 Bellefonte 86150	CPJ	Plastic Wire & Cable Corp
71C7-54180	CPJ	Phelps Dodge
75C7-85744	CPJ	Triangle Conduit & Cable
67C7-91619	CPJ	GE Cable Corp
72C7-75328-3	CPJ	Rome
72C7-75533-1	CPJ	Essex

Sheet No.: EEB-74-0014

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: _____

Reviewed by: _____

QA Acceptance: _____

2

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0015
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WDG 1/c, #2AWG, (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: 0	Operating Time	Attachment A	1 year	(1)	Attachment C.4	Engineering Analysis and Tests	None
	Temperature (^{o}F)	325	325	(4)	Attachment C.2	Generic Simultaneous Test	None
	Pressure (PSIA)	69.7	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.2	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	6.5×10^{7} γ 4×10^{9} β Attach. C.1	6.9×10^{7}	(4)	Attachment C.2	Generic Sequential Test	None
	Aging	N/A	10 years	(2)	Attachment C.3	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: H. D. Ramamurthy/sdk

Reviewed by: J. M. Bradley

QA Acceptance: _____

Attachment A

EEB-74-0015
Rev 0

System: 74
Unit: 3

Component: Cable 1/c #2 AWG
Mark: WDG

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3685-II	0	FCV-74-47 Supply	A	1 year
3ES3906-II	0	FCV-74-67	↓	↓

EEB 14-0015
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

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. 7911, 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 7901-3 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.

Sheet No: EEB 74-0015

Revision: 0

ATTACHMENT C (con'd)

C.2 Wyle Laboratory Report No. 43854-3

C.3 NUREG-0588 Material List

C.4 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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0016
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WDG 1/c, #2AWG, (CPJ) Manufacturer: Attachment B	Temperature (^{0}F)	157	325	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Accuracy: Req'd: N/A Demon: N/A Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	2.1×10^{7}	6.9×10^{7}	(4)	Attachment C.1	Generic Sequential Test	None
Location: Room 8	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: H.D. Bowman/SAK
Reviewed by: J.A. Bradley
QA Acceptance: _____

Attachment A

EEB-74-0016
Rev 0

System: 74
Unit: 3

Component: Cable 1/c #2 AWG
Mark: WDG

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3685-II	8	FCV-74-47 SUPPLY	A	1 Year

EEB 74-0016

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-74-0016

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: _____

Reviewed by: _____

QA Acceptance: _____

5

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0017
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.4	Engineering Analysis and Test	None
Component Cable WDG-1 1/c, #2AWG, (PXJ) Manufacturer: Attachm- B	Temperature (^{o}F)	325	385	(4)	Attachment C.2	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	69.7	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.2	Generic Simultaneous Test	None
Accuracy: Req'd: N/A Demon.: N/A Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	$6.5x10^{7}$ γ $4x10^{9}$ β Attach. C.1	$2x10^{8}$	(4)	Attachment C.2	Generic Sequential Test	None
Location: 0	Aging	N/A	10 years	(2)	Attachment C.3	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: H D Rosomowski /SAH

Reviewed by: J Bradley

QA Acceptance: ______

Attachment A

System: 74
Unit: 3

EEB-74-0017
Rev 0

Component: Cable 1/c #2 AWG
Mark: WDG-1

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES526-I	0	FCV-74-47 Supply	A	1 Year

EEB 14-0017

REV 0

ATTACHMENT B

Mark WDG-1

Contract No.	Type	Manufacturer
TR 823368 From WBNP 821609-3	PXJ	Cyprus Wire & Cable

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.

ATTACHMENT C (con'd)

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. 1946

Cable types: CP, CPJ, CPJJ, PXJ

Rooms: 0-18

The CP family of cables consists of cross-linked polyethylene insulation and polyvinyl chloride jacketing, and the PX family of cables consists of cross-linked polyethylene or ethylene propylene rubber, and the jacket is chlorosulfonated polyethylene or chloronated polyethylene. The following LOCA/SLB test apply:

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

PX types - 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. Because of the conservatism of these tests 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.

C.3 NUREG-0588 Material List

C.4 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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0018
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WDG-1 1/c, #2AWG, (PXJ) Manufacturer: Attachment B	Temperature (^{0}F)	308	385	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	21.5	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Accuracy: Req'd: N/A Demon: N/A Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	2 x 10^6	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
Location: Room 7	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: H. L. Romanowski / SAK
Reviewed by: J. A. Bradley
QA Acceptance: ____________

Attachment A

System: 74
Unit: 3

EEB-74-0018
Rev 0

Component: Cable 1/c #2 AWG
Mark: WDG-1

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES526-I	7	FCV-74-47 Supply	A	1 Year

EEB 74-0018

REV 0

ATTACHMENT B

Mark WDG-1

Contract No.	Type	Manufacturer
TR 823368 From WBNP 821609-3	PXJ	Cyprus Wire & Cable

Sheet No: EEB 74-0018

Revision: 0

ATTACHMENT C

C.1 TVA Engineering Report No. 1946

Cable types: CP, CPJ, CPJJ, PXJ

Rooms: 0-18

The CP family of cables consists of cross-linked polyethylene insulation and polyvinyl chloride jacketing, and the PX family of cables consists of cross-linked polyethylene or ethylene propylene rubber, and the jacket is chlorosulfonated polyethylene or chloronated polyethylene. The following LOCA/SLB test apply:

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

PX types - 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. Because of the conservatism of these tests 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.

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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0019
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WDG-1 1/c, #2 AWG PXJ 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: Room 8	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	157	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)	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: H D Ramaswamy STK
Reviewed by: J M Bradley
QA Acceptance: _____

EEB 74-0019

REV 0

ATTACHMENT B

Mark WDG-1

Contract No.	Type	Manufacturer
TR 823368 From WBNP 821609-3	PXJ	Cyprus Wire & Cable

Sheet No: EEB 74-0019

Revision: 0

ATTACHMENT C

C.1 TVA Engineering Report No. 1946

Cable types: CP, CPJ, CPJJ, PXJ

Rooms: 0-18

The CP family of cables consists of cross-linked polyethylene insulation and polyvinyl chloride jacketing, and the PX family of cables consists of cross-linked polyethylene or ethylene propylene rubber, and the jacket is chlorosulfonated polyethylene or chloronated polyethylene. The following LOCA/SLB test apply:

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

PX types - 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. Because of the conservatism of these tests 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.

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: _____

Attachment A

System: 74
Unit: 3

EEB-74-0019
Rev 0

Component: Cable
Mark: WDG-1

1/c #2 AWG

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES526-I	8	FCV-74-47 Supply	A	1 Year

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0020
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WDG-1 1/c, #2AWG, (PXJ) Manufacturer: Attachment B	Temperature (°F)	211	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: Control/Power	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)	2.1×10^7	2×10^8	(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: Room 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: H D Romanowski
Reviewed by: J M Bradley
QA Acceptance: _____

Attachment A

System: 74
Unit: 3

EEB-74-0020
Rev 0

Component: Cable 1/c #2 AWG
Mark: WDG-1

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES526-I	9	FCV-47-74 Supply	A	1 Year

EEB 74-0020

REV 0

ATTACHMENT B

Mark WDG-1

Contract No.	Type	Manufacturer
TR 823368 From WBNP 821609-3	PXJ	Cyprus Wire & Cable

Sheet No: EEB 74-0020

Revision: 0

ATTACHMENT C

C.1 TVA Engineering Report No. 1946

Cable types: CP, CPJ, CPJJ, PXJ

Rooms: 0-18

The CP family of cables consists of cross-linked polyethylene insulation and polyvinyl chloride jacketing, and the PX family of cables consists of cross-linked polyethylene or ethylene propylene rubber, and the jacket is chlorosulfonated polyethylene or chloronated polyethylene. The following LOCA/SLB test apply:

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

PX types - 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. Because of the conservatism of these tests 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.

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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0021
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.4	Engineering Analysis and Tests	None
Component Cable WDH 1/c, #1/0, (CPJ) Manufacturer: Attachment B	Temperature (^{o}F)	325	325	(4)	Attachment C.2	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	69.7	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.2	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)	6.5×10^{7} γ 4×10^{9} β Attach. C.1	6.9×10^{7}	(4)	Attachment C.2	Generic Sequential Test	None
Service: Attachment A	Aging	N/A	10 years	(2)	Attachment C.3	Generic Mat'l Test	None
Location: 0							
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: A.A. Romanowski/SMK

Reviewed by: J.L. Bradley

QA Acceptance: _____

Attachment A

EEB-74-0021
Rev 0

System: 74
Unit: 3

Component: CAble 1/c #10 AWG
Mark: WDH

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES538-I	0	FCV-74-52 Supply	A	1 year

EEB 74-0021

Rev 0

ATTACHMENT B

Mark WDH

Contract No.	Type	Manufacturer
70C7-92430	CPJ	Essex International
71C7-54180-2	CPJ	Simplex
67C7-91619	CPJ	General Cable

Sheet No: EEB 74-0021

Revision: 0

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.

Sheet No: EEB 74-0021

Revision: 0

ATTACHMENT C (con'd)

C.2 Wyle Laboratory Report No. 43854-3

C.3 NUREG-0588 Material List

C.4 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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0022
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WDH 1/c, #1/0, (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: Room 8	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	157	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)	2.1×10^7	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: H. D. Romanowski
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

System: 74
Unit: 3

EEB-74-0022
Rev 0

Component: Cable 1/c #10 AWG
Mark: WDH

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES538-I	8	FCV-74-52	A	1 Year

EEB 74-0022

Rev 0

ATTACHMENT B

Mark WDH

Contract No	Type	Manufacturer
70C7-92430	CPJ	Essex International
71C7-54180-2	CPJ	Simplex
67C7-91619	CPJ	General Cable

Sheet No.: EEB-74-0022

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: _____

Reviewed by: _____

QA Acceptance: _____

POOR ORIGINAL

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0023
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WDH 1/c, #1/0, (CPJ) Manufacturer: Attachment B	Temperature (°F)	211	325	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Accuracy: Req'd: N/A Demon: N/A Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	2.1×10^7	6.9×10^7	(4)	Attachment C.1	Generic Sequential Test	None
Location: Room 9	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: H. D. Romanowski / SAK
Reviewed by: [signature]
QA Acceptance: ____________

Attachment A

EEB 74-0023

Rev 0

System: 74
Unit: 3

Component: Cable 1/c #10 AWG
Mark: WDH

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES538-I	9	FCV-74-52	A	1 Year

EEB 74-0023

Rev 0

ATTACHMENT B

Mark WDH

Contract No.	Type	Manufacturer
70C7-92430	CPJ	Essex International
71C7-54180-2	CPJ	Simplex
67C7-91619	CPJ	General Cable

Sheet No.: EEB-74-0023

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: _____

eviewed by: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0024
Revision 0
Date 10/2-/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.4	Engineering Analysis and Tests	None
Component Cable WDI 1/c, #2/0, (CPJ) Manufacturer: Attachment B	Temperature (^{0}F)	325	325	(4)	Attachment C.2	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	69.7	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.2	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)	6.5×10^7 γ 4×10^9 β Attach. C.1	6.9×10^7	(4)	Attachment C.2	Generic Sequential Test	None
Service: Attachment A Location: 0	Aging	N/A	10 years	(2)	Attachment C.3	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: H. D. Ramanauskas/SMK

Reviewed by: J. A. Bradley

QA Acceptance: _____

Attachment A

System: 74
Unit: 3

EEB-74-0024
Rev 0

Component: Cable 1/c #2/0
Mark: WDI

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3038-II	0	FCV-74-66 Supply	A	1 year

EEB 74-0024

REV 0

ATTACHMENT B

Mark WDI

Contract No.		Type	Manufacturer
820032	XFR from WBNP 74C7-85069 WBNP WDJ	CPJ	Triangle Conduit & Cable
75C7-85744		CPJ	Triangle Conduit & Cable
73C7-84528		CPJ	Plastic Wire & Cable Corp
71C7-54180		CPJ	Simplex
67C7-91619		CPJ	General Cable Corp
72C7-75533-1		CPJ	Essex
69C7-64924		CPJ	Rockbestos

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.

Sheet No: EEB 74-0024

Revision: 0

ATTACHMENT C (con'd)

C.2 Wyle Laboratory Report No. 43854-3

C.3 NUREG-0588 Material List

C.4 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 sufficien. 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: 3
Docket: 50-296

Sheet No. (3) EEB 74-0025
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WDI 1/c, #2/0, (CPJ) Manufacturer: Attachment B	Temperature (°F)	157	325	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Accuracy: Req'd: N/A Demon: N/A Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	2.1×10^7	6.9×10^7	(4)	Attachment C.1	Generic Sequential Test	None
Location: Room 8	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: H.D. Pomorowski/SAIC
Reviewed by: [signature]
QA Acceptance: ______

Attachment A

EEB 74-0025

Rev 0

System: 74
Unit: 3

Component: Cable 1/c #2/0
Mark: WDI

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3038-II	8	FCV-74-66 Supply	A	1 Year

EEB 74-0025

REV 0

ATTACHMENT B

Mark WDI

Contract No.		Type	Manufacturer
820032	XFR from WBNP 74C7-85069 WBNP WDJ	CPJ	Triangle Conduit & Cable
75C7-85744		CPJ	Triangle Conduit & Cable
73C7-84528		CPJ	Plastic Wire & Cable Corp
71C7-54180		CPJ	Simplex
67C7-91619		CPJ	General Cable Corp
72C7-75533-1		CPJ	Essex
69C7-64924		CPJ	Rockbestos

Sheet No.: EEB- 74-0025

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: _____

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 74-0026
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component: Cable WEE 5/c, #10AWG, (PNJ) Manufacturer: Attachment B	Temperature (°F)	211	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	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: Room 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: H.D. Ramonowski/SAK
Reviewed by: J.A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0026

Rev 0

System: 74
Unit: 3

Component: Cable 5/c #10 AWG
Mark: WFE

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1167-I	9	FCV-74-77 Supply	A	1 Year

EEB 14-0026

Rev 0

ATTACHMENT B

Mark WFE

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable Corp
73C7-84528	PJJ	Rome Cable
70C7-54179-2	PNJ	Plastic Wire & Cable Corp

Sheet No.: EEB-74-0026

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:_____

1

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-74-0028
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.5	Engineering Analysis	None
Component Cable - WGB 2/c, #12 AWG (PNJ)(PJJ) Manufacturer: Attachment B	Temperature (^{o}F)	325	153	(4)	Attachments C.2 and C.3	Attachment C.4	None
Model Number: N/A	Pressure (PSIA)	69.7	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)	6.5×10^{7} γ 4×10^{9} β Attach. C.1	4×10^{7}	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A Location: 0	Aging	N/A	10 years	(2)	Attachment C.3	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: H. D. Bonnewell / SPK
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB-74-0028
Rev 0

System: 74
Unit: 3

Component: Cable 2/c #12 AWG
Mark: WGB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1054-I	0	FCV-74-47 Relay Logic Circuit A Cont	A	1 Year
3ES1083-I	0	FCV-74-47	↓	↓
3ES3554-II	0	FCV-74-47 Relay Logic Circuit B Cont		
3ES3583-II	0	FCV-74-47		

EEB 74-0028

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- 74-0028

Revision: 0

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.

ATTACHMENT C (Continued)

C.1 (Continued)

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 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.3 TVA Engineering Report No. 1943

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

Room: O

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 temperature. The in-containment SLB temperature and duration exceeds the cable ratings and the insulation and jacket distortion temperatures.

However, the service which these cable 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 insulated cable has demonstrated and is capable of withstanding the LOCA/ SLB and the post-LOCA environment of 1 year. Thus, continued operation is justified.

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.

C.4 Temperature Qualification Method

C.4.1 Standard material long-term overload temperature rating

C.4.2 Engineering analysis

1C

Sheet No: EEB- 74-0028

Revision No: 0

ATTACHMENT C (Continued)

C.5 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 74-0029
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGB 2/c, #12AWG, (PNJ)(PJJ) Manufacturer: Attachment B	Temperature (°F)	158	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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: Room 2	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: H. D. Romanowski/SAK
Reviewed by: J. M. Bradley
QA Acceptance: _____

Attachment A

EEB-74-0029
Rev 0

System: 74
Unit: 3

Component: Cable 2/c #12 AWG
Mark: WGB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1115-I	2	PT-74-51 Relay Logic Circuit A Control	A	1 Year
3ES1116-I	2	PT-74-51		
3ES1117-I	2	PT-74-51		
3ES1118-I	2	PT-74-51		
3R3265	2	ME-74-137A Pump A Seal Leakage Hi		
3R3266	2	ME-74-137A PMP C Seal Leakage Hi Control		
3R3257	2	MIS-74-137B PMP B Leakage Hi Control		
3R3258	2	MIS-74-137B PUMP D		
3ES1575-I	2	RHR PMP 3C HTR Cont		
3ES1565-I	2	RHR PMP 3A HTR Cont		
3ES1085-I	2	FIS-74-50 RHR SYS FLOW		

EEB 74-0029

Rev 0

ATTACHMENT B

Mark WGB

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Brand-Rex
73C7-84523	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-74-0029

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: _____

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)

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

Sheet No. EEB 74-0030
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGB 2/c, #12AWG, (PNJ)(PJJ) Manufacturer: Attachment B	Temperature (^{o}F)	294	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: Room 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: H. D. Romanowski SWK

Reviewed by: J. M. Bradley

QA Acceptance: _____

Attachment A

EEB-74-0030
Rev 0

System: 74
Unit: 3

Component: Cable
Mark: WGB

2/c #12 AWG

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3586-II	5	PT-74-65 RHR Relay Logic	A	1 Year
3ES3615-II	5	PT-74-65 RHR Relay Logic B		
3ES3616-II	5	PT-74-65		
3ES3617-II	5	PT-74-65		
3ES3618-II	5	PT-74-65		
3ES4065-I	5	RHR Pmp 3B Htr Cont		
3ES4075-I	5	RHR Pmp 3D Htr Cont		

EEB 74-0030

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

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0031
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WGB 2/c, #12AWG, (PNJ)(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: Room 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)	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
	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: H. D. Romanowski
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0031

Rev 0

System: 74
Unit: 3

Component: Cable 2/c #12 AWG
Mark: WGB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1115-I	8	PT-74-51 Relay Logic Circuit A Cont	A	1 Year
3ES1116-I	8	PT-74-51		
3ES1117-I	8	PT-74-51		
3ES1118-I	8	PT-74-51		
3ES1054-I	8	FCV-74-47 Relay Logic Circuit A Cont		
3ES1083-I	8	FCV-74-47		
3ES3554-II	8	FCV-74-47 Relay Logic Circuit B Cont		
3ES3583-II	8	FCV-74-47		
3ES3586-II	8	T-74-65 RHR Relay Logic Logic		
3ES3615-II	8	PT-74-65 RHR Relay Logic B		
3ES3616-II	8	PT-74-65		
3ES3617-II	8	PT-74-65		
3ES3618-II	8	PT-74-65		
3ES4065-I	8	RHR PMP 3B HTR Control		
3ES1575-I	8	RHR PMP 3C HTR Cont		
3ES1565-I	8	RHR PMP 3A HTR Cont		
3ES4075-II	8	RHR PMP 3D HTR Cont		
3ES1085-I	8	F1S-74-50 RHR SYS Flow		

EEB 74-0031

Rev 0

ATTACHMENT B

Mark WGB

Contract No.	Type	Manufacturer
67C3-91618	PN	Brand-Rex
73C7-84528	P[illegible]	Rome Cable
75K7-86150-1	PJ[illegible]	Cyprus
75K5-86506-1	PJ[illegible]	American Insulated Wire
74C7-85069-1	PJ[illegible]	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-74-0031

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0032
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGB 2/c, #12AWG, (PNJ)(PJJ) Manufacturer: Attachment B	Temperature (^{o}F)	211	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)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A Location: Room 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: H.D. Romanowski 10/22/80
Reviewed by: J.M. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0032

Rev 0

System: 74
Unit: 3

Component: Cable 2/c #12 AWG
Mark: WGB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1115-I	9	PT-74-51 Relay Logic Circuit A Cont	A	1 Year
3ES1116-I	9	PT-74-51		
3ES1117-I	9	PT-74-51		
3ES1118-I	9	PT-74-51		
3ES1054-I	9	FCV-74-47 Relay Logic Circuit A Cont		
3ES1083-I	9	FCV-74-47		
3ES3554-II	9	FCV-74-47 Relay Logic Circuit B Cont		
3ES3583-II	9	FCV-74-47		
3ES3586-II	9	PT-74-65 RHR Relay Logic Logic		
3ES3615-II	9	PT-74-65 RHR Relay Logic B		
3ES3616-II	9	PT-74-65		
3ES3617-II	9	PT-74-65		
3ES3618-II	9	PT-74-65		
3ES1085-I	9	FIS-74-50 RHR SYS FLOW		

EEB 74-0032

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-74-0032

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 74-0033
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGD 4/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (°F)	158	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 Service: Attachment A	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location Room 2	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: H. D. Romanowski/SM
Reviewed by: J. Bradley
QA Acceptance: _____

Attachment A

EEB-74-0033
Rev 0

System: 74
Unit: 3

Component: Cable 4/c #12 AWG
Mark: WGD

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1562-I	2	RHR PMP 3A Cont	A	1 year
3ES1572-I	2	RHR PMP 3C	↓	↓
3ES1154-I	2	FCV-74-7 ↓		

EEB 74-0033

Rev 0

ATTACHMENT B

Mark WGD

Contract No.	Type	Manufacturer
73C7-84528	PJJ	Rome Cable
67C3-91618	PNJ	Plastic Wire & Cable Corp
72C7-7522[illegible]-1	PJJ	Plastic Wire & Cable Corp
72C7-54762-2	PNJ	Plastic Wire & Cabel Corp
74C7-85069	PJJ	Rome
70C7-54179-1	PNJ	Brand-Rex

8C

Sheet No.: EEB-74-0033

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 74-0034
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGD 4/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (°F)	294	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: Room 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: H.O. Ramaswamy
Reviewed by: J.M. Bradley
QA Acceptance. _____

Attachment A

EEB-74-0034
Rev 0

System: 74
Unit: 3

Component: Cable 4/c #12 AWG
Mark: WGD

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES4062-II	5	RHR Pump 3B Cont	A	1 year
3ES4072-II	5	RHR Pump 3D Cont	↓	↓
3ES3639-II	5	FCV-74-30 ↓		

EEB 74-0034

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-74-0034

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 (Chatt[illegible]ga 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 74-0035
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGD 4/c, #12 AWG, PNJ Manufacturer: Attachment B	Temperature (°F)	157	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)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A Location: Room 8	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: H. D. Romonowski/SAK
Reviewed by: J. L. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0035

Rev 0

System: 74
Unit: 3

Component: Cable 4/c #12 AWG
Mark: WGD

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1562-I	8	RHR PMP 3A Cont	A	1 Year
3ES1572-I	8	RHR PMP 3C Cont	↓	↓
3ES4062-II	8	RHR PMP 3B Cont		
3ES4072-II	8	RHR PMP 3D Cont		
3ES1154-I	8	FCV-74-7 Cont		
3ES3639-II	8	FCV-74-30 ↓		

EEB 74-0035

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-74-0035

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 may not 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 550 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 74-0036
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGD 4/c, #12 AWG, PNJ Manufacturer: Attachment B	Temperature (°F)	211	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
Model Number: N/A	Pressure (PSIA)	15.0	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)	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: Room 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: H. D. Romanowski/SAK
Reviewed by: J. L. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0031

Rev 0

System: 74
Unit: 3

Component: Cable 4/c #12 AWG
Mark: WGD

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1154-I	9	FCV-74-7 Cont	A	1 Year
3ES3639-II	9	FCV-74-30 ↓	↓	↓

EEB 74-0036

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-74-0036

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 may even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-[illegible] 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

.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 74-0037
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGG 7/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (^{o}F)	158	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 Location: Room 2	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: H. D. Romanowski 10/22/80
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB-74-0037
Rev 0

System: 74
Unit: 3

Component: Cable
Mark: WGG

7/c #12 AWG

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R3259	2	MIS-74-137A RHR Temp & Moist Control	A	1 Year
3R3251	2	MIS-74-137B	↓	↓

EEB 14-0037

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-74-0037

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 not even the jacket experience the temperature profile until some time has elapsed.

TVA has conducted tests (Chattanooga Central Laboratories Report No. 81L-81-682) 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)

Sheet No. (3) EEB 74-0038
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGG 7/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (°F)	220	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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	3.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: Room 6	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: H.E. Romanowski / SAI
Reviewed by: J.E. Bradley
QA Acceptance: ____________

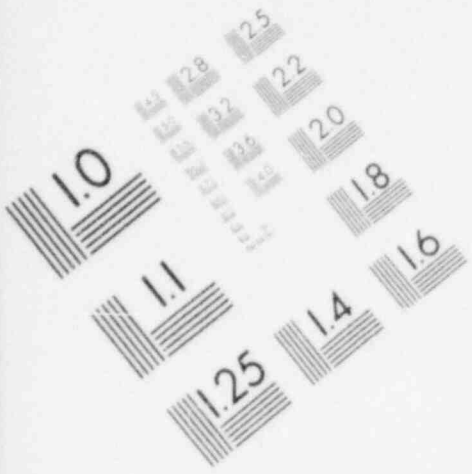
Attachment A

EEB-74-0038
Rev 0

System: 74
Unit: 3

Component: Cable 7/c #12 AWG
Mark: WGG

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3V2252	6	FCV-74-102 & 119 Cont	A	1 Year
3V2263	6	FCV-74-103 & 112	↓	↓



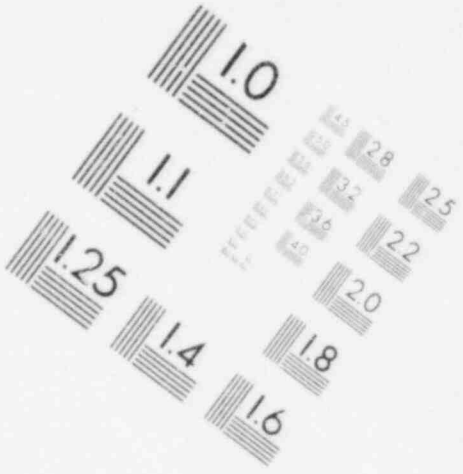
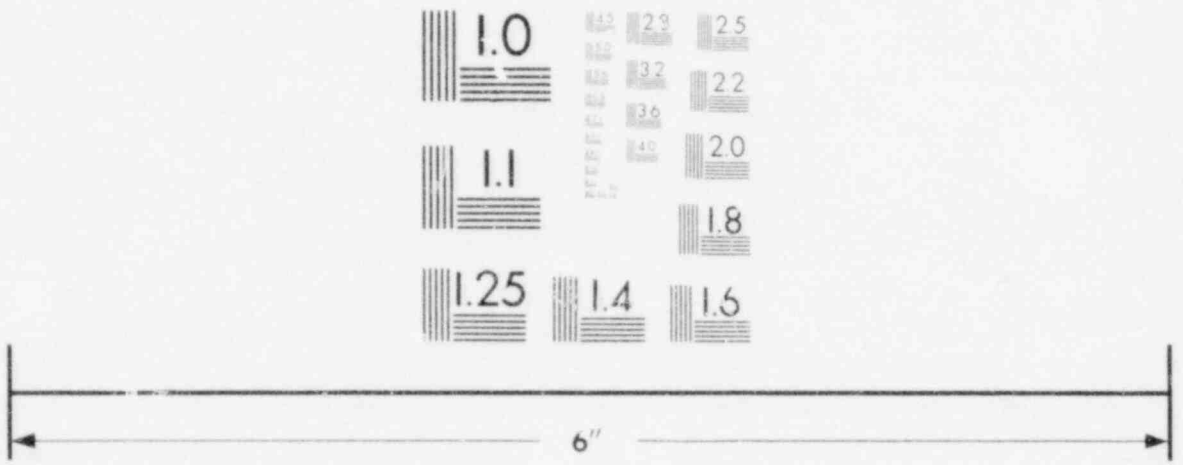
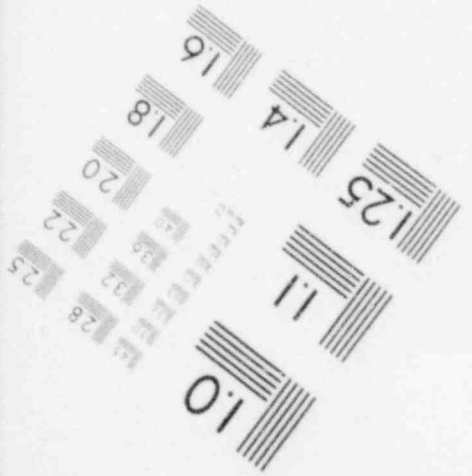
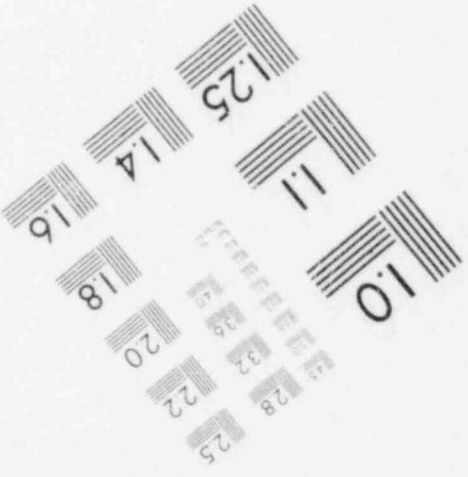
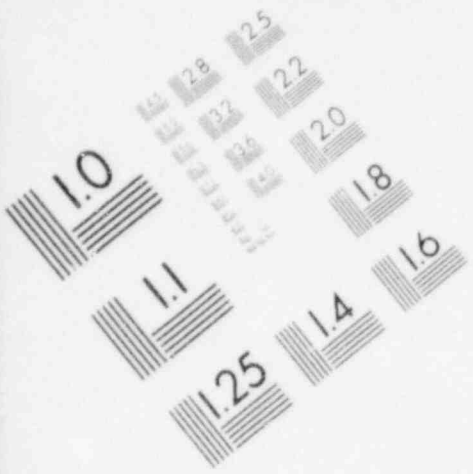


IMAGE EVALUATION
TEST TARGET (MT-3)









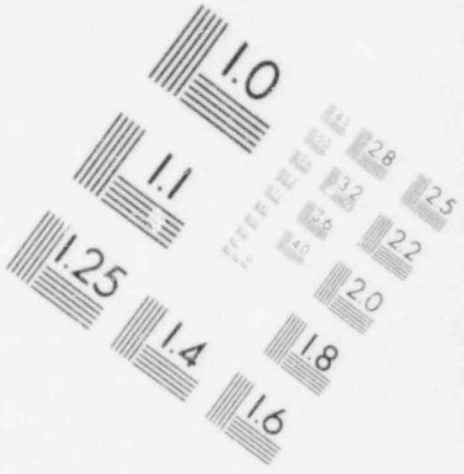
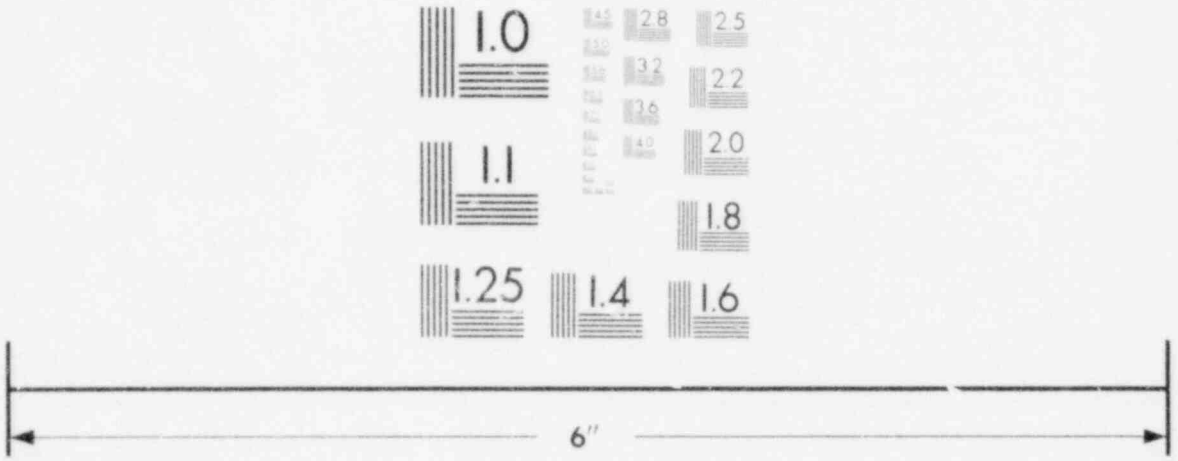
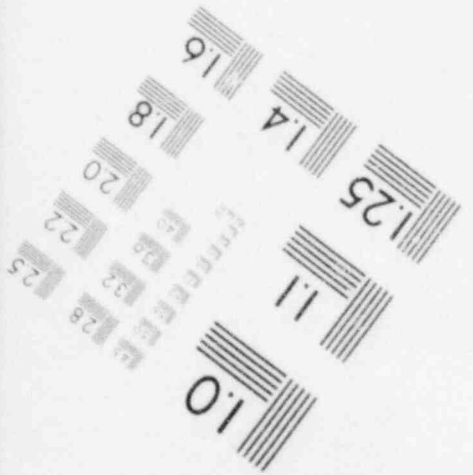
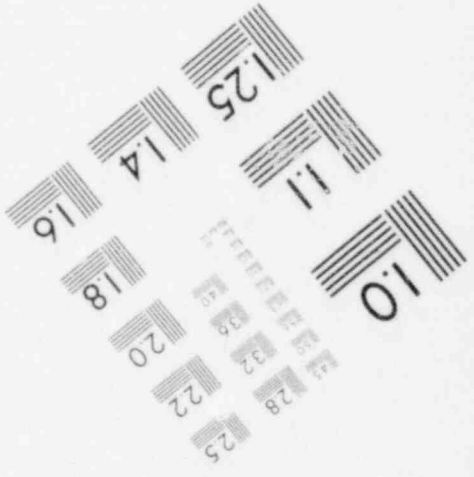


IMAGE EVALUATION
TEST TARGET (MT-3)







EEB 74-0038

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-74-0038

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-81-6021 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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

(3)
Sheet No. EEB-74-0040
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.5	Engineering Analysis	None
Component Cable - WGI 16/c, #12 AWG (PNJ)(PJJ) Manufacturer: Attachment B	Temperature (^{o}F)	325	153	(4)	Attachments C.2 and C.3	Attachment C.4	None
Model Number: N/A	Pressure (PSIA)	69.7	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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	$6.5x10^7 \gamma$ $4x10^9 \beta$ Attach. C.1	$4x10^7$	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: 0	Aging	N/A	10 years	(2)	Attachment C.3	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: H.D. Tomaszewski/SAK

Reviewed by: J.E. Bradley

QA Acceptance: ____________

Attachment A

System: 74
Unit: 3

EEB-74-0040
Rev 0

Component: Cable 16/c #12 AWG
Mark: WGI

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3542	0	FCV-74-52 Cont	A	1 Year

EEB 74-0040

Rev 0

ATTACHMENT B

Mark WGI

Contract No.	Type	Manufacturer
73C7-84528	PJJ	Rome Cable
67C2-91618	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	Brand-Rex

Sheet No: EEB- 74-0040

Revision: 0

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.

Sheet No: 74-0040

Revision: 0

ATTACHMENT C (Continued)

C.1 (Continued)

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 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.3 TVA Engineering Report No. 1943

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

Room: O

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 temperature. The in-containment SLB temperature and duration exceeds the cable ratings and the insulation and jacket distortion temperatures.

However, the service which these cable 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 insulated cable has demonstrated and is capable of withstanding the LOCA/ SLB and the post-LOCA environment of 1 year. Thus, continued operation is justified.

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.

C.4 Temperature Qualification Method

C.4.1 Standard material long-term overload temperature rating

C.4.2 Engineering analysis

Sheet No: EEB- 74-0040

vision No: 0

ATTACHMENT C (Continued)

C.5 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 74-0041
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGI 16/c, #12AWG, (PJ) 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)	3×10^7	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: Room 2							
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: H. D. Romanowski/SA
Reviewed by: J. M. Bradley
QA Acceptance: _____

Attachment A

EEB-74-0041
Rev 0

System: 74
Unit: 3

Component: Cable 16/c #12 AWG
Mark: WGI

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES555-I	2	FCV-74-1 Cont	A	1 year
3ES568-I	2	FCV-74-12	↓	↓
3ES580-I	2	FCV-74-2		
3ES593-I	2	FCV-74-13		
3ES1153-I	2	FCV-74-7		

EEB 74-0041

Rev 0

ATTACHMENT B

Mark WGI

Contract No.	Type	Manufacturer
73C7-84528	PJJ	Rome Cable
67C3-91618	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-74-0041

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 not 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 74-0042
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating me	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGI 16/c, #12AWG, (PJ) Manufacturer: Attachment B	Temperature (^{o}F)	294	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 Location: Room 5	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

s: (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: H.D. Romanowski

Reviewed by: J.A. Bradley

QA Acceptance: _____

Attachment A

EEB-74-0042
Rev 0

System: 74
Unit: 3

Component: Cable 16/C #12 AWG
Mark: WGI

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3055-II	5	FCV-74-24 Cont	A	1 year
3ES3068-II	5	FCV-74-35	↓	↓
3ES3080-II	5	FCV-74-25		
3ES3093-II	5	FCV-74-36		
3ES3638-II	5	FCV-74-30		
3ES3664-II	5	FCV-74-99		

EEB 74-0042

Rev 0

ATTACHMENT 8

Mark WGI

Contract No.	Type	Manufacturer
73C7-84528	PJJ	Rome Cable
67C3-91618	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-74-0042

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: _____

(3)

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Sheet No. EEB 74-0043
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attacnment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGI 16/c, #12AWG, (PJ) Manufacturer: Attachment B	Temperature (°F)	220	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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	3.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: Room 6	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: H.D. Romanowski
Reviewed by: J. Bradley
QA Acceptance: ______

Attachment A

EEB-74-0043
Rev 0

System: 74
Unit: 3

Component: Cable 16/c #12 AWG
Mark: WGI

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES678-I	6	FCV-74-57 Cont	A	1 Year
3ES703-I	6	FCV-74-58		
3ES691-I	6	FCV-74-59		
3ES3178-II	6	FCV-74-71		
3ES3628-II	6	FCV-74-72		
3ES3191-II	6	FCV-74-73		

EEB 74-0043

Rev 0

ATTACHMENT B

Mark WGI

Contract No.	Type	Manufacturer
73C7-84528	PJJ	Rome Cable
67C3-91618	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	Brand-Rex

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 550 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 74-0044
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGI 16/c, #12AWG, (PNJ)(PJJ) Manufacturer: Attachment B	Temperature (^{o}F)	157	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)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A Location: Room 8	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: H. D. Romanowski 10/29
Reviewed by: J. B. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0044

Rev 0

System: 74
Unit: 3

Component: Cable 16/c #12 AWG
Mark: WGI

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3664-II	8	FCV-74-99 Cont	A	1 year

EEB 74-0044

Rev 0

ATTACHMENT B

Mark WGI

Contract No.	Type	Manufacturer
73C7-84528	PJJ	Rome Cable
67C3-91618	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-74-0044

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-81-6003) 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 74-0045
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGI 16/c, #12AWG, (PNJ)(PJJ) Manufacturer: Attachment B	Temperature (^{o}F)	211	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)	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: Room 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: H. D. Romanowski
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0045

Rev 0

System: 74
Unit: 3

Component: Cable 16/c #12 AWG
Mark: WGI

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES555-I	9	FCV-74-1 Cont	A	1 Year
3ES568-1	9	FCV-74-12 Cont	A	1 year
3ES580-I	9	FCV-74-2 Cont	A	1 Year
3ES593-I	9	FCV-74-13 Cont	A	1 Year
3ES1153-I	9	FCV-74-7 Cont	A	1 year
3ES 678-I	9	FCV-74-57 Cont	A	1 Year
3ES3055-II	9	FCV-74-24 Cont	A	1 Year
3ES3068-II	9	FCV-74-35 Cont	A	1 Year
3ES3080-II	9	FCV-74-25 Cont	A	1 Year
3ES3093-II	9	FCV-74-36 Cont	A	1 Year
3ES3638-II	9	FCV-74-30 Cont	A	1 Year
3ES703-I	9	FCV-74-58 Cont	A	1 Year
3ES3664-II	9	FCV-74-99 Cont	A	1 Year
3ES691-I	9	FCV-74-59 Cont	A	1 Year
3ES3178-II	9	FCV-74-71 Cont	A	1 Year
3ES3628-II	9	FCV-74-72 Cont	A	1 Year
3ES3191-II	9	FCV-74-73 Cont	A	1 Year

EEB 74-0045

Rev 0

ATTACHMENT B

Mark WGI

Contract No.	Type	Manufacturer
73C7-84528	PJJ	Rome Cable
67C3-91618	PNJ	Plastic Wire & Cable Corp
70C7-54179-1	PNJ	Brand-Rex

8C

Sheet No.: EEB-74-0045

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 not 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

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0046
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.5	Engineering Analysis	None
Component Cable NGK 12/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (°F)	325	153	(4)	Attachments C.2 and C.3	Attachment C.4	None
Model Number: N/A	Pressure (PSIA)	69.7	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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	6.5×10^7 γ 4×10^9 β Attach. C.1	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: 0	Aging	N/A	10 years	(2)	Attachment C.3	Oper. Exper.	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: H. D. Romanowski / SAK
Reviewed by: J. Bradley
QA Acceptance: ____________

Attachment A

System: 74
Unit: 3

EEB-74-0046
Rev 0

Component: Cable 12/c #12 AWG
Mark: WGK

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3686-II	0	FCV-74-47 Cont	A	1 Year
3ES3651-II	0	FCV-74-47	↓	↓
3ES3039-II	0	FCV-74-66 ↓		

EEB 74-0046

Rev 0

ATTACHMENT B

Mark WGK

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable Corp
73C7-84528	PJJ	Rome Cable
70C7-54179-1	PNJ	Brand-Rex

1C

Sheet No: EEB-74-0046

Revision: 0

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.

1C

Sheet No: EEB-74-5046

Revision: 0

ATTACHMENT C (Continued)

C.1 (Continued)

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 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.3 TVA Engineering Report No. 1943

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

Room: 0

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 temperature. The in-containment SLB temperature and duration exceeds the cable ratings and the insulation and jacket distortion temperatures.

However, the service which these cable 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 insulated cable has demonstrated and is capable of withstanding the LOCA/ SLB and the post-LOCA environment of 1 year. Thus, continued operation is justified.

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.

C.4 Temperature Qualification Method

C.4.1 Standard material long-term overload temperature rating

C.4.2 Engineering analysis

Sheet No: EEB- 74-0046

Revision No: 0

ATTACHMENT C (Continued)

C.5 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)

Sheet No. (3) EEB 74-0047
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGK 12/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (°F)	158	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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: Room 2	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: H.D. Romanowski / 5791

Reviewed by: [signature]

QA Acceptance: ____________

Attachment A

EEB-74-0047
Rev 0

System: 74
Unit: 3

Component: Cable 12/c #12 AWG
Mark: WGK

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES551-I	2	FCV-74-1 Cont	A	1 Year
3ES564-I	2	FCV-74-12	↓	↓
3ES1151-I	2	FCV-74-7		
2ES3713	2	FCV-74-96		
3ES3736	2	FCV-74-97 ↓		

EEB 74-0047

Rev 0

ATTACHMENT B

Mark WGK

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable Corp
73C7-84528	PJJ	Rome Cable
70C7-54179-1	PNJ	Brand-Rex

BC

Sheet No.: [illegible]-74-0047

Revision: [illegible]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-[illegible] 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 74-0048
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGK 12/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (°F)	294	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 Location: Room 5	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: H. D. Romenowski
Reviewed by: J. Bradley
QA Acceptance: _____

Attachment A

EEB-74-0048
Rev 0

System: 74
Unit: 3

Component: Cable
Mark: WGK

12/c #12 AWG

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3051-II	5	FCV-74-24 Cont	A	1 Year
3ES3064-II	5	FCV-74-35	↓	↓
3ES3076-II	5	FCV-74-25		
3ES3089-II	5	FCV-74-36		
3ES3661-II	5	FCV-74-99		

EEB 74-0048

Rev 0

ATTACHMENT B

Mark WGK

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable Corp
73C7-84528	PJJ	Rome Cable
70C7-54179-1	PNJ	Brand-Rex

8C

Sheet No.: EEB-74-0048

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 74-0049
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGK 12/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (°F)	220	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)	3.1×10^7	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: Room 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: H D Ramsewak/SAK
Reviewed by: J A Bradley
QA Acceptance: _____

Attachment A

System: 74
Unit: 3

EEB-74-0049
Rev 0

Component: Cable 12/c #12 AWG
Mark: WGK

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3681-II	6	FCV-74-46 Cont	A	1 Year
3ES3176-II	6	FCV-74-71	↓	↓
3ES3626-II	6	FCV-74-72		
3ES3189-II	6	FCV-74-73 ↓		

EEB 74-0049

Rev 0

ATTACHMENT B

Mark WGK

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable Corp
73C7-84528	PJJ	[illegible]e Cable
70C7-54179-1	PNJ	Brand Rex

Sheet No.: EEB-74-0249

Revision: 0

ATTACHMENT C

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

C.2 TVA Engineering Report No. 1943.

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

Rooms 1-18

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

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

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

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

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

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

Prepared by:_____

Reviewed by:_____

QA Acceptance:_____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0050
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGK 12/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (°F)	157	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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: Room 8	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: H. D. Romanowski / SAI

Reviewed by: [signature]

QA Acceptance: ____________

Attachment A

EEB 74-0050

Rev 0

System: 74
Unit: 3

Component: Cable 12/c #12AWG
Mark: WGK

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3151-II	8	FCV-74-74 Cont	A	1 Year
3ES3681-II	8	FCV-74-46 Cont	A	1 Year
3ES3686-II	8	FCV-74-47 Cont	A	1 Year
3ES3651-II	8	FCV-74-47 Cont	A	1 Year
3ES551-I	8	FCV-74-1 Cont	A	1 Year
3ES564-I	8	FCV-74-12 Cont	A	1 Year
3ES1151-I	8	FCV-74-7 Cont	A	1 Year
3ES3051-II	8	FCV-74-24 Cont	A	1 Year
3ES064-II	8	FCV-74-35 Cont	A	1 year
3ES3076-II	8	FCV-74-25 Cont	A	1 year
3ES3089-II	8	FCV-74-36 Cont	A	1 Year
3ES3661-II	8	FCV-74-99 Cont	A	1 Year
3ES3676-II	8	FCV-74-71 Cont	A	1 year
3ES3626-II	8	FCV-74-72 Cont	A	1 year
3ES3189-II	8	FCV-74-73 Cont	A	1 Year
3ES3039-II	8	FCV-74-66 Cont	A	1 Year
2ES3713	8	FCV-74-96 Cont	A	1 Year
3ES3736	8	FCV-74-97 Cont	A	1 Year
3ES3726	8	FCV-74-100 Cont	A	1 Year
3ES3164-II	8	FCV-74-75 Cont	A	1 Year

EEB 74-0050

Rev 0

ATTACHMENT B

Mark WGK

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable Corp
73C7-84528	PJJ	Rome Cable
70C7-54179-1	PNJ	Brand-Rex

8C

Sheet No.: EEB-74-0050

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 74-0051
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGK 12/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (°F)	211	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
Model Number: N/A	Pressure (PSIA)	15.0	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)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A Location: Room 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 attac[illegible]ppendix sheets.
(4) See Section 3.0 and/or Ap[illegible] B in 79-01B report.

Prepared by: [illegible]
Reviewed by: [illegible]
QA Acceptance: _____

Attachment A

EEB 74-0051

Rev 0

System: 74
Unit: 3

Component: Cable 12/c #12 AWG
Mark: WGK

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3164-II	9	FCV-74-75 Cont	A	1 Year
3ES551-I	9	FCV-74-1 Cont	A	1 Year
3ES564-I	9	FCV-74-12 Cont	A	1 Year
3ES1151-I	9	FCV-74-7 Cont	A	1 Year
3ES3089-II	9	FCV-74-36 Cont	A	1 Year
3ES3189-II	9	FCV-74-73 Cont	A	1 Year
3ES3151-II	9	FCV-74-74 Cont	A	1 Year

EEB 14-0051

Rev 0

ATTACHMENT B

Mark WGK

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable Corp
73C7-84528	PJJ	Rome Cable
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-74-0051

Revision: 0

ATTACHMENT C

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

C.2 TVA Engineering Report No. 1943

a) 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. CIL-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 P[illegible]t
Unit: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0054
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.5	Engineering Analysis	None
Component Cable WGM 16/c, #12AWG, (CN1) Manufacturer: Attachment B	Temperature (°F)	325	153	(4)	Attachments C.2 and C.3	Attachment C.4	None
Model Number: N/A	Pressure (PSIA)	69.7	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)	6.5×10^7 γ 4×10^9 β Attach. C.1	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A	Aging	N/A	10 years	(2)	Attachment C.3	Oper. Exper.	None
Location: 0							
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: H.D. Romanowski/SMK
Reviewed by: J.A. Bradley
QA Acceptance: _____

Attachment A

System: 74
Unit: 3

EEB-74-0054
Rev 0

Component: Cable 16/c #12 AWG
Mark: WGM

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3907-II	0	FCV-74-67 Cont	A	1 year

EEB 74-0054

Rev 0

ATTACHMENT B

Mark WGM

Contract No.	Type	Manufacturer
TR 820500 XFR From 74C7-85069-1	PJJ	Rome Cable
72X7-74885-1	PNJ	Brand-Rex
67C3-91618	PNJ	Plastic Wire & Cable
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	Brand-Rex

Sheet No: EEB-74-0054

Revision: 0

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.

Sheet No: EEB 74-0054

Revision: 0

ATTACHMENT C (Continued)

C.1 (Continued)

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 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.3 TVA Engineering Report No. 1943

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

Room: O

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 temperature. The in-containment SLB temperature and duration exceeds the cable ratings and the insulation and jacket distortion temperatures.

However, the service which these cable 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 insulated cable has demonstrated and is capable of withstanding the LOCA/ SLB and the post-LOCA environment of 1 year. Thus, continued operation is justified.

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.

C.4 Temperature Qualification Method

C.4.1 Standard material long-term overload temperature rating

C.4.2 Engineering analysis

Sheet No: EEB-74-0054

Revision No: 0

ATTACHMENT C (Continued)

C.5 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: _____

8

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0055
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGM 16/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (^{o}F)	294	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: Room 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: H. D. Romsenthal
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

System: 74
Unit: 3

EEB-74-0055
Rev 0

Component: Cable 16/c #12 AWG
Mark: WGM

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3636-II	5	FCV-74-30 Cont	A	1 year

EEB 74-0055

Rev 0

ATTACHMENT B

Mark WGM

Contract No.	Type	Manufacturer
TR 820500 XFR From 74C7-85069-1	PJJ	Rome Cable
72X7-74885-1	PNJ	Brand-Rex
67C3-91618	PNJ	Plastic Wire & Cable
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-74-0055

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)

Sheet No. (3) EEB 74-0056
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGM 16/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (°F)	157	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)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A Location: Room 8	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: H. D. Ronsonewski
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0056

Rev 0

System: 74
Unit: 3

Component: Cable 16/c #12
Mark: WGM

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3636-II	8	FCV-74-30 Cont	A	1 Year

EEB 74-0056

Rev 0

ATTACHMENT B

Mark WGM

Contract No.	Type	Manufacturer
TR 820500 XFR From 74C7-85069-1	PJJ	Rome Cable
72X7-74885-1	PNJ	Brand-Rex
67C3-91618	PNJ	Plastic Wire & Cable
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-74-0056

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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0057
Revision 9
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WGM 16/c, #12AWG, (PNJ) Manufacturer: Attachment B	Temperature (^{o}F)	157	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)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A Location: Room 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: H.D. Romanauski
Reviewed by: J.A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0057

Rev 0

System: 74
Unit: 3

Component: Cable 16/c #12
Mark: WGM

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3636-II	9	FCV-74-30 Cont	A	1 year

EEB 14-0057

Rev 0

ATTACHMENT B

Mark WGM

Contract No.	Type	Manufacturer
TR 820500 XFR From 74C7-85069-1	PJJ	Rome Cable
72X7-74885-1	PNJ	Brand-Rex
67C3-91618	PNJ	Plastic Wire & Cable
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	Brand-Rex

8C

Sheet No.: EEB-74-0057

Revision: 0

ATTACHMENT C

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

C.2 TVA Engineering Report No. 1943.

(3) 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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0058
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WHB 2/c, #14AWG, (PNJ)(PJJ) Manufacturer: Attachment B	Temperature (^{o}F)	294	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: Room 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: H. D. Lomanowski/jm
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0058

Rev 0

System: 74
Unit: 3

Component: Cable 2/c, #14 AWG
Mark: WHB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3648-II	5	FCV-74-30 CONT	A	1 Year

EEB 74-0058

Rev 0

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-74-0058

Revision: 0

ATTACHMENT C

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

C.2 TVA Engineering Report No. 1943

(2) 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: _____

18

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0059
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WHB 2/c, #14AWG, (PNJ)(PJJ) Manufacturer: Attachment B	Temperature (°F)	220	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)	3.1×10^7	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: Room 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: H. D. Romonowski
Reviewed by: J. M. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0059

Rev 0

System: 74
Unit: 3

Component: Cable 2/c, #14 AWG
Mark: WHB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1158-I	6	FCV-74-46 RHR SVS I LGC	A	1 Year
3ES3159-II	6	FCV-74-46 CONT	A	1 Year
3ES3631-II	6	FCV-74-72 CONT	A	1 Year

EEB 74-0059

Rev 0

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-74-0059

Revision: 0

ATTACHMENT C

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

C.2 TVA Engineering Report No. 1943.

C.3 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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0060
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WHB 2/c, #14AWG, (PNJ)(PJJ) Manufacturer: Attachment B	Temperature (°F)	157	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)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A Location: Room 8	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: H. D. Romanowski 5/11
Reviewed by: J. L. Bradley
QA Acceptance: _____

Attachment A

EEB 74-00600

Rev 0

System: 74
Unit: 3

Component: Cable 2/c, #14 AWG
Mark: WHB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3170-II	8	FCV-74-75 CONT	A	1 Year
3ES3156-II	8	FCV-74-75 CONT	A	1 Year
3ES1158-I	8	FCV-74-46 RHR SVS I LGC	A	1 Year
3ES3648-II	8	FCV-74-30 CONT	A	1 Year
3ES656-I	8	FCV-74-60 CONT	A	1 Year
3ES670-I	8	FCV-74-61 CONT	A	1 Year
3ES3631-II	8	FCV-74-72 CONT	A	1 Year

EEB 74-0060

Rev 0

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-74-0060

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 74-0061
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WH8 2/c, #14AWG, (PNJ)(PJJ) Manufacturer: Attachment B	Temperature (^{o}F)	211	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)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A Location: Room 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: H. D. Romanowski
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0061

Rev 0

System: 74
Unit: 3

Component: Cable 2/c, #14 AWG
Mark: WHB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3170-II	9	FCV-74-75 CONT	A	1 Year
3ES3156-II	9	FCV-74-75 CONT	A	1 Year
3ES1158-I	9	FCV-74-46 RHR SVS I LGC	A	1 Year
3ES3648-II	9	FCV-74-30 CONT	A	1 Year
3ES656-I	9	FCV-74-60 CONT	A	1 Year
3ES670-I	9	FCV-74-61 CONT	A	1 Year
3ES3631-II	9	FCV-74-72 CONT	A	1 Year

EEB 74-0061

Rev 0

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

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Sheet No.: EEB-74-0061

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 74-0062
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WHD 4/c, #14AWG, (PNJ)(PJJ) Manufacturer: Attachment B	Temperature (°F)	220	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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	3.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: Room 6	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

See Section 2.4 in 79-01B report.
Section 4.1.2 in 79-01B report.
...d other information not on these ... the attached appendix sheets.
...and/or Appendix B in 79-01B report.

Prepared by: H.D. Romanowski
Reviewed by: [signature]
QA Acceptance: ____________

Attachment A

EEB 74-0062

Rev 0

System: 74
Unit: 3

Component: Cable 4/c, #14 AWG
Mark: WHD

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES679-I	6	FCV-74-57 CONT	A	1 Year
3ES704-I	6	FCV-74-58 CONT	A	1 Year
3ES692-I	6	FCV-74-59 CONT	A	1 Year
3ES3179-II	6	FCV-74-71 CONT	A	1 Year
3ES3629-II	6	FCV-74-72 CONT	A	1 Year
3ES3192-II	6	FCV-74-73 CONT	A	1 Year

EEB 74-OCT-2

Rev 0

ATTACHMENT B

Mark WHD

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable
74C7-825527-1	PJJ	Continental Wire & Cable
75K7-86150-1	PJJ	Cyprus
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	Brand-Rex

Sheet No.: EEB-74-0062

Revision: 0

ATTACHMENT C

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

C.2 TVA Engineering Report No. 1943.

C.3 Cable types: PJ, PN, PNJ, PJJ, PSJ

Rooms 1-18

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

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

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

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

C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

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

Prepared by: _____

Reviewed by: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0063
Revision 9
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WHD 4/c, #14AWG, (PNJ)(PJJ) Manufacturer: Attachment B	Temperature (^{o}F)	211	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)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Service: Attachment A Location: Room 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: H. D. Romanowski
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0063

Rev 0

System: 74
Unit: 3

Component: Cable 4/c, #14 AWG
Mark: WHD

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3179-II	9	FCV-74-71 CONT	A	1 Year
3ES3629-II	9	FCV-74-72 CONT	A	1 Year
3ES3192-II	9	FCV-74-73 CONT	A	1 Year

EEB 74-0063

Rev 0

ATTACHMENT B

Mark WHD

Contract No.	Type	Manufacturer
67C3-91618	PNJ	Plastic Wire & Cable
74C7-825527-1	PJJ	Continental Wire & Cable
75K7-86150-1	PJJ	Cyprus
72C7-75328-2	PNJ	Tamaqua
70C7-54179-1	PNJ	Brand-Rex

8C

Sheet No.: EEB-74-0063

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 74-0067
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WHJ 12/c, #14AWG, (PNJ) Manufacturer: Attachment B	Temperature (^{o}F)	158	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: Room 2							
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: H.D. Romanowski
Reviewed by: J.A. Bailey
QA Acceptance: _____

Attachment A

EEB 74-0067

Rev 0

System: 74
Unit: 3

Component: Cable 12/c #14 AWG (PNJ)
Mark: WHJ

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES576-I	2	FCV-74-02 Cont.	A	1 yr
3ES589-I	2	FCV-74-13 Cont.	A	1 yr

EEB 74-0067

Rev 0

ATTACHMENT B

Mark WHJ

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

Sheet No.: EEB-74-0067

Revision: 0

ATTACHMENT C

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

C.2 TVA Engineering Report No. 1943.

a) 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 74-0068
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WHJ 12/c, #14AWG, (PNJ) Manufacturer: Attachment B	Temperature (^{o}F)	220	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)	3.1×10^7	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: Room 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: H. O. Romanowski
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0068

Rev 0

System: 74
Unit: 3

Component: Cable 12/c #14 AWG (PNJ)
Mark: WHJ

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES676-I	6	FCV-74-57 Cont.	A	1 yr
3ES701-I	6	FCV-74-58 Cont.	A	1 yr
3ES689-I	6	FCV-74-59 Cont.	A	1 yr

FEB 74-9068

Rev 0

ATTACHMENT B

Mark WHJ

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

Sheet No.: EEB-74-0068

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 74-0070
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WHJ 12/c, #14AWG, (PNJ) Manufacturer: Attachment B	Temperature (°F)	157	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
Model Number: N/A Function: Control/Power	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
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 Service: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Location: Room 8	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: H. D. Romanowski /
Reviewed by: J. Bradley
QA Acceptance: ______

Attachment A

EEB 74-0070

Rev 0

System: 74
Unit: 3

Component: Cable 12/c #14 AWG (PNJ)
Mark: WHJ

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES651-I	8	FCV-74-60 Cont.	A	1 yr
3ES664-I	8	FCV-74-61 Cont.	A	1 yr
3ES676 I	8	FCV-74-2 Cont.	A	1 yr
3ES589-I	8	FCV-74-13 Cont.	A	1 yr
3ES676-I	8	FCV-74-57 Cont.	A	1 yr
3ES701-I	8	FCV-74-58 Cont.	A	1 yr
3ES689-I	8	FCV-74-59 Cont.	A	1 yr

EEB 74-0070

Rev 0

ATTACHMENT B

Mark WHJ

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

8C

Sheet No.: EEB-74-0070

Revision: 0

ATTACHMENT C

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

C.2 TVA Engineering Report No. 1943.

C.3 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 74-0071
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable NHJ 12/c, #14AWG, (PNJ) Manufacturer: Attachment B	Temperature (^{o}F)	211	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)	2.1 x 10^{7}	4x10^{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: Room 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: H. D. Romenowski

Reviewed by: J. M. Bradley

QA Acceptance: _____

Attachment A

EEB 74-0071

Rev 0

System: 74
Unit: 3

Component: Cable 12/c #14 AWG (PNJ)
Mark: WHJ

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES651-I	9	FCV-74-60 Cont.	A	1 yr
3ES664-I	9	FCV-74-61 Cont.	A	1 yr
3ES1168-I	9	FCV-74-77 Cont.	A	1 yr
3ES576-I	9	FCV-74-2 Cont.	A	1 yr
3ES589-I	9	FCV-74-13 Cont.	A	1 yr
3ES676-I	9	FCV-74-57 Cont.	A	1 yr
3ES701-I	9	FCV-74-58 Cont.	A	1 yr
3ES689-I	9	FCV-74-59 Cont.	A	1 yr

EEB 74-0071

Rev 0

ATTACHMENT B

Mark WHJ

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

Sheet No.: EEB-74-0071

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 74-0072
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WHJ 12/c, #14AWG, (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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A Location: Room 12	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: H.B. Romanowski / JJK

Reviewed by: [signature]

QA Acceptance: ______

Attachment A

EEB 74-0072

Rev 0

System: 74
Unit: 3

Component: Cable 12/c #14 AWG (PNJ)
Mark: WHJ

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1168-I	12	FCV-74-77 Cont.	A	1 yr

EEB 14-0012

Rev 0

ATTACHMENT B

Mark WHJ

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

8C

Sheet No.: EEB-74-0072

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

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB-74-0073
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.5	Engineering Analysis	None
Component Cable - WHL 16/c, #14 AWG (PNJ) Manufacturer: Attachment B	Temperature (^{o}F)	325	153	(4)	Attachments C.2 and C.3	Attachment C.4	None
Model Number: N/A	Pressure (PSIA)	69.7	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)	6.5×10^{7} γ 4×10^{9} β Attach. C.1	4×10^{7}	(4)	NUREG-0588 Materials List	Generic Mate al Test	None
Service: Attachment A	Aging	N/A	10 years	(2)	Attachment C.3	Oper. Experience	None
Location: 0							
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: H.D. Romenowski
Reviewed by: J.A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0073

Rev 0

System: 74
Unit: 3

Component: Cable 16/c #14 AWG (PNJ)
Mark: WHL

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES539-I	0	FCV-74-52 Cont.	A	1 yr

EEB 74-0073

REV 0

ATTACHMENT B

Mark WHL

Contract No.	Type	Manufacturer
67C3-91618-1	PNJ	Plastic Wire & Company
72C7-75228-1 (SQN)	PJJ	Plastic Wire & Cable

Sheet No: EEB- 74-0073

Revision: 0

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.

Sheet No: EEB 74-0073

Revision: 0

ATTACHMENT C (Continued)

C.1 (Continued)

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 IPCEA S-61-402 Paragraph 3.9 and Appendix D

C.3 TVA Engineering Report No. 1943

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

Room: O

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 temperature. The in-containment SLB temperature and duration exceeds the cable ratings and the insulation and jacket distortion temperatures.

However, the service which these cable 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 insulated cable has demonstrated and is capable of withstanding the LOCA/ SLB and the post-LOCA environment of 1 year. Thus, continued operation is justified.

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.

C.4 Temperature Qualification Method

C.4.1 Standard material long-term overload temperature rating

C.4.2 Engineering analysis

Sheet No: EEB-74-0073

Revision No: 0

ATTACHMENT C (Continued)

C.5 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: _____

8

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Pev 2)

(3)
Sheet No. EEB 74-0074
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WHL 16/c, #14AWG, (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: Room 7	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (^{o}F)	308	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
	Pressure (PSIA)	21.5	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)	2×10^6	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: K. D. Ramanauskas

Reviewed by: J. M. Bradley

QA Acceptance: _____

Attachment A

EEB 74-0074

Rev 0

System: 74
Unit: 3

Component: Cable 16/c #14 AWG (PNJ)
Mark: WHL

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES539-I	7	FCV-74-52 Cont.	A	1 yr
3ES527-I	7	FCV-74-53 Cont.	A	1 yr

EEB 74-0074

REV 0

ATTACHMENT B

Mark WHL

Contract No.	Type	Manufacturer
67C3-91618-1	PNJ	Plastic Wire & Company
72C7-75228-1 (SQN)	PJJ	Plastic Wire & Cable

Sheet No.: EEB-74-0074

Revision: 0

ATTACHMENT C

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

C.2 TVA Engineering Report No. 1343.

C.3 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 74-0075
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable NHL 16/c, #14AWG, (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: Room 8	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
	Temperature (°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: H.D. Romanowski/SA
Reviewed by: J.P. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0075

Rev 0

System: 74
Unit: 3

Component: Cable 16/c #14 AWG (PNJ)
Mark: WHL

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES539-I	8	FCV-74-52 Cont.	A	1 yr
3ES527-I	8	FCV-74-53 Cont.	A	1 yr

EEB 74-0075

REV 0

ATTACHMENT B

Mark WHL

Contract No.	Type	Manufacturer
67C3-91618-1	PNJ	Plastic Wire & Company
72C7-75228-1 (SQN)	PJJ	Plastic Wire & Cable

Sheet No.: EEB-74-0075

Revision: 0

ATTACHMENT C

C.1 IPCEA S-61-402 Paragraph 3.3 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 74-0076
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WHL 16/c, #14AWG, (PNJ) Manufacturer: Attachment B	Temperature (°F)	211	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
Model Number: N/A	Pressure (PSIA)	15.0	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 Service: Attachment A	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
Location: Room 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: K. D. Romanowski
Reviewed by: J. M. Bradley
QA Acceptance: _____

Attachment A

ECN 74-0076

Rev 0

System: 74
Unit: 3

Component: Cable 16/c #14 AWG (PNJ)
Mark: WHL

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES539-I	9	FCV-74-52 Cont.	A	1 yr
3ES527-I	9	FCV-74-53 Cont.	A	1 yr

EEB 74-0076

REV 0

ATTACHMENT B

Mark WHL

Contract No.	Type	Manufacturer
67C3-91618-1	PNJ	Plastic Wire & Company
72C7-75228-1 (SQN)	PJJ	Plastic Wire & Cable

8C

Sheet No.: EEB-14-0076

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 74-0077
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WLC 3/c, #12AWG, (CPJJ) 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: 0	Operating Time	Attachment A	1 year	(1)	Attachment C.4	Engineering Analysis and Tests	None
	Temperature (^{o}F)	325	325	(4)	Attachment C.2	Generic Simultaneous Test	None
	Pressure (PSIA)	69.7	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.2	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	6.5×10^7 γ 4×10^9 β Attach. C.1	6.9×10^7	(4)	Attachment C.2	Generic Sequential Test	None
	Aging	N/A	10 years	(2)	Attachment C.3	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: H. A. Romanowski 10/24
Reviewed by: J. L. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0077

Rev 0

System: 74
Unit: 3

Component: Cable 3/c #12 AWG (CPJJ)
Mark: WLC

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1137-I	0	FCV-74-78 Supply	A	1 yr

EEB 74-0077

Rev 0

ATTACHMENT B

Mark WLC

Contract No.	Type	Manufacturer
71C7-54517	CPJJ	Plastic Wire & Cable
73C7-84528	CPJJ	Plastic Wire & Cable
68C7-61920	CPJJ	Sumitomo Shoji
72C7-75533-1	CPJJ	Essex
72C7-75228-1	CPJJ	PWC

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 x 10^7 rads of beta.

Since the energy dissipation of gamma radiation occurs via ionizing processes, one can add the accident dose of 4 x 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 x 10^7 rads which added directly gives a total dose of 7.3 x 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 x 10^7 is less than the values for which we have in-air test data for SROAJ types (1.2 x 10^8) and for XLPE types (2 x 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.

Sheet No: EEB 74-0077

Revision: 0

ATTACHMENT C (con'd)

C.2 Wyle Laboratory Report No. 43854-3

C.3 NUREG-0588 Material List

C.4 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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0078
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WLC 3/c, #12AWG, (CPJJ) Manufacturer: Attachment B	Temperature (^{o}F)	158	325	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
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	6.9×10^7	(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: Room 2							
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: K. D. Romanowski
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0078

Rev 0

System: 74
Unit: 3

Component: Cable 3/c #12 AWG (CPJJ)
Mark: WLC

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1150-I	2	FCV-74-7 Supply	A	1 yr

EEB 74-0078

Rev 0

ATTACHMENT B

Mark WLC

Contract No.	Type	Manufacturer
71C7-54517	CPJJ	Plastic Wire & Cable
73C7-84528	CPJJ	Plastic Wire & Cable
68C7-61920	CPJJ	Sumitomo Shoji
72C7-75533-1	CPJJ	Essex
72C7-75228-1	CPJJ	PWC

Sheet No.: EEB- 74-0078

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: _____

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 74-0079
Revision 9
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WLC 3/c, #12AWG, (CPJJ) 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: Room 6	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	220	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)	3.1×10^7	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: H D Ramonowski / SPH
Reviewed by: J M Bradley
QA Acceptance: _____

Attachment A

EEB 74-0079

Rev 0

System: 74
Unit: 3

Component: Cable 3/c #12 AWG (CPJJ)
Mark: WLC

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES700-I	6	FCV-74-58 Supply	A	1 yr
3ES688-I	6	FCV-74-59 Supply	A	1 yr

EEB 74-0079

Rev 0

ATTACHMENT B

Mark WLC

Contract No.	Type	Manufacturer
71C7-54517	CPJJ	Plastic Wire & Cable
73C7-84528	CPJJ	Plastic Wire & Cable
68C7-61920	CPJJ	Sumitomo Shoji
72C7-75533-1	CPJJ	Essex
72C7-75228-1	CPJJ	PWC

Sheet No.: EEB-74-0079

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: _____

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 74-0080
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WLC 3/c, #12AWG, (CPJJ) Manufacturer: Attachment B	Temperature (^{o}F)	157	325	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
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	6.9×10^7	(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: Room 8							
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: K. D. Rosanowski/SA
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0080

Rev 0

System: 74
Unit: 3

Component: Cable 3/c #12 AWG (CPJJ)
Mark: WLC

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1150-I	8	FCV-74-7 Supply	A	1 yr
3ES700-I	8	FCV-74-58 Supply	A	1 yr
3ES688-I	8	FCV-74-59 Supply	A	1 yr

EEB 74-0080

Rev 0

ATTACHMENT B

Mark WLC

Contract No.	Type	Manufacturer
71C7-54517	CPJJ	Plastic Wire & Cable
73C7-84528	CPJJ	Plastic Wire & Cable
68C7-61920	CPJJ	Sumitomo Shoji
72C7-75533-1	CPJJ	Essex
72C7-75228-1	CPJJ	PWC

Sheet No.: EEB- 74-0030

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: _____

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 74-0081
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WLC 3/c, #12AWG, (CPJJ) Manufacturer: Attachment B	Temperature (^{o}F)	211	325	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
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	6.9×10^7	(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: Room 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: H. D. Romenowski

Reviewed by: J. A. Bradley

QA Acceptance: _____

Attachment A

EEB 74-0081

Rev 0

System: 74
Unit: 3

Component: Cable 3/c #12 AWG (CPJJ)
Mark: WLC

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1150-I	9	FCV-74-7 Supply	A	1 yr
3ES700-I	9	FCV-74-58 Supply	A	1 yr
3ES688-I	9	FCV-74-59 Supply	A	1 yr

EEB 74-0081

Rev 0

ATTACHMENT B

Mark WLC

Contract No.	Type	Manufacturer
71C7-54517	CPJJ	Plastic Wire & Cable
73C7-84528	CPJJ	Plastic Wire & Cable
68C7-61920	CPJJ	Sumitomo Shoji
72C7-75533-1	CPJJ	Essex
72C7-75228-1	CPJJ	PWC

Sheet No.: EEB-74-0081

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: _____

Reviewed by: _____

QA Acceptance: _____

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

Sheet No. EEB74-0082 (3)
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WLG 7/c, #12 WWG CPJJ 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: 0 Flood Level Elev: 552' Above Flood Level: Yes X No	Operating Time	Attachment A	1 year	(1)	Attachment C.4	Engineering Analysis and Tests	None
	Temperature (°F)	325	325	(4)	Attachment C.2	Generic Simultaneous Test	None
	Pressure (PSIA)	69.7	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.2	Generic Simultaneous Test	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	6.5×10^7 γ 4×10^9 β Attach. C.1	6.9×10^7	(4)	Attachment C.2	Generic Sequential Test	None
	Aging	N/A	10 years	(2)	Attachment C.3	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: H.D. Romanowski/SHK
Reviewed by: J.M. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0082

Rev 0

System: 74
Unit: 3

Component: Cable 7/c #12 AWG (CPJJ)
Mark: WLG

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES1139-I	0	FCV-74-78 Cont.	A	1 yr

EEB 74-0082

Rev 0

ATTACHMENT B

Mark WLG

Contract No.	Type	Manufacturer
68C7-61920	CPJJ	Sumitomo Shoji
72C7-75228-1	CPJJ	Essex

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.

Sheet No: EEB 74-0082

Revision: 0

ATTACHMENT C (con'd)

C.2 Wyle Laboratory Report No. 43854-3

C.3 NUREG-0588 Material List

C.4 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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Sheet No. (3) LEB 74-0083
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WLO 3/c, #10 AWG CPJJ Manufacturer: Attachment B	Temperature (°F)	158	325	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Accuracy: Req'd: N/A Demon: N/A Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	$3x10^7$	$6.9x10^7$	(4)	Attachment C.1	Generic Sequential Test	None
Location: Room 2	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: H. D. Romanowski / JPA

Reviewed by: J. L. Bradley

QA Acceptance: ______

Attachment A

EEB 74-0083

Rev 0

System: 74
Unit: 3

Component: Cable 3/c, #10 AWG
Mark: WLO

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES550-I	2	FCV-74-1 SUPPLY	A	1 Year
3ES563-I	2	FCV-74-12 SUPPLY	A	1 Year
3ES575-II	2	FCV-74-2 SUPPLY	A	1 Year
3ES588-I	2	FCV-74-13 SUPPLY	A	1 Year
2ES3712	2	FCV-74-96 SUPPLY	A	1 Year
3ES3735	2	FCV-74-97 SUPPLY	A	1 Year

ATTACHMENT B

Mark WLO

Contract No.	Type	Manufacturer
71C7-54517	CPJJ	Plastic Wire & Cable
68C7-61920	CPJJ	Sumitomo Shoji
72C7-75228-1	CPJJ	PWC
72C7-75533-1	CPJJ	Essex

Sheet No.: EEB-74-0083

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: _____

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 74-0084
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WLO 3/c, #10 AWG CPJJ Manufacturer: Attachment B	Temperature (^{o}F)	294	325	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
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)	$3x10^7$	$6.9x10^7$	(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: Room 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: H. D. Romanowski
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0084

Rev 0

System: 74
Unit: 3

Component: Cable 3/c, #10 AWG
Mark: WLO

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3650-II	5	FCV-74-101 SUPPLY	A	1 Year
3ES3063-II	5	FCV-74-35 SUPPLY	A	1 Year
3ES3075-II	5	FCV-74-25 SUPPLY	A	1 Year
3ES3088-II	5	FCV-74-36 SUPPLY	A	1 Year
3ES3635-II	5	FCV-74-30 SUPPLY	A	1 Year
3ES3660-II	5	FCV-74-99 SUPPLY	A	1 Year

EEB 74-0084

Rev 0

ATTACHMENT B

Mark WLO

Contract No.	Type	Manufacturer
71C7-54517	CPJJ	Plastic Wire & Cable
68C7-61920	CPJJ	Sumitomo Shoji
72C7-75228-1	CPJJ	PWC
72C7-75533-1	CPJJ	Essex

Sheet No.: EEB- 74-0084

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: _____

Reviewed by: _____

QA Acceptance: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Pev 2)

(3)
Sheet No. EEB 74-0085
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WLO 3/c, #10 AWG CPJJ Manufacturer: Attachment B Model Number: N/A Function: Control Power Accuracy: Req'd N/A Demo Category: Attachment A Service: Attachment A Location: Room 6	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	220	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)	3.1×10^7	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: H.D. Romenesko
Reviewed by: J.M. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0085

Rev 0

System: 74
Unit: 3

Component: Cable 3/c, #10 AWG
Mark: WLO

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES675-I	6	FCV-74-57 SUPPLY	A	1 Year
3ES3175-II	6	FCV-74-71 SUPPLY	A	1 Year
3ES3625-II	6	FCV-74-72 SUPPLY	A	1 Year
3ES3188-II	6	FCV-74-73 SUPPLY	A	1 Year

EEB 74-0085

Rev 0

ATTACHMENT B

Mark WLO

Contract No.	Type	Manufacturer
71C7-54517	CPJJ	Plastic Wire & Cable
68C7-61920	CPJJ	Sumitomo Shoji
72C7-75228-1	CPJJ	PWC
72C7-75533-1	CPJJ	Essex

Sheet No.: EEB- 74-0085

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: _____

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 74-0086
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WLO 3/c,#10 AWG CPJJ 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: Room 8	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	157	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)	2.1×10^7	6.9×10^7	(4)	Attachment C.1	Generic Sequential Te	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: H.D. Romanowski
Reviewed by: J.M. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0086

Rev 0

System: 74
Unit: 3

Component: Cable 3/c, #10, AWG
Mark: WLO

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES3650-II	8	FCV-74-24 SUPPLY	A	1 Year
3ES650-I	8	FCV-74-61 SUPPLY		
3ES663-I	8	FCV-74-61 SUPPLY		
3ES3671-II	8	FCV-74-101 SUPPLY		
3ES550-I	8	FCV-74-1 SUPPLY		
3ES563-I	8	FCV-74-12 SUPPLY		
3ES575-II	8	FCV-74-2 SUPPLY		
3ES588-I	8	FCV-74-13 SUPPLY		
3ES675-I	8	FCV-74-74-57		
3ES3063-II	8	FCV-74-35 SUPPLY		
3ES3075-II	8	FCV-74-25 SUPPLY		
3ES3088-II	8	FCV-74-36 SUPPLY		
3ES3635-II	8	FCV-74-30 SUPPLY		
3ES3660-II	8	FCV-74-99 SUPPLY		
3ES3175-II	8	FCV-74-71 SUPPLY		
3ES3625-II	8	FCV-74-72 SUPPLY		
3ES3188-II	8	FCV-74-73 SUPPLY		
2ES3712	8	FCV-74-96 SUPPLY		
3ES3735	8	FCV-74-97 SUPPLY		
3ES3725	8	FCV-74-100 SUPPLY		

EEB 74-0086

Rev 0

ATTACHMENT B

Park WLO

Contract No.	Type	Manufacturer
71C7-54517	CPJJ	Plastic Wire & Cable
68C7-61920	CPJJ	Sumitomo Shoji
72C7-75228-1	CPJJ	PWC
72C7-75533-1	CPJJ	Essex

Sheet No.: EEB-74-0086

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: _____

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 74-0087
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WLO 3/c, #10 AWG CPJJ Manufacturer: Attachment B	Temperature (^{o}F)	211	325	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Control/Power	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
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	6.9×10^7	(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: Room 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: K. D. Ramaswamy
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0087

Rev 0

System: 74
Unit: 3

Component: Cable 3/c, #10 AWG
Mark: WLO

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES650-I	9	FCV-74-61 SUPPLY	A	1 Year
3ES663-I	9	FCV-74-61 SUPPLY	A	1 Year
3ES550-I	9	FCV-74-1 SUPPLY	A	1 Year
3ES563-I	9	FCV-74-2 SUPPLY	A	1 Year
3ES575-II	9	FCV-74-2 SUPPLY	A	1 Year
3ES588-I	9	FCV-74-13 SUPPLY	A	1 Year
3ES675-I	9	FCV-74-57 SUPPLY	A	1 Year
3ES3635-II	9	FCV-74-30 SUPPLY	A	1 Year

EEB 74-0087

Rev 0

ATTACHMENT B

Mark WLO

Contract No.	Type	Manufacturer
71C7-54517	CPJJ	Plastic Wire & Cable
68C7-61920	CPJJ	Sumitomo Shoji
72C7-75228-1	CPJJ	PWC
72C7-75533-1	CPJJ	Essex

Sheet No.: EEB-74-0087

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: _____

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 74-0088
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WNE 1/c, #400 MCM, CPSJ Manufacturer: Attachment B	Temperature (^{o}F)	158	325	(4)	Attachment C.1	1. Generic Simultaneous Test 2. Engr. analysis	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Power	Relative Humidity (%)	100	100	(4)	Attachment C.1	1. Generic Simultaneous Test 2. Engr. analysis	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)	$3x10^7$	$6.9x10^7$	(4)	Attachment C.1	1. Generic Sequential Test 2. Engr. analysis	None
Service: Attachment A Location: Room 2	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: H. D. Romanosky
Reviewed by: J. M. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0088

Rev 0

System: 74
Unit: 3

Component: Cable 1/c, #400 MCM
Mark: WNE

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES4070-II	2	RHR PMP 3D SUPPLY	A	1 Year
3ES1570-I	2	RHR PMP 3C SUPPLY	A	1 Year
3ES1560-I	2	RHR PMP 3A SUPPLY	A	1 Year

EEB 74-0088

Rev 0

ATTACHMENT B

Mark WNE

Contract No.	Type	Manufacturer
71C7-54180	CPSJ	Phelps Dodge Cable & Wire
72C7-75212	CPSJ	General Cable

Sheet No. EEB 74-0088

Revision: 0

ATTACHMENT C

C.1 TVA Engineering Report No. 1944

Cable types: CP, CPJ, CPJJ, PXJ

Rooms: 0-18

The CP family of cables consists of cross-linked polyethylene insulation and polyvinyl chloride jacketing, and the PX family of cables consists of cross-linked polyethylene or ethylene propylene rubber, and the jacket is chlorosulfonated polyethylene or chloronated polyethylene. The following LOCA/SLB test apply:

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

PX types 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. Because of the conservatism of these tests 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.

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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0089
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WNE 1/c, #400 MCM, CPSJ Manufacturer: Attachment B Model Number: N/A Function: Power Accuracy: Req'd: N/A Demon: N/A Category: Attachment A Service: Attachment A Location: Room 5	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (°F)	294	325	(4)	Attachment C.1	1. Generic Simultaneous Test 2. Engr. analysis	None
	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
	Relative Humidity (%)	100	100	(4)	Attachment C.1	1. Generic Simultaneous Test 2. Engr. analysis	None
	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
	Radiation (RAD)	$3x10^7$	$6.9x10^7$	(4)	Attachment C.1	1. Generic Sequential Test 2. Engr. analysis	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: H.D. Ramaswamy
Reviewed by: J.M. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0089

Rev 0

System: 74
Unit: 3

Component: Cable 1/c, #400 MCM
Mark: WNE

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3ES4070-II	5	RHR PMP 3D SUPPLY	A	1 Year
3ES4060-I	5	RHR PMP 3B SUPPLY	A	1 Year

EEB 74-0089

Rev 0

ATTACHMENT B

Mark WNE

Contract No.	Type	Manufacturer
71C7-54180	CPSJ	Phelps Dodge Cable & Wire
72C7-75212	CPSJ	General Cable

Sheet No. EEB 74-0089

Revision: 0

ATTACHMENT C

C.1 TVA Engineering Report No. 1944

Cable types: CP, CPJ, CPJJ, PXJ

Rooms: 0-18

The CP family of cables consists of cross-linked polyethylene insulation and polyvinyl chloride jacketing, and the PX family of cables consists of cross-linked polyethylene or ethylene propylene rubber, and the jacket is chlorosulfonated polyethylene or chloronated polyethylene. The following LOCA/SLB test apply:

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

PX types 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. Because of the conservatism of these tests 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.

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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0090
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WUB 2/c, #16 AWG, Copper/Const Manufacturer: Attachment B	Temperature (^{o}F)	157	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)	2.1×10^7	5×10^7	(4)	Attachment C.1	Generic Sequential Test	None
Location: Room 8	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: H. D. Romanowski

Reviewed by: J. A. Bradley

QA Acceptance: _____

Attachment A

EEB 74-0090

Rev 0

System: 74
Unit: 3

Component: Cable 2/c, #16 AWG
Mark: WUB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R853	8	TE-74-82 RHR HTX C OT TMP	A	1 Year
3R851	8	TE-74-82 RHR HTX C OT TMP	A	1 Year
3R852	8	TE-74-81 RHR HTX A OT TMP	A	1 Year
3R850	8	TE-74-9 RHR HTX A OT TMP	A	1 Year
3R860	8	TE-74-32 RHR HTX B OT TMP	A	1 Year
3R861	8	TE-74-43 RHR HTX D OT TMP	A	1 Year
3R862	8	TE-74-83 RHR HTX B OT TMP	A	1 Year
3R863	8	TE-74-84 RHR HTX D OT TMP	A	1 Year

EEB 74-0090

Rev 0

ATTACHMENT B

Mark WUB

Contract No.	Type	Manufacturer
68C7-51959	PE/PE	Continental Wire & Cable
72C7-83014		Continental Wire & Cable

Sheet No.: EEB-74-0090

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: _____

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SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

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

(3)
Sheet No. EEB 74-0091
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WUB 2/c,#16 AWG, Copper/Const Manufacturer: Attachment B	Temperature (°F)	157	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	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Accuracy: Req'd: N/A Demon: N/A Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	2.1×10^7	2×10^8	(4)	Attachment C.1	Generic Sequential Test	None
Location: Room 8	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: H.D. Romanowski
Reviewed by: [signature]
QA Acceptance: ✓

Attachment A

EEB 74-0091

Rev 0

System: 74
Unit: 3

Component: Cable 2/c, #16 AWG
Mark: WUB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R853	8	TE-74-82 RHR HTX C OT TMP	A	1 Year
3R851	8	TE-74-82 RHR HTX C OT TMP	A	1 Year
3R852	8	TE-74-81 RHR HTX A OT TMP	A	1 Year
3R850	8	TE-74-9 RHR HTX A OT TMP	A	1 Year
3R860	8	TE-74-32 RHR HTX B OT TMP	A	1 Year
3R861	8	TE-74-43 RHR HTX D OT TMP	A	1 Year
3R862	8	TE-74-83 RHR HTX B OT TMP	A	1 Year
3R863	8	TE-74-84 RHR HTX D OT TMP	A	1 Year

EEB 74-0091

Rev 0

ATTACHMENT B

Mark WUB

Contract No.	Type	Manufacturer
68C7-51959	PE/PE	Continental Wire & Cable
72C7-83014		Continental Wire & Cable

Sheet No: EEB 74-0091

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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0092
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WUB 2/c, #16 AWG Copper/Const Manufacturer: Attachment B	Temperature (°F)	157	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 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)	2.1×10^7	4×10^7	(4)	NUREG-0588 Material List	Generic Material Tests	None
Location: Room 8	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: K.O. Romanowski
Reviewed by: J.A. Bradley
QA Acceptance: _____

EEB 74-0092

Rev 0

ATTACHMENT B

Mark WUB

Contract No.	Type	Manufacturer
68C7-51959	PE/PE	Continental Wire & Cable
72C7-83014		Continental Wire & Cable

Attachment A

EEB 74-0092

Rev 0

System: 74
Unit: 3

Component: Cable 2/c, #16 AWG
Mark: WUB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R853	8	TE-74-82 RHR HTX C OT TMP	A	1 Year
3R851	8	TE-74-82 RHR HTX C OT TMP	A	1 Year
3R852	8	TE-74-81 RHR HTX A OT TMP	A	1 Year
3R850	8	TE-74-9 RHR HTX A OT TMP	A	1 Year
3R860	8	TE-74-32 RHR HTX B OT TMP	A	1 Year
3R861	8	TE-74-43 RHR HTX D OT TMP	A	1 Year
3R862	8	TE-74-83 RHR HTX B OT TMP	A	1 Year
3R863	8	TE-74-84 RHR HTX D OT TMP	A	1 Year

Sheet No: EEB- 74-0092

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- 74-0092

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 79-0093
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WVA 2/c, #16 AWG, 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: Room 2 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)	158	335	(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)	$3x10^7$	$2x10^8$	(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: H. D. Ramaswamy
Reviewed by: J. M. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0093

Rev 0

System: 74
Unit: 3

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R3282	2	TTS-74-136A Cont	A	1 year
3R1656	2	FT-74-50 Flow Trans	A	1 year
3R1651	2	FT-74-56 Flow Trans		

EEB 74-0093

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-74-0093

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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0094
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WVA 2/c, #16 AWG, 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: Room 5	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{0}F)	294	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)	3×10^{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: A. D. Romanowski
Reviewed by: J. M. Bradley for
QA Acceptance: _____

EEB 17-0074

Rev 0

System: 74
Unit: 3

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R3281	5	TTS-74-136B Cont	A	1 year

EEB 74-0094

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-74-0094

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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0095
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVA 2/c, #16 AWG, PE Manufacturer: Attachment B	Temperature (^{o}F)	158	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 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)	$3x10^7$	$4x10^7$	(4)	NUREG-0588 Material List	Generic Material Tests	None
Location: Room 2	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: H.D. Romanowski
Reviewed by: J.A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0095

Rev 0

System: 74
Unit: 3

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R3282	2	TTS-74-136A Cont	A	1 year
3R1656	2	FT-74-50 Flow Trans	A	1 year
3R1651	2	FT-74-56 Flow Trans		

EEB 74-0095

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-74-0095

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-74-0095

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 74-0096
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVA 2/c, #16 AWG, PE Manufacturer: Attachment B	Temperature (^{o}F)	158	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 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)	$3x10^7$	$4x10^7$	(4)	NUREG-0588 Material List	Generic Material Tests	None
Location: Room 5	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: K.D. Ramenowski
Reviewed by: J.A. Bailey
QA Acceptance: _____

Attachment A

EEB 74-0096

Rev 0

System: 74
Unit: 3

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R3281	5	TTS-74-136 Cont	A	1 year

EEB 74-0096

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- 74-0096

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, th e cables sustained a dielectric test while immersed in water of 66 olts 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-74-0096

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 74-0097
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVA 2/c, #16 AWG, CSPE Manufacturer: Attachment B	Temperature (°F)	158	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)	$3x10^7$	$5x10^7$	(4)	Attachment C.1	Generic Sequential Test	None
Location: Room 2	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: H.D. Romanowski
Reviewed by: J.M. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0097

Rev 0

System: 74
Unit: 3

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R3282	2	TTS-74-136A Cont	A	1 year
3R1656	2	FT-74-50 Flow Trans	A	1 year
3R1651	2	FT-74-56 Flow Trans		

EEB 74-0097

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-74-0097

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. EEB 74-0098
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVA 2/c, #16 AWG, CSPE Manufacturer: Attachment B	Temperature (°F)	294	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)	3×10^7	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: Room 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: H. D. Romenowski
Reviewed by: J. A. Bradley
QA Acceptance: _____

EEB 11-0034

Rev 0

System: 74
Unit: 3

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R3281	5	TTS-74-136B Cont	A	1 year

EEB 74-0098

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 74-0098

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. EEB 74-0099
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WVA-1 2/c, #18 AWG, 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: Room 2 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)	158	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)	$3x10^7$	$2x10^8$	(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: H. D. Romonowski
Reviewed by: J. M. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0099

Rev 0

System: 74
Unit: 3

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3A2436	2	TTS-74-136A Cont	A	1 year

EEB 74-0099

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

1.1

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0100
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WVA-1 2/c, #18 AWG, 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: Room 5 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)	294	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)	3×10^7	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
	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: H. D. Romenesko
Reviewed by: J. A. Bradley
QA Acceptance: _____

EEB 14-0100

Rev 0

System: 74
Unit: 3

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3A2427	5	TTS-136B Cont	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

Sheet No: EEB-74-0100

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: 3
Docket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Sheet No. EEB 74-0101 (3)
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 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 AWG, PE Manufacturer: Attachment B	Temperature (°F)	158	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 Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	$3x10^7$	$4x10^7$	(4)	NUREG-0588 Material List	Generic Material Tests	None
Location: Room 2	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: H.D. Rominowski
Reviewed by: [signature]
QA Acceptance: ____________

Attachment A

EEB 74-0101

Rev 0

System: 74
Unit: 3

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3A2436	2	TTS-74-136A Cont	A	1 year

ATTACHMENT B

Mark WVA-1

	Contract No.	Type	Manufacturer
	6SC7-61986	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-74-0101

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 6.25×10^5 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- 74-0101

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 74-0102
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachm Component Cable WVA-1 2/c, #18 AWG, 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: Room 5 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)	294	203	(4)	IPCEA S-61-402 par 3.9 and Attachment C.2	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)	$3x10^7$	$4x10^7$	(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: K. D. Romanowski
Reviewed by: J. M. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0102

Rev 0

System: 74
Unit: 3

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3A2427	5	TTS-136B Cont	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

Sheet No: EEB- 79-0102

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-74-0102

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 74-0103
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 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 AWG, CSPE Manufacturer: Attachment B	Temperature (°F)	158	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)	$3x10^7$	$5x10^7$	(4)	Attachment C.1	Generic Sequential Test	None
Location: Room 2	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: K. D. Romanowski 9/81
Reviewed by: J. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0103

Rev 0

System: 74
Unit: 3

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3A2436	2	TTS-74-136A Cont	A	1 year

EEB 74-0103

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-14-0103

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)

Sheet No.[3] EEB 74-0104
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 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 AWG, CSPE Manufacturer: Attachment B	Temperature (°F)	294	250	(4)	Attachment C.1	Generic Simultaneous Test	None
Model Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
Function: Signal/Instrumentation	Relative Humidity (%)	100	100	(4)	Attachment C.1	Generic Simultaneous Test	None
Accuracy: Req'd: N/A Demon: N/A Category: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
Service: Attachment A	Radiation (RAD)	$3x10^7$	$5x10^7$	(4)	Attachment C.1	Generic Sequential Test	None
Location: Room 5	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: H.D. Romanowski / SRH
Reviewed by: J. Bradley
QA Acceptance: ____

Attachment A

EEB 74-0104

Rev 0

System: 74
Unit: 3

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

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3A2427	5	TTS-136B Cont	A	1 year

EEB 74-0104

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-74-0104

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: _____

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0105
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WVB 3/c, #16 AWG, 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: Room 2	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	158	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)	3×10^7	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: H D Romenowski
Reviewed by: J A Bradley
QA Acceptance: _____

EEB 74-0105

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 - 74-0105

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: _____

13

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0106
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WVB 3/x, #16 AWG, 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: Room 5	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
	Temperature (^{o}F)	294	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)	$3x10^7$	$2x10^8$	(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: H.D. Romanowski

Reviewed by: J. Bradley

QA Acceptance: _____

Attachment A

EEB 74-0106

Rev 0

System: 74
Unit: 3

Component: Cable, 3/c, #16AWG
Mark: WVB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R2267	5	TE-74-95B Steam Line Leakage	A	1 year
3R2277	5	TE-74-95G Steam Line Leakage	A	1 year

EEB 74-0106

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 74-0106

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: _____

13

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0107
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 year	(1)	Attachment C.3	Engineering Analysis and Test	None
Component Cable WVB 3/x, #16 AWG, XLPE Manufacturer: Attachment B	Temperature (^{o}F)	157	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 Service: Attachment A	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
Location: Room 8	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: H. D. Bonnewitz 9/4
Reviewed by: J. L. Bradley
QA Acceptance: _____

EEB 77-0107

Rev 0

System: 74
Unit: 3

Component: Cable, 3/c, #16AWG
Mark: WVB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R2268	8	TE-74-95C Steam Line Leakage	A	1 year
3R2269	8	TE-74-95D Steam Line Leakage	A	1 year

EEB 74-0107

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 74-0107

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: _____

13

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB 74-0108
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 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, #16 AWG, 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	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: Room 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: H. D. Romonowski
Reviewed by: J. A. Bradley
QA Acceptance: _____

EEB 17-010X

Rev 0

System: 74
Unit: 3

Component: Cable, 3/c, #16AWG
Mark: WVB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R2275	12	TE-74-95E Steam Line Leakage	A	1 year
3R2276	12	TE-74-95F Steam Line Leakage	A	1 year

EEB 74-0108

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 74-0108

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 74-0109
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVB 3/c, #16 AWG, PE Manufacturer: Attachment B	Temperature (°F)	158	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 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)	$3x10^7$	$4x10^7$	(4)	NUREG-0588 Material List	Generic Material Tests	None
Location: Room 2	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: H. D. Romanski
Reviewed by: J. M. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0109

Rev 0

System: 74
Unit: 3

Component: Cable, 3/c, #16AWG
Mark: WVB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R2266	2	TE-74-95A Steam Line Leakage	A	1 year
3R2278	2	TE-74-95H Steam Line Leakage	A	1 year

EEB 74-0109

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- 74-0109

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-74-0109

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 74-0110
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVB 3/x, #16 AWG, PE Manufacturer: Attachment B	Temperature (°F)	294	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 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)	$3x10^7$	$4x10^7$	(4)	NUREG-0588 Material List	Generic Material Tests	None
Location: Room 5	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: H.D. Romanowski 10/22/80
Reviewed by: J.A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0110

Rev 0

System: 74
Unit: 3

Component: Cab , 3/c, #16AWG
Mark: WVB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R2267	5	TE-74-95B Steam Line Leakage	A	1 year
3R2277	5	TE-74-95G Steam Line Leakage	A	1 year

EFB 74-0110

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- 74-0110

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- 74-0110

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 74-0111
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WVB 3/c, #16 AWG, PE Manufacturer: Attachment B Model Number: N/A Function: Signal/Instrumentation Accuracy: Req'd: N/A Demo: N/A Category: Attachment A Service: Attachment A Location: Room 8 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)	157	203	(4)	IPCEA S-61-402 par 3.9 and Attachment C.2	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)	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
	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: H D Romensky
Reviewed by: J Bradley
QA Acceptance: _____

Attachment A

EEB 14-011

Rev 0

System: 74
Unit: 3

Component: Cable, 3/c, #16AWG
Mark: WVB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R2268	8	TE-74-95C Steam Line Leakage	A	1 year
3R2269	8	TE-74-95D Steam Line Leakage	A	1 year

EEB 74-0111

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- 79-0111

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.

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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- 74-0111

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 74-0112
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVB 3/c, #16 AWG, PE Manufacturer: Attachment B	Temperature (°F)	199	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 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: Room 12	Aging	N/A	20 years	(2)	Attachment C.1	Oper. Experience	None
Flood Level Elev: 552' Above Flood Level: Yes X No	Submergence	N/A	N/A	(4)	N/A	N/A	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: H. D. Romaswaly
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0112

Rev 0

System: 74
Unit: 3

Component: Cable, 3/c, #16AWG
Mark: WVB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R2275	12	TE-74-95E Steam Line Leakage	A	1 year
3R2276	12	TE 74-95F Steam Line Leakage	A	1 year

EEB 74-0112

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.

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

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. FEB-74-0113
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WYB 3/C, #16 AWG (CSPE) Manufacturer: Attachment B	Temperature (°F)	158	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)	$3x10^7$	$5x10^7$	(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: Room 2							
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 Romanowski
Reviewed by: J A Bradley
QA Acceptance: _____

Attachment A

EEB -74-0113

Rev 0

System: 74
Unit: 3

Component: Cable, 3/c, #16AWG
Mark: WVB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R2266	2	TE-74-95A Steam Line Leakage	A	1 year
3R2278	2	TE-74-95H Steam Line Leakage	A	1 year

EEB -74-0113

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 74-0113

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. EEB 74-0114
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVB 3/c, #16 AWG, CSPE Manufacturer: Attachment B	Temperature (°F)	294	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)	$3x10^7$	$5x10^7$	(4)	Attachment C.1	Generic Sequential Test	None
Location: Room 5	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: H. D. Romanowski
Reviewed by: J. A. Bradley
QA Acceptance: _____

Attachment A

EEB 74-0114

Rev 0

System: 74
Unit: 3

Component: Cable, 3/c, #16AWG
Mark: WVB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R2267	5	TE-74-95B Steam Line Leakage	A	1 year
3R2277	5	TE-74-95G Steam Line Leakage	A	1 year

EEB 74-0114

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-74-0114

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. EEB 74-0115
Revision 0
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVB 3/c, #16 AWG, CSPE Manufacturer: Attachment B	Temperature (^{o}F)	157	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)	2.1×10^7	5×10^7	(4)	Attachment C.1	Generic Sequential Test	None
Location: Room 8	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: H. D. Bonnewitz
Reviewed by: J. M. Bradley
QA Acceptance: _____

EEB 14-0115

Rev 0

System: 74
Unit: 3

Component: Cable, 3/c, #16AWG
Mark: WVB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R2268	8	TE-74-95C Steam Line Leakage	A	1 year
3R2269	8	TE-74-95D Steam Line Leakage	A	1 year

EEB 74-0115

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-74-0115

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)

Sheet No. EEB 74-0116 (3)
Revision 9
Date 10/22/80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WVB 3/c, #16 AWG, 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: Room 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: H. D. Romanowski
Reviewed by: J. Bradley
QA Acceptance: _____

EEB 7-0116

Rev 0

System: 74
Unit: 3

Component: Cable, 3/c, #16AWG
Mark: WVB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
3R2275	12	TE-74-95E Steam Line Leakage	A	1 year
3R2276	12	TE-74-95F Steam Line Leakage	A	1 year

EEB 74-0116

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-74-0116

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: _____

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

acility: Browns Ferry Nuclear Plant
nit: 3
ocket: 50-296

(3)
Sheet No. EEB 74-0117
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
ystem: 74 lant ID No. EA.	Operating Time	Attach. A	1 Year	(1)	Attachment C	Engineering Analysis	None
omponent Electrical Penetrations Assembly anufacturer: General Electric Company	Temperature (°F)	325	Attach. B.2	(4)	Attachment B.5	Simultaneous Test	None
odel Number: NS04	Pressure (PSIA)	67	Attach. B.3	(4)	Attachment B.5	Simultaneous Test	None
unction: Low voltage power and control primary containment penetration	Relative Humidity (%)	100	100	(4)	Attachment B.5	Simultaneous Test	None
ccuracy: Req'd: N/A Demon: N/A ategory: See Attach. A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
ervice: See Attachment A	Radiation (RAD)	$6.5x10^7$ $4x10^9$ Attach. B.1	$6.5x10^7$ $4x10^9$	(4)	Attachment B.6 Attachment C	1. Test 2. Engineering Analysis	None
ocation: 0	Aging	N/A	Attach. B.4	(2)	Attachment B.7	Attachment B.8	None
lood Level Elev: 552' bove Flood Level: Yes X No	Submergence	N/A	N/A	(4)	N/A	N/A	None

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

(2) See Section 4.1. 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: KD Romanowski 10/22/80

Reviewed by: [signature]

QA Acceptance:

Attachment A

EEB 74-0117

Rev 0

System: 74
Unit: 3

Component: Penetration
Mark: EA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
EA	0	FCV-74-78 Control	A	1 Year

Attachment B EEB _____

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 0588 Materials List (Crosslinked Polyethylene)

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

EEB -74-0117

Rev 0

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.

acility: Browns Ferry Nuclear Plant
nit: 3
ocket: 50-296

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. FEB 74-0118
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
ystem: 74 lant ID No. EF. omponent Electrical Penetrations Assembly anufacturer: General Electric Company odel Number: NS04 unction: Low voltage power and control primary containment penetration ccuracy: Req'd: N/A Demon: N/A ategory: See Attach. A ervice: See Attachment A ocation: 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)	5.5×10^7 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	Attachment B.8	None
lood Level Elev: 552' bove Flood Level: Yes X No	Submergence	N/A	N/A	(4)	N/A	N/A	None

lotes:
(1) See Section 2.4 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: K D Romanowski 10/22/80
Reviewed by: [signature]
QA Acceptance: _____

Attachment A

System: 74
Unit: 3

EEB -74-0118

Rev 0

Component: Penetration
Mark: EB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
EB	0	FCV-74-78 Control	A	1 Year

Attachment B EEB _____

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 type Test Data - Epoxy Life Tests
   Connectors - Wyle Laboratory Report 4385-2, Browns Ferry Connectors
   Cable - NAI 0588 Materials List (Crosslinked Polyethylene)

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

EEB -74-0118

Rev 0

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 -74-0118

Rev 0

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: 1
Docket: 50-259

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB74-0119
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.3	Engineering Analysis	None
Component Cable WBB 1/C #12 AWG (PN) (PNJ) Manufacturer: Attachment B	Temperature (^{0}F)	325	203	(4)	IPCEA S-61-403 par 3.9 and Appendix C.2	Standard Mat'l Long-Term Temp. Rating	None
Model Number: N/A	Pressure (PSIA)	69.7	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)	$6.5\times10^{7}\gamma$ $4\times10^{9}\beta$ Attach. C.1	4×10^{7}	(4)	NUREG-0588 Material List	Generic Material Tests	None
Service: Attachment A	Aging	N/A	10 years	(2)	Attachment C.2	Oper. Experience	None
Location: 0							
Flood Level Elev: 552' Above Flood Level: Yes* No	Submergence	N/A	N/A	(4)	N/A	N/A	None

Notes:
(1) See Section 2.4 in 79-01B 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: T A Marshall
Reviewed by: J F Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 24-0119

Rev 0

System: 74
Unit: 1

Component: CABLE 1/c #12 (PNJ)
Mark: WBB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES1182-I	0	FCV-74-47 CONT	A	1 Year
1ES3687-II	0	FCV-74-47 CONT	A	1 Year

ATTACHMENT C (Con'd) Revision: 0

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.

.2 TVA Engineering Report No. 1943

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. EEB74-0120
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A Component Cable WBB 1/C #12 AWG (PN)(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: Room 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: T A Marshall

Reviewed by: J F Wagner 10/24/80

QA Acceptance: _____

Attachment A

EEB 74-020

Rev 0

System: 74
Unit: 1

Component: CABLE 1/c #12 (PNJ)
Mark: WBB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R3264	2	MIS-74-137A PMP RM Humidity CONT	A	1 Year
1R3263	2	ME-74-137A	A	1 Year
1R3256	2	MIS-74-137B		
1R3255	2	ME-74-137B		
1R3262	2	TTS-74-136A A/C TEMP CONT		

EEB 74-0120

Rev 0

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-74-0120

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. EEB74-0121
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
System: 74 Plant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
Component Cable WBB 1/C #12 AWG (PN) Manufacturer: Attachment B	Temperature (°F)	294	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: Room 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: T A Marshall

Reviewed by: J F Wagner 10/22/80

QA Acceptance: _____

Attachment A

EEB 74-0121

Rev 0

System: 74
Unit: 1

Component: CABLE 1/c #12 (PNJ)
Mark: WBB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1R3254	5	TTS-74-136B B/D TEMP CONT	A	1 Year

EEB 74-0121

Rev 0

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

8C

Sheet No.: EEB-74-0121

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)

(3)

cility: Browns Ferry Nuclear Plant
it: 1
cket: 50-259

Sheet No. EEB74-0122
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
stem: 74 ant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
mponent Cable WBB 1/C #12 AWG (PN)(PNJ) nufacturer: Attachment B	Temperature (°F)	147	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
del Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
nction: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
curacy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
tegory: Attachment A	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
rvice: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
cation: Room 8	Submergence	N/A	N/A	(4)	N/A	N/A	None
ood Level Elev: 552' ove Flood Level: Yes X No							

tes: (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: T A Marshall

Reviewed by: J F Wagner 10/22/80

QA Acceptance: _____

Attachment A

ECR 74-0122

Rev 0

System: 74
Unit: 1

Component: CABLE 1/c #12 (PNJ)
Mark: WBB

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES3687-II	8	FCV-74-47 CONT	A	1 Year

EEB 74-0122

Rev 0

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

8C

Sheet No.: EEB-74-0122

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 _____

Attachment A

EEB 24-0123

Rev 0

System: 74
Unit: 1

Component: CABLE 1/c #14AWG (PN)
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES540-I	0	FCV-74-52 CONT	A	1 Year
1ES541-I	0	FCV-74-52 CONT		
1ES529-II	0	FCV-74-53 CONT		
1ES547-I	0	FCV-74-52 CONT		
1ES3040-II	0	FCV-74-66 CONT		
1ES3029-II	0	FCV-74-67 CONT		
1ES3028-II	0	FCV-74-67 CONT		
1ES3041-II	0	FCV-74-66 CONT		

EEB 74-0123

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
	67C3-91518	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

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 $\times 10^{9}$ rads for the beta accident dose at the periphery of the containment is being reevaluated due to its high value. However, using this value and making reference to the 7901-B DOR guidelines section 4.2.1 and the depth dose penetration, which owing to the low penetrating power of beta particles gives a factor of 10 reduction for 40 mils of jacketing material, and a factor of 10 for an insulation thickness of 30 mils and which is conservative for TVA's 600-volt power and control cables and extremely conservative for TVA's triax and coax and signal cable due to their thickness and the presence of metallic shielding material, and assigning a factor of 3 for the installation shielding of metal trays, conduit, boxes, and flexible conduit, we arrive at a total effective dose of $.3 \times 10^{7}$ 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. 1342

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: _____

cility: Browns Ferry Nuclear Plant
it: 1
cket: 50-259

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB74-0124
Revision 0
Date 10-23-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
stem: 74 ant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
mponent Cable WEA 1/c, #14 AWG PN nufacturer: Attachment B	Temperature (°F)	292	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
del Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
nction: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
curacy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
tegory: Attachment A rvice: Attachment A	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
cation: Room 2	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
ood Level Elev: 552' ove Flood Level: Yes X No	Submergence	N/A	N/A	(4)	N/A	N/A	None

tes: (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: T A Marshall
Reviewed by: J F Wilson 10/31/80
QA Acceptance: _____

Attachment A

EEB 74-0124

Rev 0

System: 74
Unit: 1

Component: CABLE 1/c #14AWG (PN)
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES552-II	2	FCV-74-1 CONT	A	1 Year
1ES553-I	2	FCV-74-1 CONT		
1ES554-I	2	FCV-74-1 CONT		
1ES565-I	2	FCV-74-12 CONT		
1ES566-I	2	FCV-74-12 CONT		
1ES567-I	2	FCV-74-12 CONT		
1ES577-I	2	FCV-74-2 CONT		
1ES578-I	2	FCV-74-2 CONT		
1ES579-I	2	FCV-74-2 CONT		
1ES590-I	2	FCV-74-13 CONT		
1ES591-I	2	FCV-74-13 CONT		
1ES592-I	2	FCV-74-13 CONT		
1ES1152-I	2	FCV-74-7 CONT		
1ES1155-I	2	FCV-74-7 CONT		
1ES1156-I	2	FCV-74.7 CONT		

EEB 74-0124

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

8C

Sheet No.: EEB-74-0124

Revision: 0

ATTACHMENT C

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

C.2 TVA Engineering Report No. 1943

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

Rooms 1-18

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

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C.3 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)

(3)

Sheet No. EEB74-0125
Revision —
Date 10-24-80

acility: Browns Ferry Nuclear Plant
nit: 1
ocket: 50-260

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
ystem: 74 lant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
omponent Cable WCA 1/C #14 AWG (PN) anufacturer: Attachment B	Temperature (°F)	139	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
odel Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
unction: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
ccuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
ategory: Attachment A	Radiation (RAD)	3×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
ervice: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
ocation: Room 5	Submergence	N/A	N/A	(4)	N/A	N/A	None
lood Level Elev: 552' bove 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: T A Mansfield
Reviewed by: J J Wagner 10/22/80
QA Acceptance: _____

Attachment

EEB 74-0125

Rev 0

System: 74
Unit: 1

Component: CABLE 1/c #14AWG (PN)
Mark: WCA

Plant I. D. No.	Room	Fur	rvice	Category	Operating Time
1ES3052-II	5	FCV	T	A	1 Year
1ES3053-II	5	FCV	T		
1ES3054-II	5	FCV-			
1ES3065-II	5	FCV-			
1ES3066-II	5	FCV-7	T		
1ES3067-II	5	FCV-7	CONT		
1ES3077-II	5	FCV-74-25	CONT		
1ES3078-II	5	FCV-74-25	CONT		
1ES3079-II	5	FCV-74-25	CONT		
1ES3090-II	5	FCV-74-36	CONT		
1ES3091-II	5	FCV-74-36	CONT		
1ES3092-II	5	FDC-74-36	CONT		
1ES3662-II	5	FCV-74-98	CONT		
1ES3663-II	5	FCV-74-98	CONT		

EEB 74-0125

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-74-0125

Revision: 0

ATTACHMENT C

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

C.2 TVA Engineering Report No. 1943

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

Rooms 1-18

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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

acility: Browns Ferry Nuclear Plant
nit: 1
ocket: 50-259

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB74-0126
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
ystem: 74 lant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
omponent Cable WCA 1/C #14 AWG (PN) anufacturer: Attachment B	Temperature (°F)	217	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
odel Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
unction: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
ccuracy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
ategory: Attachment A	Radiation (RAD)	3.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
ervice: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
ocation: Room 6	Submergence	N/A	N/A	(4)	N/A	N/A	None
lood Level Elev: 552' bove Flood Level: Yes X No							

otes:
(1) See Section 2.4 in 79-01B report.
(2) See Section 4.1.2 in 79-01B report.
(3) All notes and other information not on these sheets are on the attached appendix sheets.
(4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: T A Marshall

Reviewed by: J F Wagner 10/24/80

QA Acceptance: _____

Attachment A

EEB 24-026

Rev 0

System: 74
Unit: 1

Component: CABLE 1/c #14AWG (PN)
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1V2253	6	FSV-74-102 SUPPLY	A/B	1 HR/1 YR
1V2254	6	FCV-74-102 CONT	A	1 Year
1V2255	6	FCV-74-102 CONT		
1V2264	6	FCV-74-103 CONT		
1V2265	6	FCV-74-103 CONT		
1V2266	6	FCV-74-103 CONT		
1V2256	6	FCV-74-119 CONT		
1V2257	6	FCV-74-119 CONT		
1V2258	6	FCV-74-119 CONT		
1V2267	6	FCV-74-103 CONT		
1V2268	6	FCV-74-120 CONT		
1V2269	6	FCV-74-120 CONT		
1ES677-I	6	FCV-74-57 CONT		
1ES702-I	6	FCV-74-58 CONT		
1ES690-I	6	FCV-74-59 CONT		
1ES3177-II	6	FCV-74-71 CONT		
1ES3627-II	6	FCV-74-72 CONT		

EEB 74-0126

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-74-0126

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: _____

cility: Browns Ferry Nuclear Plant
it: 1
cket: 50-259

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

Sheet No. EEB74-0127 (2)
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
stem: 74 ent ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
mponent Cable WCA 1/C #14 AWG (PN) nufacturer: Attachment B	Temperature (°F)	308	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
del Number: N/A	Pressure (PSIA)	21.5	N/A	(4)	N/A	N/A	None
nction: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
curacy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
tegory: Attachment A	Radiation (RAD)	2×10^6	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
rvice: Attachment A cation: Room 7	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
ood Level Elev: 552' ove Flood Level: Yes X No	Submergence	N/A	N/A	(4)	N/A	N/A	None

tes: (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: T A Marshall
Reviewed by: J F Wagner 10/22/80
QA Acceptance: _____

Attachment A

EEB 74-0127

Rev 0

System: 74
Unit: 1

Component: CABLE 1/c #14AWG (PN)
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES528-I	7	FCV-74-53 CONT	A	1 Year
1ES52.-II	7	FCV-74-53 CONT	↓	↓
1ES534-I	7	FCV-74-53 CONT		

EEB 74-0127

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-74-0127

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: P[illegible], 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

POOR ORIGINAL

cility: Browns Ferry Nuclear Plant
it: 1
cket: 50-259

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB74-0128
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
stem: 74 ant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
mponent Cable WCA 1/C #14 AWG (PN) nufacturer: Attachment B	Temperature (°F)	147	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
del Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
nction: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
curacy: Req'd: N/A Demon: N/A tegory: Attachment A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
rvice: Attachment A cation: Room 8	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
lood Level Elev: 552' bove Flood Level: Yes ✗ No	Submergence	N/A	N/A	(4)	N/A	N/A	None

otes: (1) See Section 2.4 in 79-01B report.
(2) See Section 4.1.2 in 79-01B report.
(3) All notes and other information not on these sheets are on the attached appendix sheets.
(4) See Section 3.0 and/or Appendix B in 79-01B report.

Prepared by: I A Marshall

Reviewed by: J F Wagner 10/22/80

QA Acceptance: ____________

Attachment A

EEB 24-0128

Rev 0

System: 74
Unit: 1

Component: CABLE 1/c #14AWG (PN)
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES3165-II	8	FCV-74-75 CONT	A	1 Year
1ES3152-II	8	FCV-74-74 CONT		
1ES540-1	8	FCV-74-52 CONT		
1ES541-I	8	FCV-74-52 CONT		
1ES528-I	8	FCV-74-53 CONT		
1ES529-II	8	FCV-74-53 CONT		
1ES652-I	8	FCV-74-60 CONT		
1ES665-I	8	FCV-74-61 CONT		
1ES3040-II	8	FCV-74-66 CONT		
1ES3029-II	8	FCV-74-67 CONT		
1ES3028-II	8	FCV-74-67 CONT		
1ES3041-II	8	FCV-74-66 CONT		

EEB 74-0128

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 Coro
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-74-0128

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: _____

cility: Browns Ferry Nuclear Plant
it:1
cket: 50-259

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB74-0129
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
stem: 74 ant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
mponent Cable WCA 1/C #14 AWG (PN) nufacturer: Attachment B	Temperature (°F)	214	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
del Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
nction: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
curacy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
tegory: Attachment A	Radiation (RAD)	2.1×10^7	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
rvice: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
cation: Room 9	Submergence	N/A	N/A	(4)	N/A	N/A	None
lood Level Elev: 552' bove 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: T A Marshall
Reviewed by: J F Wagner 10/24/80
QA Acceptance: _____

Attachment A

EEB 74-0129

Rev 0

System: 74
Unit: 1

Component: CABLE 1/c #14AWG (PN)
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES3152-II	9	FCV-74-74 CONT	A	1 Year
1ES652-I	9	FCV-74-60 CONT	↓	↓
1ES665-I	9	FCV-74-61 CONT		
1ES553-I	9	FCV-74-1 CONT		

EEB 74-0129

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-74-0129

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.

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C.3 Temperature Qualification Method

C.3.1 Standard material long-term overload temperature rating

C.3.2 Engineering Analysis

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

Prepared by: _____

Reviewed by: _____

QA Acceptance: _____

8

cility: Browns Ferry Nuclear Plant
t: 1
cket: 50-259

SYSTEM COMPONENT EVALUATION WORK SHEET (Rev 2)

(3)
Sheet No. EEB74-0130
Revision 0
Date 10-22-80

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF		QUALIFICATION METHOD	OUTSTANDING ITEMS
	Parameter	Specification	Qualification	Specification	Qualification		
stem: 74 ant ID No. Attachment A	Operating Time	Attachment A	1 Year	(1)	Attachment C.4	Engineering Analysis	None
mponent Cable WCA 1/C #14 AWG (PN) nufacturer: Attachment B	Temperature (°F)	174	153	(4)	Attachments C.1 and C.2	Attachment C.3	None
del Number: N/A	Pressure (PSIA)	15.0	N/A	(4)	N/A	N/A	None
nction: Control/Power	Relative Humidity (%)	100	100	(4)	IPCEA S-61-402 par 3.9, 3.7.3 6.7	Standard Material Requirement	None
curacy: Req'd: N/A Demon: N/A	Chemical Spray	N/A	N/A	(4)	N/A	N/A	None
tegory: Attachment A	Radiation (RAD)	3.1×10^4	4×10^7	(4)	NUREG-0588 Materials List	Generic Material Test	None
rvice: Attachment A	Aging	N/A	20 years	(2)	Attachment C.2	Oper. Experience	None
cation: Room 12	Submergence	N/A	N/A	(4)	N/A	N/A	None
lood Level Elev: 552' bove 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: T A Marshall

Reviewed by: J T Wagner 10/24/80

QA Acceptance: _____

Attachment A

EEB 74-0130

Rev 0

System: 74
Unit: 1

Component: CABLE 1/c #14AWG (PN)
Mark: WCA

Plant I. D. No.	Room	Function/Service	Category	Operating Time
1ES1169-I	12	FCV-74-77 CONT	A	1 Year
1ES1170-I	12	FCV-74-77 CONT	A	1 Year

EEB 74-0130

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