CALCULATION/PROBLEM COVER SHEET

Calculation/Problem No: 1040-001-014

Title: High Pressure Injection System 2.11

Client: Toledo Edison Company Project: Davis-Besse Unit 1

Job No: 1040-001-671

I & E Bulletin 79-01B
Equipment Qualification

Design Input/References:

Design Inputs are outlined in the Cover Report.

Assumptions:

Assumptions are outlined in the Cover Report.

Method:

Methods are outlined in the Cover Report.

Remarks:

EDS Nuclear Report No. 02-1040-1076.

REV. NO.	REVISION	APPROVED	DATE
0	original	Jeffrey S. Haverly	10-2-81
2	GENERAL MINIMAL REVISIONS	NK Woodward	11/2/83

Facility: Davis-Besse Unit 1
Docket: 50-346

MASTER LIST
HARSH ENVIRONMENT
HIGH PRESSURE INJECTION SYSTEM

Index No: 211M-001
Rev.: 2

Prepared by: N. Lewis Date: 11/6/87
Checked by: [signature] Date: 11/4/87

Worksheet Index No.	Rev.	Plant ID Number	Generic Name	LOCATION: Inside Primary Containment	LOCATION: Outside Primary Containment	REMARKS
211H-004	2	MP0581	High Pressure Injection Pump Motor		Rm. 105	
211H-005	2	MP0582	High Pressure Injection Pump Motor		Rm. 115	
211H-006	2	MP1971	Lube Oil Pump Motor		Rm. 105	
211H-007	2	MP1981	Lube Oil Pump Motor		Rm. 115	
211H-008	2	MVHP02A	Valve Motor Operator		Rm. 236	
211H-009	2	MVHP02B	Valve Motor Operator		Rm. 236	
211H-010	2	MVHP02C	Valve Motor Operator		Rm. 208	
211H-011	2	MVHP02D	Valve Motor Operator		Rm. 208	
211H-012	2	MP1972	Lube Oil Pump Motor		Rm. 105	
211H-013	2	MP1982	Lube Oil Pump Motor		Rm. 115	
211H-014	2	PDS4957	Pressure Differential Switch		Rm. 105	
211H-015	2	PDS4961	Pressure Differential Switch		Rm. 115	
	2	BE11A	Motor Control Center		Rm. 209	See 2.21
	2	BF11C	Motor Control Center		Rm. 236	See 2.21
	2	CDE11A	Disconnect Switch Cabinet		Rm. 304	See 2.21
	2	CDF11C	Disconnect Switch Cabinet		Rm. 236	See 2.21
	2	EVHP02A	Terminal Block Box		Rm. 236	See 2.21
	2	EVHP02B	Terminal Block Box		Rm. 236	See 2.21
	2	EVHP02C	Terminal Block Box		Rm. 208	See 2.21
	2	EVHP02D	Terminal Block Box		Rm. 208	See 2.21
	2	JT1715	Terminal Block Box		Rm. 115	See 2.21

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MASTER LIST
NON-HARSH ENVIRONMENT
HIGH PRESSURE INJECTION SYSTEM

Index No.: [illegible]IM-002
Rev.: 2

Prepared by: F Lewis Date: 9/30/83
Checked by: [illegible] Date: [illegible]

Worksheet Index No.	Rev.	Plant ID Number	Generic Name	LOCATION		REMARKS
				Inside Primary Containment	Outside Primary Containment	
	0	AC111	4.16 KV Switchgear Breaker		Rm. 325	
	0	AD111	4.16 KV Switchgear Breaker		Rm. 323	
	0	BE12E	Motor Control Center		Rm. 100	
	0	BF12A	Motor Control Center		Rm. 428	
	0	C5716	Engineering Safety Feature Panel		Rm. 505	

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MASTER LIST

Index No.: [illegible]1M-003
Rev.: 2

HIGH PRESSURE INJECTION SYSTEM

Prepared by: J Lewis Date: 9/30/83
Checked by: [illegible] Date: [illegible]

Worksheet Index No.	Rev.	Plant ID Number	Generic Name	LOCATION		REMARKS
				Inside Primary Containment	Outside Primary Containment	

Facility: Davis-Besse Unit 1
Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

Index No.: 211H-004
Rev.: 2

Prepared by: T Lewis Date: 9/30/83
Checked by: H Mackbrandt Date: 9/30/83

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF.		Qualification Method	Outstanding Items
	Parameter	Specification	Qualification	Specification	Qualification		
System: High Pressure Injection	Operating Time	1 Year	1.1 Years	F	E-9 V-41D	Simultaneous Test	None
Plant ID No. MP0581 Component: High Pressure Injection Pump Motor Manufacturer: Westinghouse Style Number: RMR74L10300	Temperature (°F)	130.0	145.0	C-105	E-9 E-16 Note 1	Simultaneous Test	None
	Pressure (PSIA)	16.06	17.66	C-105	E-9 E-16 Note 1	Simultaneous Test	None
Function: Drives High Pressure Injection Pump P58-1	Relative Humidity (%)	100.0	100.0	A	E-9 E-16 Note 1	Simultaneous Test	None
Accuracy: Spec: N/A Demon: N/A	Chemical Spray	N/A	N/A	N/A	N/A	N/A	None
Service: High Pressure Injection Pump P58-1							
Location: Auxiliary Bldg. Rm. 105	Radiation	9.2×10^5 RADS	5.0×10^7 RADS	AS	E-9 CAL-60	Sequential Test	None
Flood Level Elev: N/A Above Flood Level: N/A	Aging	40 Years	40 Years	I	CAL-59	Sequential Test	None
Needed for: Hot Shutdown [X] Cold Shutdown [ ]	Submergence	N/A	N/A	N/A	N/A	N/A	None

Facility: Davis-Besse Unit 1
Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

NOTES

Index No.: 211H-004A
Rev.: 2

Prepared by: T Lewis Date: 9/30/83
Checked by: [signature] Date: 9/30/83

1. An entire Westinghouse Large Motor Division thermalastic epoxy insulation system prototype stator was thermally cycled. Temperature ranged from -30°C (in dry ice for 6 hours and rapidly raised to 150°C). This was repeated 4 times. The stator was then immersed in water and the insulation resistance was checked. Insulation resistance prior to test was 9×10^4 Meg ohms and post test the resistance was 2×10^4 Meg ohms while submerged. (Reference E-9)

   In another test, an entire thermalastic epoxy insulation system stator was submerged while energized in both tap water and salt water. Satisfactory performance was demonstrated for 1,000 days in tap water and 200 days in salt water. (Reference E-16)

   Thermalastic epoxy insulation system can simultaneously withstand harsh steam environments as demonstrated by a 58.3 day exposure to 100% relative humidity at 122°F. The resulting insulation resistance was 4,000 Meg ohms. Additionally, a thermalastic epoxy insulation system has satisfactorily passed a 48-hour exposure to 500°C. (Reference E-16)

   Based on the above tests, it can be concluded that motors constructed utilizing thermalastic epoxy insulation system would satisfactorily withstand the postulated steam exposure. The postulated exposure reaches peak values of 145°F (130°F plus 15°F margin) and 17.66 psia (16.06 psia plus 10% margin). The transient has a duration of 1450 seconds.

Facility: Davis-Besse Unit 1
Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

Index No.: 211H-005
Rev.: 2

Prepared by: T Lewis Date: 9/30/83
Checked by: G McDonald Date: 9/30/83

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF.		Qualification Method	Outstanding Items
	Parameter	Specification	Qualification	Specification	Qualification		
System: High Pressure Injection Plant ID No. MP0582 Component: High Pressure Injection Pump Motor Manufacturer: Westinghouse Style Number: RMR74L10278 Function: Drives High Pressure Injection Pump P58-2 Accuracy: Spec: N/A Demon: N/A Service: High Pressure Injection Pump P58-2 Location: Auxiliary Bldg. Rm. 115 Flood Level Elev: N/A Above Flood Level: N/A Needed for: Hot Shutdown [X] Cold Shutdown [ ]	Operating Time	1 Year	1.1 Years	F	E-9 V-41D	Simultaneous Test	None
	Temperature (°F)	177.0	192.0	C-115	E-9 E-16 Note 1	Simultaneous Test	None
	Pressure (PSIA)	15.60	17.16	C-115	E-9 E-16 Note 1	Simultaneous Test	None
	Relative Humidity (%)	100.0	100.0	A	E-9 E-16 Note 1	Simultaneous Test	None
	Chemical Spray	N/A	N/A	N/A	N/A	N/A	None
	Radiation	6.2×10^5 RADS	5.0×10^7 RADS	AS	E-9 CAL-60	Sequential Test	None
	Aging	40 Years	40 Years	I	CAL-59	Sequential Test	None
	Submergence	N/A	N/A	N/A	N/A	N/A	None

Facility: Davis-Besse Unit 1
Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

Index No.: 211H-005A
Rev.: 2

NOTES

Prepared by: J Lewis Date: 9/30/83
Checked by: [signature] Date: 9/30/83

1. An entire Westinghouse Large Motor Division thermalastic epoxy insulation system prototype stator was thermally cycled. Temperature ranged from -30°C (in dry ice for 6 hours and rapidly raised to 150°C). This was repeated 4 times. The stator was then immersed in water and the insulation resistance was checked. Insulation resistance prior to test was 9×10^4 Meg ohms and post test the resistance was 2×10^4 Meg ohms while submerged. (Reference E-9)

   In another test, an entire thermalastic epoxy insulation system stator was submerged while energized in both tap water and salt water. Satisfactory performance was demonstrated for 1,000 days in tap water and 200 days in salt water. (Reference E-16)

   Thermalastic epoxy insulation system can simultaneously withstand harsh steam environments as demonstrated by a 58.3 day exposure to 100% relative humidity at 122°F. The resulting insulation resistance was 4,000 Meg ohms. Additionally, a thermalastic epoxy insulation system has satisfactorily passed a 48-hour exposure to 500°C. (Reference E-16)

   Based on the above tests, it can be concluded that motors constructed utilizing thermalastic epoxy insulation system would satisfactorily withstand the postulated steam exposure. The postulated exposure reaches peak values of 192°F (177°F plus 15°F margin) and 17.16 psia (15.6 psia plus 10% margin). The transient has a duration of 400 seconds.

Facility: Davis-Besse Unit 1
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SYSTEM COMPONENT EVALUATION WORKSHEET

Index No.: 211H-006
Rev.: 2

Prepared by: T Lewis Date: 9/30/87
Checked by: [illegible] Date: [illegible]

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF.		Qualification Method	Outstanding Items
	Parameter	Specification	Qualification	Specification	Qualification		
System: High Pressure Injection	Operating Time	1 Year	Note 1	Note 2	N/A	N/A	Note 3
Plant ID No. MP1971 Component: Lube-Oil Pump Motor	Temperature (°F)	130.0	Note 1	C-105	N/A	N/A	Note 3
Manufacturer: Prestolite-Leland	Pressure (PSIA)	16.06	Note 1	C-105	N/A	N/A	Note 3
Model Number: 913126-01 Function: Drives Lube-Oil Pump	Relative Humidity (%)	100.0	Note 1	A	N/A	N/A	Note 3
Accuracy: Spec: N/A Demon: N/A Service: High Pressure Injection Pump P58-1	Chemical Spray	N/A	N/A	N/A	N/A	N/A	Note 3
Location: Auxiliary Bldg. Rm. 105	Radiation	1.9×10^6 RADS	Note 1	T	N/A	N/A	Note 3
Flood Level Elev: N/A Above Flood Level: N/A	Aging	40 Years	Note 1	I	N/A	N/A	Note 3
Needed for: Hot Shutdown [X] Cold Shutdown [ ]	Submergence	N/A	N/A	N/A	N/A	N/A	None

Facility: Davis-Besse Unit 1
Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

Index No.: 211H-006A
Rev.: 2

NOTES

Prepared by: J Lewis Date: 9/30/83
Checked by: [illegible] Date: [illegible]

1. The component is a lube-oil pump motor which is used in providing lubrication for the high pressure injection pumps. The harsh environment specified for Room 105 is caused by a postulated main feedwater line break in Room 303. The high pressure injection pumps may be required to aid in the HELB accident.

   The emergency procedures applicable to the main feedwater line break specify the need for high pressure injection only in response to an overfeeding of the steam generators upon auxiliary feed initiation, thus causing primary system depressurization. Furthermore, setpoint changes have been made, lowering the steam generator level maintained, to preclude the need for high pressure injection. This lack of required operation of the HPI system would also eliminate the necessity of the lube-oil pump motors.

   The elevated temperature and pressure values seen by the lube-oil pump motor are of a relatively short duration and magnitude. The pressure spike peaks at 16.06 psia in 1.75 seconds. As a result, the effects of the 100% relative humidity would be negligible due to the small pressure increase and also due to the sealing capability of the motor. The temperature peak of 130°F occurs in 19 seconds but returns to ambient in 24 minutes. The increase in the temperature is not instantaneous as it occurs gradually to the peak and would therefore not impact motor operation. The radiation value specified is due to the post-LOCA recirculation of fluids. This recirculation would occur close to or at the end of the functioning of the high pressure injection pumps if required. Assuming common motor materials are used in the lube-oil pump motor would preclude its failure in the harsh environment since the radiation value is significantly low.

   In the highly unlikely event of failure of this pump motor, a redundant HPI train, located in Room 115, is available to mitigate the HELB if required. Although the environment in Room 115 is elevated due to the break in Room 303, the temperature peaks at only 99°F, and the pressure peaks at only 15.6 psia (see CAL-35). These values are less than those in Room 105, and they are very close to being considered non-harsh. This fact introduces a significantly higher probability of the component remaining functional. Based on our discussion above and coupled with the likely availability of a redundant HPI train, interim operation is justified.

2. One-year operating time is used as a conservative maximum specification.

3. This component will be replaced with a qualified motor in accordance with FCR 83-062.

Facility: Davis-Besse Unit 1
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SYSTEM COMPONENT EVALUATION WORKSHEET

Index No.: 211H-007
Rev.: 2

Prepared by: J Lewis Date: 9/30/83
Checked by: [illegible] Date: [illegible]

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF.		Qualification Method	Outstanding Items
	Parameter	Specification	Qualification	Specification	Qualification		
System: High Pressure Injection	Operating Time	1 Year	Note 1	Note 2	N/A	N/A	Note 3
Plant ID No. MP1981	Temperature (°F)	177.0	Note 1	C-115	N/A	N/A	Note 3
Component: Lube-Oil Pump Motor							
Manufacturer: Prestolite-Leland	Pressure (PSIA)	15.60	Note 1	C-115	N/A	N/A	Note 3
Model Number: 913126-01	Relative Humidity (%)	100.0	Note 1	A	N/A	N/A	Note 3
Function: Drives Lube-Oil Pump							
Accuracy: Spec: N/A Demon: N/A	Chemical Spray	N/A	N/A	N/A	N/A	N/A	Note 3
Service: High Pressure Injection Pump P58-2							
Location: Auxiliary Bldg. Rm. 115	Radiation	2.67 x 10^6 RADS	Note 1	T	N/A	N/A	Note 3
Flood Level Elev: N/A							
Above Flood Level: N/A	Aging	40 Years	Note 1	I	N/A	N/A	Note 3
Needed for:							
Hot Shutdown [X]	Submergence	N/A	N/A	N/A	N/A	N/A	None
Cold Shutdown [ ]							

Facility: Davis-Besse Unit 1
Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

Index No.: 211H-007A
Rev.: 2

NOTES

Prepared by: T Lewis Date: 9/30/83
Checked by: [illegible] Date: [illegible]

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1. The component is a lube-oil pump motor which is used in providing lubrication for the high pressure injection pumps. The harsh environment specified for Room 115 is caused by a postulated main feedwater line break in Room 314. The high pressure injection pumps may be required to aid in the HELB accident.

   The emergency procedures applicable to the main feedwater line break specify the need for high pressure injection only in response to an overfeeding of the steam generators upon auxiliary feed initiation, thus causing primary system depressurization. Furthermore, setpoint changes have been made, lowering the steam generator level maintained, to preclude the need for high pressure injection. This lack of required operation of the HPI system would also eliminate the necessity of the lube-oil pump motors.

   The elevated temperature and pressure values seen by the lube-oil pump motor are of a relatively short duration and magnitude. The pressure spike peaks at 15.6 psia in 1.7 seconds. As a result, the effects of the 100% relative humidity would be negligible due to the small pressure increase and also due to the sealing capability of the motor. The temperature peak of 177°F occurs in 19 seconds but returns to ambient in 6.7 minutes. The increase in the temperature is not instantaneous as it occurs gradually to the peak and would therefore not impact motor operation. The radiation value specified is due to the post-LOCA recirculation of fluids. This recirculation would occur close to or at the end of the functioning of the high pressure injection pumps if required. Assuming common motor materials are used in the lube-oil pump motor would preclude its failure in the harsh environment since the radiation value is significantly low.

   In the highly unlikely event of failure of this pump motor, a redundant HPI train, located in Room 105, is available to mitigate the HELB if required. Although the environment in Room 105 is elevated due to the break in Room 314, the temperature peaks at only 112.5°F, and the pressure peaks at only 15.2 psia (see CAL-35). These values are less than those in Room 115, and they are very close to being considered non-harsh. This fact introduces a significantly higher probability of the component remaining functional. Based on our discussion above and coupled with the likely availability of a redundant HPI train, interim operation is justified.

2. One-year operating time is used as a conservative maximum specification.

3. This component will be replaced with a qualified motor in accordance with FCR 83-062.

Facility: Davis-Besse Unit 1
Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

Index No. 211H-008
Rev.: 2

Prepared by: N Lewis Date: 11/1/83
Checked by: [signature] Date: 11/2/83

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF.		Qualification Method	Outstanding Items
	Parameter	Specification	Qualification	Specification	Qualification		
System: High Pressure Injection Plant ID No. MVHP02A Component: Valve Motor Operator Manufacturer: Limitorque Model Number: SMB-00-15 O/N: 360207A S/N: 149800 Function: Operates Valve HP2A Accuracy: Spec: N/A Accuracy: Demon: N/A Service: HP Injection 2-1 Valve Location: Auxiliary Bldg. Room 236 Flood Level Elev: N/A Above Flood Level: N/A Needed for: Hot Shutdown [X] Cold Shutdown [X]	Operating Time	1 Year	1.1 Years	F	M-28 V-24B Note 1	Simultaneous Test	None
	Temperature (°F)	198.0	250.0	C-236	M-28 V-24B	Simultaneous Test	None
	Pressure (PSIA)	15.51	39.7	C-236	M-28 V-24B	Simultaneous Test	None
	Relative Humidity (%)	100.0	100.0	A	M-28 V-24B	Simultaneous Test	None
	Chemical Spray	N/A	N/A	N/A	N/A	N/A	None
	Radiation	1.97×10^6 RADS	2.0×10^7 RADS	T	M-28 V-24B	Sequential Test	None
	Aging	40 Years	40 Years	I	CAL-93	Sequential Test Analysis	None
	Submergence	N/A	N/A	N/A	N/A	N/A	None

Facility: Davis-Besse Unit 1
Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

NOTES

Index No.: 211H-008A
Rev.: 2

Prepared by: N Ferris Date 11/1/83
Checked by: [signature] Date 11/2/83

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1. The test subjected the valve motor operator to a transient of 250°F and 39.7 psia for 30 minutes, followed by a cooldown to 120°F in 1.5 hours. The valve motor operator was then exposed to a second transient of 250°F and 39.7 psia for 22 hours, then a cooldown to 200°F and 24.7 psia which was maintained for 15 days. The temperature in Room 236 peaks at 198°F in 19 seconds. The pressure in Room 236 peaks at 15.51 psia in 1.60 seconds. The temperature and pressure in Room 236 return to ambient conditions after 6.7 minutes.

   Based on this information, it can be concluded that the laboratory test subjected the valve motor operator to an overall more severe environment than that which would result from the postulated HELB. Since the valve motor operator remained operable throughout the test, it can be concluded that the valve motor operator will remain functional during and after exposure to the accident environment which would result from the postulated HELB. (Reference C-236)

Facility: Davis-Besse Unit 1
Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

Index No. 211H-009
Rev.: 2

Prepared by: N Louis Date: 11/1/83
Checked by: D.F. McDonald Date: 11/2/83

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF.		Qualification Method	Outstanding Items
	Parameter	Specification	Qualification	Specification	Qualification		
System: High Pressure Injection Plant ID No. MVHP02B Component: Valve Motor Operator Manufacturer: Limitorque Model Number: SMB-00-15 O/N: 360207A S/N: 149801 Function: Operates Valve HP2B Accuracy: Spec: N/A Demon: N/A Service: HP Injection 2-2 Valve Location: Auxiliary Bldg. Room 236 Flood Level Elev: N/A Above Flood Level: N/A Needed for: Hot Shutdown [X] Cold Shutdown [X]	Operating Time	1 Year	1.1 Years	F	M-28 V-24B Note 1	Simultaneous Test	None
	Temperature (°F)	198.0	250.0	C-236	M-28 V-24B	Simultaneous Test	None
	Pressure (PSIA)	15.51	39.7	C-236	M-28 V-24B	Simultaneous Test	None
	Relative Humidity (%)	100.0	100.0	A	M-28 V-24B	Simultaneous Test	None
	Chemical Spray	N/A	N/A	N/A	N/A	N/A	None
	Radiation	1.97×10^6 RADS	2.0×10^7 RADS	T	M-28 V-24B	Sequential Test	None
	Aging	40 Years	40 Years	I	CAL-93	Sequential Test Analysis	None
	Submergence	N/A	N/A	N/A	N/A	N/A	None

Facility: Davis-Besse Unit 1
Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

Index No.: 211H-009A
Rev.: 2

NOTES

Prepared by: N Lewis Date: 11/1/83
Checked by: [signature] Date: 11/2/83

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1. The test subjected the valve motor operator to a transient of 250°F and 39.7 psia for 30 minutes, followed by a cooldown to 120°F in 1.5 hours. The valve motor operator was then exposed to a second transient of 250°F and 39.7 psia for 22 hours, then a cooldown to 200°F and 24.7 psia which was maintained for 15 days. The temperature in Room 236 peaks at 198°F in 19 seconds. The pressure in Room 236 peaks at 15.51 psia in 1.60 seconds. The temperature and pressure in Room 236 return to ambient conditions after 6.7 minutes.

   Based on this information, it can be concluded that the laboratory test subjected the valve motor operator to an overall more severe environment than that which would result from the postulated HELB. Since the valve motor operator remained operable throughout the test, it can be concluded that the valve motor operator will remain functional during and after exposure to the accident environment which would result from the postulated HELB. (Reference C-236)

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SYSTEM COMPONENT EVALUATION WORKSHEET

Index # 211H-010
Rev.: 2

Prepared by: N Lewis Date: 11/1/83
Checked by: D MacDonell Date: 11/4/83

EQUIPMENT DESCRIPTION	ENVIRONMENT		DOCUMENTATION REF.		Qualification Method	Outstanding Items
	Parameter	Specification	Qualification	Specification	Qualification		
System: High Pressure Injection Plant ID No. MVHP02C Component: Valve Motor Operator Manufacturer: Limitorque Model Number: SMB-00-15 O/N: 360207A S/N: 149802 Function: Operates Valve HP2C Accuracy: Spec: N/A Demon: N/A Service: HP Injection 1-1 Valve Location: Auxiliary Bldg. Room 208 Flood Level Elev: N/A Above Flood Level: N/A Needed for: Hot Shutdown [X] Cold Shutdown [X]	Operating Time	1 Year	1.1 Years	F	M-28 V-24B Note 1	Simultaneous Test	None
	Temperature (°F)	192.0	250.0	C-208	M-28 V-24B	Simultaneous Test	None
	Pressure (PSIA)	16.25	39.7	C-208	M-28 V-24B	Simultaneous Test	None
	Relative Humidity (%)	100.0	100.0	A	M-28 V-24B	Simultaneous Test	None
	Chemical Spray	N/A	N/A	N/A	N/A	N/A	None
	Radiation	1.97×10^6 RADS	2.0×10^7 RADS	T	M-28 V-24B	Sequential Test	None
	Aging	40 Years	40 Years	I	CAL-93	Sequential Test Analysis	None
	Submergence	N/A	N/A	N/A	N/A	N/A	None

Facility: Davis-Besse Unit 1
Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

Index No.: 211H-010A
Rev.: 2

NOTES

Prepared by N Lewis, Date 11/1/83
Checked by: [illegible], Date 11/2/83

1. The test subjected the valve motor operator to a transient of 250°F and 39.7 psia for 20 minutes, followed by a cooldown to 120°F in 1.5 hours. The valve motor operator was then exposed to a second transient of 250°F and 39.7 psia for 22 hours, then a cooldown to 200°F and 24.7 psia which was maintained for 15 days. The temperature in Room 208 peaks at 192°F in 7.1 seconds. The pressure in Room 208 peaks at 16.25 psia in 1.55 seconds. The temperature and pressure in Room 208 return to ambient conditions after 20 minutes.

   Based on this information, it can be concluded that the laboratory test subjected the valve motor operator to an overall more severe environment than that which would result from the postulated HELB. Since the valve motor operator remained operable throughout the test, it can be concluded that the valve motor operator will remain functional during and after exposure to the accident environment which would result from the postulated HELB. (Reference C-208)

Facility: Davis-Besse Unit 1
Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

Index No. 211H-011
Rev.: 2

Prepared by: N Lewis Date: 11/1/83
Checked by: [illegible] Date: 11/4/83

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF.		Qualification Method	Outstanding Items
	Parameter	Specification	Qualification	Specification	Qualification		
System: High Pressure Injection Plant ID No. MVHP02D Component: Valve Motor Operator Manufacturer: Limitorque Model Number: SMB-00-15 O/N: 360207A S/N: 149803 Function: Operates Valve HP2D Accuracy: Spec: N/A Demon: N/A Service: HP Injection 1-2 Valve Location: Auxiliary Bldg. Room 208 Flood Level Elev: N/A Above Flood Level: N/A Needed for: Hot Shutdown [X] Cold Shutdown [X]	Operating Time	1 Year	1.1 Years	F	M-28 V-24B Note 1	Simultaneous Test	None
	Temperature (°F)	192.0	250.0	C-208	M-28 V-24B	Simultaneous Test	None
	Pressure (PSIA)	16.25	39.7	C-208	M-28 V-24B	Simultaneous Test	None
	Relative Humidity (%)	100.0	100.0	A	M-28 V-24B	Simultaneous Test	None
	Chemical Spray	N/A	N/A	N/A	N/A	N/A	None
	Radiation	1.97×10^6 RADS	2.0×10^7 RADS	T	M-28 V-24B	Sequential Test	None
	Aging	40 Years	40 Years	I	CAL-33	Sequential Test Analysis	None
	Submergence	N/A	N/A	N/A	N/A	N/A	None

Facility: Davis-Besse Unit 1
Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

NOTES

Index No.: 211H-011A
Rev.: 2

Prepared by: N Lewis Date 11/1/83
Checked by: [signature] Date 11/2/83

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1. The test subjected the valve motor operator to a transient of 250°F and 39.7 psia for 30 minutes, followed by a cooldown to 120°F in 1.5 hours. The valve motor operator was then exposed to a second transient of 250°F and 39.7 psia for 22 hours, then a cooldown to 200°F and 24.7 psia which was maintained for 15 days. The temperature in Room 208 peaks at 192°F in 7.1 seconds. The pressure in Room 208 peaks at 16.25 psia in 1.55 seconds. The temperature and pressure in Room 208 return to ambient conditions after 20 minutes.

   Based on this information, it can be concluded that the laboratory test subjected the valve motor operator to an overall more severe environment than that which would result from the postulated HELB. Since the valve motor operator remained operable throughout the test, it can be concluded that the valve motor operator will remain functional during and after exposure to the accident environment which would result from the postulated HELB. (Reference C-208)

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SYSTEM COMPONENT EVALUATION WORKSHEET

Index No.: 211H-012
Rev.: 2

Prepared by: J Lewis Date: 9/30/83
Checked by: [illegible] Date: [illegible]

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF.		Qualification Method	Outstanding Items
	Parameter	Specification	Qualification	Specification	Qualification		
System: High Pressure Injection Plant ID No. MP1972 Component: Lube-Oil Pump Motor Manufacturer: Prestolite-Leland Model Number: 912626-DC Function: Drives Lube-Oil Pump Accuracy: Spec: N/A Demon: N/A Service: High Pressure Injection Pump P58-1 Location: Auxiliary Bldg. Rm. 105 Flood Level Elev: N/A Above Flood Level: N/A Needed for: Hot Shutdown [X] Cold Shutdown [ ]	Operating Time	1 Year	Note 1	Note 2	N/A	N/A	Note 3
	Temperature (°F)	130.0	Note 1	C-105	N/A	N/A	Note 3
	Pressure (PSIA)	16.06	Note 1	C-105	N/A	N/A	Note 3
	Relative Humidity (%)	100.0	Note 1	A	N/A	N/A	Note 3
	Chemical Spray	N/A	N/A	N/A	N/A	N/A	Note 3
	Radiation	1.9×10^6 RADS	Note 1	T	N/A	N/A	Note 3
	Aging	40 Years	Note 1	I	N/A	N/A	Note 3
	Submergence	N/A	N/A	N/A	N/A	N/A	None

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NOTES

Prepared by: N Lewis Date: 11/1/83
Checked by: [signature] Date: 11/2/83

1. The component is a lube-oil pump motor which is used in providing lubrication for the high pressure injection pumps. The harsh environment specified for Room 105 is caused by a postulated main feedwater line break in Room 303. The high pressure injection pumps may be required to aid in the HELB accident.

   The emergency procedures applicable to the main feedwater line break specify the need for high pressure injection only in response to an overfeeding of the steam generators upon auxiliary feed initiation, thus causing primary system depressurization. Furthermore, setpoint changes have been made, lowering the steam generator level maintained, to preclude the need for high pressure injection. This lack of required operation of the HPI system would also eliminate the necessity of the lube-oil pump motors.

   The elevated temperature and pressure values seen by the lube-oil pump motor are of a relatively short duration and magnitude. The pressure spike peaks at 16.06 psia in 1.75 seconds. As a result, the effects of the 100% relative humidity would be negligible due to the small pressure increase and also due to the sealing capability of the motor. The temperature peak of 130°F occurs in 19 seconds but returns to ambient in 24 minutes. The increase in the temperature is not instantaneous as it occurs gradually to the peak and would therefore not impact motor operation. The radiation value specified is due to the post-LOCA recirculation of fluids. This recirculation would occur close to or at the end of the functioning of the high pressure injection pumps if required. Assuming common motor materials are used in the lube-oil pump motor would preclude its failure in the harsh environment since the radiation value is significantly low.

   In the highly unlikely event of failure of this pump motor, a redundant HPI train, located in Room 115, is available to mitigate the HELB if required. Although the environment in Room 115 is elevated due to the break in Room 303, the temperature peaks at only 99°F, and the pressure peaks at only 15.6 psia (see CAL-35). These values are less than those in Room 105, and they are very close to being considered non-harsh. This fact introduces a significantly higher probability of the component remaining functional. Based on our discussion above and coupled with the likely availability of a redundant HPI train, interim operation is justified.

2. One-year operating time is used as a conservative maximum specification.

3. This component will not be scheduled for replacement until it is determined that a fractional horsepower qualified DC motor exists.

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SYSTEM COMPONENT EVALUATION WORKSHEET

Index No.: 211H-013
Rev.: 2

Prepared by: Z Lewis Date: 9/30/83
Checked by: [illegible] Date: [illegible]

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF.		Qualification Method	Outstanding Items
	Parameter	Specification	Qualification	Specification	Qualification		
System: High Pressure Injection	Operating Time	1 Year	Note 1	Note 2	N/A	N/A	Note 3
Plant ID No. MP1982	Temperature (°F)	177.0	Note 1	C-115	N/A	N/A	Note 3
Component: Lube-Oil Pump Motor							
Manufacturer: Prestolite-Leland	Pressure (PSIA)	15.60	Note 1	C-115	N/A	N/A	Note 3
Model Number: 912626-DC	Relative Humidity (%)	100.0	Note 1	A	N/A	N/A	Note 3
Function: Drives Lube-Oil Pump							
Accuracy: Spec: N/A Demon: N/A	Chemical Spray	N/A	N/A	N/A	N/A	N/A	Note 3
Service: High Pressure Injection Pump P58-2							
Location: Auxiliary Bldg. Rm. 115	Radiation	2.67×10^6 RADS	Note 1	T	N/A	N/A	Note 3
Flood Level Elev: N/A							
Above Flood Level: N/A	Aging	40 Years	Note 1	I	N/A	N/A	Note 3
Needed for:							
Hot Shutdown [X]	Submergence	N/A	N/A	N/A	N/A	N/A	None
Cold Shutdown [ ]							

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SYSTEM COMPONENT E[redacted]CATION WORKSHEET

Index No: [redacted]211H-013A
Rev.: 2

NOTES

Prepared by: N Lewis Date: 11/1/83
Checked by: [signature] Date: 11/2/83

1. The component is a lube-oil pump motor which is used in providing lubrication for the high pressure injec[redacted]pumps. The harsh environment specified for Room 115 is caused by a postulated main feedwater line break in Room 314. The high pressure injection pumps may be required to aid in the HELB accident.

   The emergency procedures applicable to the main feedwater line break specify the need for high pressure injection only in response to an overfeeding of the steam generators upon auxiliary feed initiation, thus causing primary system depressurization. Furthermore, setpoint changes have been made, lowering the steam generator level maintained, to preclude the need for high pressure injection. This lack of required operation of the HPI system would also eliminate the necessity of the lube-oil pump motors.

   The elevated temperature and pressure values seen by the lube-oil pump motor are of a relatively short duration and magnitude. The pressure spike peaks at 15.6 psia in 1.7 seconds. As a result, the effects of the 100% relative humidity would be negligible due to the small pressure increase and also due to the sealing capability of the motor. The temperature peak of 177°F occurs in 19 seconds but returns to ambient in 6.7 minutes. The increase in the temperature is not instantaneous as it occurs gradually to the peak and would therefore not impact motor operation. The radiation value specified is due to the post-LOCA recirculation of fluids. This recirculation would occur close to or at the end of the functioning of the high pressure injection pumps if required. Assuming common motor materials are used in the lube-oil pump motor would preclude its failure in the harsh environment since the radiation value is significantly low.

   In the highly unlikely event of failure of this pump motor, a redundant HPI train, located in Room 105, is available to mitigate the HELB if required. Although the environment in Room 105 is elevated due to the break in Room 314, the temperature peaks at only 112.5°F, and the pressure peaks at only 15.2 psia (see CAL-35). These values are less than those in Room 115, and they are very close to being considered non-harsh. This fact introduces a significantly higher probability of the component remaining functional. Based on our discussion above and coupled with the likely availability of a redundant HPI train, interim operation is justified.

2. One-year operating time is used as a conservative maximum specification.

3. This component will not be scheduled for replacement until it is determined that a fractional horsepower qualified DC motor exists.

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Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

Index No.: 211H-014
Rev.: 2

Prepared by: N Lewis Date: 11/1/83
Checked by: [illegible] Date: 11/2/83

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF.		Qualification Method	Outstanding Items
	Parameter	Specification	Qualification	Specification	Qualification		
System: High Pressure Injection Plant ID No. PDIS4957 Component: Pressure Differential Indicating Switch Manufacturer: United Electric Model Number: 357 Function: Operates High Pressure Injection DC Lube Oil Pump Accuracy: Spec: N/A Demon: N/A Service: High Pressure Injection DC Lube Oil Pump Location: Auxiliary Bldg. Rm. 105 Flood Level Elev: N/A Above Flood Level: N/A Needed for: Hot Shutdown [X] Cold Shutdown [X]	Operating Time	1 Year	Note 1	Note 2	N/A	N/A	Note 1
	Temperature (°F)	130.0	Note 1	C-105	N/A	N/A	Note 1
	Pressure (PSIA)	16.06	Note 1	C-105	N/A	N/A	Note 1
	Relative Humidity (%)	100.0	Note 1	A	N/A	N/A	Note 1
	Chemical Spray	N/A	N/A	N/A	N/A	N/A	None
	Radiation	9.2×10^5 RADS	8.0×10^6 RADS	AS	CAL-68	Analysis	None
	Aging	40 Years	15 Years Note 3	I	N/A CAL-68	Analysis	None
	Submergence	N/A	N/A	N/A	N/A	N/A	None

Facility: Da[redacted]-Besse Unit 1 SYSTEM COMPONENT E[redacted]ATION WORKSHEET Index No. [redacted]11H-014A
Docket: 50-346 Rev.: 2

NOTES

Prepared by: T Louie Date: 9/30/83
Checked by: [signature] Date: [illegible]

1. This component is scheduled to be replaced by the first refueling outage subsequent to component on-site availability.

   The component is a pressure differential indicating switch used to start the dc lube oil pump motor which is used in providing lubrication for the high pressure injection pumps. The harsh environment specified for Room 105 is caused by a postulated main feedwater line break in Room 303. The high pressure injection pumps may be required to aid in the HELB accident.

   The emergency procedures applicable to the main feedwater line break specify the need for high pressure injection only in response to an overfeeding of the steam generators upon auxiliary feed initiation, thus causing primary system depressurization. Furthermore, setpoint changes have been made, lowering the steam generator level maintained, to preclude the need for high pressure injection. This lack of required operation of the HPI system would also eliminate the necessity of the pressure differential indicating switch.

   The elevated temperature and pressure values seen by the pressure differential indicating switch are of a relatively short duration and magnitude. The pressure spike peaks at 16.06 psia in 1.75 seconds. As a result, the effects of the 100% relative humidity would be negligible due to the small pressure increase and also due to the sealing capability of the pressure differential indicating switch. The temperature peak of 130°F occurs in 19 seconds but returns to ambient in 24 minutes. The increase in the temperature is not instantaneous as it occurs gradually to the peak and would therefore not impact switch operation. The radiation value specified is due to the post-LOCA recirculation of fluids. This recirculation would occur close to or at the end of the functioning of the high pressure injection pumps if required.

   In the highly unlikely event of failure of this pressure differential indicating switch, a redundant HPI train, located in Room 115, is available to mitigate the HELB if required. Although the environment in Room 115 is elevated due to the break in Room 303, the temperature peaks at only 99°F, and the pressure peaks at only 15.6 psia (see CAL-35). These values are less than those in Room 115, and they are very close to being considered non-harsh. This fact introduces a significantly higher probability of the component remaining functional. Based on our discussion above and coupled with the likely availability of a redundant HPI train, interim operation is justified.

2. One-year operating time is used as a conservative maximum specification.

3. Materials and/or components sensitive to thermal aging will be replaced as per maintenance and replacement schedules to assure that associated component will maintain functional operability in harsh environments.

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Docket: 50-346

COMPONENT MATERIALS EVALUATION SHEET

Index No.: 211H-014B
Rev.: 2

Prepared by: N Lewis Date: 11/1/83
Checked by: [signature] Date: 11/2/83

Plant I.D. No.: PDIS4957
Component: Pressure Differential Switch
Manufacturer: United Electric
Model No.: 357

		THERMAL AGING		RADIATION	
Parts List *	Materials List	Qualification	Reference	Qualification	Reference
Switch	General Purpose Phenolic (Durez)	Greater than 40 year @ 122°F	CAL-68	8.0×10^6 RADS	CAL-68
Caplug	Polyvinlchloride	Greater than 40 year @ 122°F	CAL-68	9.0×10^6 RADS	CAL-68
Cover Gasket	BUNA-N	15 Years @ 122°F	CAL-68	1.5×10^7 RADS	CAL-68
Switch Insulator	Copaco Paper	Greater than 40 year @ 122°F	CAL-68	2.0×10^8 RADS	CAL-68

Material & Parts List Reference: V-46A

Facility: Davis-Besse Unit 1 SYSTEM COMPONENT EVALUATION WORKSHEET Index No: 211H-015
Docket: 50-346 Rev.: 2

Prepared by: N Lewis Date: 11/1/83
Checked by: [signature] Date: 11/2/83

EQUIPMENT DESCRIPTION	ENVIRONMENT			DOCUMENTATION REF.		Qualification Method	Outstanding Items
	Parameter	Specification	Qualification	Specification	Qualification		
System: High Pressure Injection Plant ID No. PDIS4961 Component: Pressure Differential Indicating Switch Manufacturer: United Electric Model Number: 357 Function: Operates High Pressure Injection DC Lube Oil Pump Accuracy: Spec: N/A Demon: N/A Service: High Pressure Injection DC Lube Oil Pump Location: Auxiliary Bldg. Rm. 115 Flood Level Elev: N/A Above Flood Level: N/A Needed for: Hot Shutdown [X] Cold Shutdown [X]	Operating Time	1 Year	Note 1	Note 2	N/A	N/A	Note 1
	Temperature (°F)	177.0	Note 1	C-115	N/A	N/A	Note 1
	Pressure (PSIA)	15.60	Note 1	C-115	N/A	N/A	Note 1
	Relative Humidity (%)	100.0	Note 1	A	N/A	N/A	Note 1
	Chemical Spray	N/A	N/A	N/A	N/A	N/A	None
	Radiation	6.21×10^5 RADS	8.0×10^6 RADS	AS	CAL-68	Analysis	None
	Aging	40 Years	15 Years Note 3	I	CAL-68	Analysis	None
	Submergence	N/A	N/A	N/A	N/A	N/A	None

Facility: Davis-Besse Unit 1
Docket: 50-346

SYSTEM COMPONENT EVALUATION WORKSHEET

Index No.: 211H-015A
Rev.: 2

NOTES

Prepared by: T Lewis Date: 9/30/83
Checked by: [illegible] Date: [illegible]

1. This component is scheduled to be replaced by the first refueling ou[illegible] subsequent to component on-site availability.

   The component is a pressure differential indicating switch used to start the dc lube oil pump motor which is used in providing lubrication for the high pressure injection pumps. The harsh environment specified for Room 115 is caused by a postulated main feedwater line break in Room 314. The high pressure injection pumps may be required to aid in the HELB accident.

   The emergency procedures applicable to the main feedwater line break specify the need for high pressure injection only in response to an overfeeding of the steam generators upon auxiliary feed initiation, thus causing primary system depressurization. Furthermore, setpoint changes have been made, lowering the steam generator level maintained, to preclude the need for high pressure injection. This lack of required operation of the HPI system would also eliminate the necessity of the pressure differential indicating switch.

   The elevated temperature and pressure values seen by the pressure differential indicating switch are of a relatively short duration and magnitude. The pressure spike peaks at 15.6 psia in 1.7 seconds. As a result, the effects of the 100% relative humidity would be negligible due to the small pressure increase and also due to the sealing capability of the pressure differential indicating switch. The temperature peak of 177°F occurs in 19 seconds but returns to ambient in 6.7 minutes. The increase in the temperature is not instantaneous as it occurs gradually to the peak and would therefore not impact switch operation. The radiation value specified is due to the post-LOCA recirculation of fluids. This recirculation would occur close to or at the end of the functioning of the high pressure injection pumps if required.

   In the highly unlikely event of failure of this pressure differential indicating switch, a redundant HPI train, located in Room 105, is available to mitigate the HELB if required. Although the environment in Room 105 is elevated due to the break in Room 314, the temperature peaks at only 112.5°F, and the pressure peaks at only 15.2 psia (see CAL-35). These values are less than those in Room 115, and they are very close to being considered non-harsh. This fact introduces a significantly higher probability of the component remaining functional. Based on our discussion above and coupled with the likely availability of a redundant HPI train, interim operation is justified.

2. One-year operating time is used as a conservative maximum specification.

3. Materials and/or components sensitive to thermal aging will be replaced as per maintenance and replacement schedules to assure that associated component will maintain functional operability in harsh environments.

Facility: [illegible]s-Besse Unit 1
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COMPONENT MATERIAL [illegible]VALUATION SHEET

Index No.: [illegible]1H-015B
Rev.: 2

Prepared by: N Lewis Date: 11/1/93
Checked by: [signature] Date: 11/2/93

Plant I.D. No.: PDIS4961 Component: Pressure Differential Switch

Manufacturer: United Electric Model No.: 357

		THERMAL AGING		RADIATION	
Parts List *	Materials List	Qualification	Reference	Qualification	Reference
Switch	General Purpose Phenolic (Durez)	Greater than 40 year @ 122°F	CAL-68	8.0×10^6 RADS	CAL-68
Caplug	Polyvinlchloride	Greater than 40 year @ 122°F	CAL-68	8.0×10^6 RADS	CAL-68
Cover Gasket	BUNA-N	15 Years @ 122°F	CAL-68	1.5×10^7 RADS	CAL-68
Switch Insulator	Copaco Paper	Greater than 40 year @ 122°F	CAL-68	2.0×10^8 RADS	CAL-68

Material & Parts List Reference: V-46A