Consumers
Power
Company

General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201 • Area Code 517 788-0550

November 30, 1978

Director, Nuclear Reactor Regulation
Att: Mr Dennis L Ziemann, Chief
Operating Reactors Branch No 2
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKET 50-155 - LICENSE DPR-6 -
BIG ROCK POINT PLANT - RESPONSE
TO LETTER DATED SEPTEMBER 6, 1978:
ENVIRONMENTAL QUALIFICATION
(SEP TOPIC III-12)

Your letter of September 6, 1978 transmitted a tabulation of information regarding safety-related electrical equipment qualification using an NRC standard format. Consumers Power Company was requested to complete as much of the table as possible, identify appropriate references and confirm the accuracy and completeness of the table. Attachment I to this letter provides Consumers Power Company's response to your request.

As stated in our previous submittal of February 24, 1978, the equipment addressed is: (1) That equipment which must operate to ensure safe shutdown of the plant during a loss of coolant accident (inside of containment) and a main steam line break (outside of containment) and (2) that equipment that is subject to a potentially hostile environment due to the above events. You will note that the table, as submitted to Consumers Power Company on September 6, 1978, has been broken down using four criteria: (1) By equipment manufacturer, (2) by equipment location (ie, inside or outside containment), (3) by time needed, and (4) whether or not the equipment was submerged. It is Consumers Power Company's conclusion that this breakdown is necessary to ensure that future users of this tabulated data will be able to draw realistic conclusions regarding this equipment.

The electrical equipment was reviewed to determine the length of time required to remain operational. This was based on time span from the initiation of the event until the component is required to start to operate and the time span over which it must continue to operate. The time needed identified for each item is conservative and, in some cases, is considerably longer than the equipment will actually be required to function.

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It is Consumers Power Company's conclusion that this list provides an adequate basis to support operation of the plant.

Included as Attachment II to this letter is an updated copy of the electrical equipment qualification tables in the format as previously submitted by Consumers Power Company (February 24, 1978). This attachment is being submitted in order to ensure that previously submitted information is current. Some revision was required to accommodate newly acquired information and to correct errors found during this review. Other unrevised pages of the previous submittal have not been resubmitted.

David A Bixel (Signed)

David A Bixel
Nuclear Licensing Administrator

CC: JGKeppler, USNRC

ATTACHMENT 1

Electrical Equipment-Environmental
Qualification and Requirements

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment Parameter	Spec.	Qual.	Qual. Method	Reference	See note 2 for "Time Needed" determination
1	Solenoid Valve								2	
		49	I	10m	Temp. (F)	235	415	Eval	1,19	See note 6
	ASCO/HTX8300061RF	Page 7			Pr. (Psia)	42	42	↓	1, 19	
					RH (%)	100%	100%		1	
		Item 7			Chem.	No	--		--	
					Rad. (R)	1.4×10^6	6×10^6		19	
	SV-4876				Sub.	Yes	Yes		Note 1	
2	Solenoid Valve								2	
					Temp. (F)	235	340	Eval	1	
	ASCO/830060RF	49	I	10m	Pr. (Psia)	42	42		1	
					RH (%)	100	100		1	
	SV-4869	Page 7			Chem.	No	--		--	
	SV-4891				Rad. (R)	1.4×10^6	4×10^6		19	
		Items 4,5, 6			Sub.	Yes	Yes	↓	Note 1	
3									2	
	Solenoid Valve	49	I	10m	Temp. (F)	235	240	Eval	1,52	
		page 7			Pr. (Psia)	42	42		1,52	
	ASCO/831620	Item 3			RH (%)	100	100		1,52	
					Chem.	No	--		--	
	HVA 90-441-1A				Rad. (R)	1.4×10^5	3×10^6		19	
					Sub.	No	--	↓	--	
	SV-4879									

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment Parameter	Spec.	Qual.	Qual. Method	Reference	
4	Solenoid Valve									
		50	I	30d	Temp. (F)	235	240	V.Data	20	240° to 1 hour
	ASCO/	pg9			Pr. (Psia)	42	42	↓	20	220° continuous
	HT831677	Items 1-4			RH (%)	100	100		20	
					Chem.	No	--		--	
					Rad. (R)	$1.3X10^6$	$2X10^8$		20, 63, 64	
					Sub	No	--			
	SV-4980 thru SV-4983									
5	Solenoid Valve									
	Target Rock/	50	I	30d	Temp. (F)	235	300	Test	8	
	73V001	pg 9			Pr. (Psia)	42	85	↓	8	
		Items5-8			RH (%)	100	100	↓	8	
	SV-4984 through SV-4987				Chem.	No	--	--	--	
					Rad. (R)	$1.3X10^6$	$3.3X10^7$	Test	8	
					Sub.	Nc	--	--	--	
6					(see Note 4)					
	Motor Operated	52	0	30d	Temp. (F)	100	140	Eval	2	Note 13, 4
	Valve Starter	pg. 4			Pr. (Psia)	15	15	↓		Note 4
		Items11,12			RH (%)	100	100	↓		See Note 5, 13, 4
	GE CR-106-CO				Chem.	No	--	--	--	
	TEC 36015				Rad. (R)	No	--	--	--	
					Sub.	No	--	--	--	
	NO-1 52-2B45									

Reactor: Big Rock Point Plant — Systematic Eval on Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment Parameter	Spec.	Qual.	Qual. Method	Reference	
7									2	
	Motor Operated Valve	49	I	30d	Temp. (F)	235	235	Test	12	
	Rotork/14A	Pg. 4			Pr. (Psia)	42	42	↓	12	
	Limitorque/SMA-00	Items 9,10			RH (%)	100	100	↓	12	
		Pg.5			Chem.	No	--	--	--	
		Items1-5			Rad. (R)	$1.3X10^6$	$3X10^6$	Eval	15	
	MO-7064				Sub.	No	--	--	--	
	MO-7068									
	MO-7051									
	MO-7061									
	MO-7071									
	MO-7069									
8	Penetration, Elec.									
	Amphenol-Borg/	50	I	30d	Temp. (F)	235	235	V.Data	67,68	
	Co-axial	Pg.11			Pr. (Psia)	42	42	↓	↓	
		Items 3			RH (%)	100	100	↓	↓	
					Chem.	No	--	--	--	
					Rad. (R)	$6X10^4$	$6X10^4$	Eval	69	
					Sub.	No	--	--	--	
9										
	Penetration	50	I	30d	Temp. (F)	235	280	Test,Eval	22,27	See note 9
	Conax	Fg.9			Pr. (Psia)	42	60	Test,Eval	↓	
	B4205	Items9-12			RH (%)	100	100	Test,Eval	↓	
					Chem.	No	--	--	--	
	H40				Rad. (R)	$1.3X10^6$	$2.3X10^7$	Test,Eval	22,27	
	H65				Sub.	No	--	--	--	
	H81									
	H83									

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment Parameter	Environment Spec.	Environment Qual.	Qual. Method	Reference	
10	Penetration									
	Rundel Manufacturer;	50	I	30d	Temp. (F)	235	274	Eval	5, 65	
	Bechtel Specification	Page 11			Pr. (Psia)	42	45	↓	↓	
	3150E-19	Item 2			RH (%)	100	100	↓	↓	
					Chem.	No	--	--	--	
					Rad. (R)	$1.3X10^6$	Sat	Eval	5, 65,66	
					Sub.	No	--	--	--	
11	Terminal									
	Connections (RDS Syst.)	50	I	30d	Temp. (F)	235	235	V.Data	6	
		page 11			Pr. (Psia)	42	42	↓	↓	
	AMP Special Products	Item 6			RH (%)	100	100	↓	↓	
					Chem.	No	--	--	--	
					Rad. (R)	$1.3X10^6$	$7X10^8$	V.Data	6	
					Sub.	No	--			
12										
	Terminal	50	I	30d	Temp. (F)	235	235	Eval	33,14	
	Block (RDS System)	page 11			Pr. (Psia)	42	42	↓	↓	
		Item 7			RH (%)	100	100	↓	↓	
	States Block/NT				Chem.	No	--	--	--	
					Rad. (R)	$1.3X10^6$	$1X10^8$	Eval	33,14	
					Sub.	No	--	--	--	

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment Parameter	Environment Spec.	Environment Qual.	Qual. Method	Reference	
13	Splice									
	Amp	49	I	30d	Temp. (F)	235	392	Test	55,61	See note 8
	CertiSeal 324549	page 7			Pr. (Psia)	42	42	Eval	Note 14	
	324990	Item 2			RH (%)	100	100	Eval	Note 14	
	(see item 50 for other				Chem.	No	--	--	--	
	splices)				Rad. (R)	$1.3X10^6$	$1.3X10^6$	Eval	36,59,61	Note 17
					Sub.	No	--	--	--	
14	Junction Box	52	I	30d	Temp. (F)	235	235	Eval	33	
	Rumsey Electrical	page 10			Pr. (Psia)	42	42	↓	↓	
	Gasketed	Item 1			RH (%)	100	100			
					Chem.	No	--	--	--	
	TB240-TB 243				Rad. (R)	$1.3X10^6$	$1X10^8$	Eval	33	
					Sub.	No	--	--	--	
15	Junction Box	52	I	30d	Temp. (F)	235	235	Eval	4,2,26	
		page 6			Pr. (Psia)	42	42	↓	↓	
	JB 160	Item 12			RH (%)	100	100			
	JB 161				Chem.	No	--	--	--	
	JB 164				Rad. (R)	$1.3X10^6$	Sat	Eval	4,2,26	
	JB 166				Sub.	No	--	--	--	
	JB 167									

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment: Parameter	Spec.	Qual.	Qual. Method	Reference
16	Cable	50	I	30d	Temp. (F)	235	325	Test	9
	Kerite/FR	page 6			Pr. (Psia)	42	97	↓	↓
		Item 11			RH (%)	100	100		
					Chem.	No	--	--	--
					Rad. (R)	$7X10^6$	$1.2X10^8$	Test	9
					Sub.	Yes	Sat	Eval	Note 1
17	Cable	50	I	30d	Temp. (F)	235	270	Test	11
	Raychem	page 9			Pr. (Psia)	42	85	↓	↓
		Item 13			RH (%)	100	100		
					Chem.	No	--	--	--
					Rad. (R)	$7X10^6$	$1.0X10^8$	Test	11
					Sub.	Yes	Sat	Eval	Note 1
18	Cable	50	I	30d	Temp. (F)	235	280	Test	10
	Cerro Wire and	page 10			Pr. (Psia)	42	85	↓	↓
	Cable/FR	Item 2			RH (%)	100	100		
					Chem.	No	--	--	--
					Rad. (R)	$7X10^6$	$2X10^8$	Test	10
					Sub.	Yes	Sat	Eval	Note 1

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment: Parameter	Spec.	Qual.	Qual. Method	Reference	
19										
	Cable	50	I	30d	Temp. (F)	235	250	Test	3,7	See note 10
	Various Vendors	page 10			Pr. (Psia)	42	42	↓	↓	
		Item 3			RH (%)	100	100	↓	↓	
					Chem.	No	--	--	--	
					Rad. (R)	$7X10^6$	$7X10^6$	Eval	3,36	Note 17
					Sub.	Yes	--	--	--	
20	Transmitter Flow	49								
	Barton/386 (224)	page 1	I	30d	Temp. (F)	235	235	CofC	2,13	
		Items 1,2,4			Pr. (Psia)	42	42	↓	↓	
	FT-2161				RH (%)	100	100	↓	↓	
	FT-2162 (See Note 11)	page 3			Chem.	No	--	--	--	
	FT-2164	Item 1			Rad. (R)	$1.3X10^6$	$2X10^8$	Test	13	
					Sub.	No	---	CofC	13	
21										
	Pressure Transmitter	52	I	30d	Temp. (F)	235	235	CofC	28	
	Foxboro	page 5			Pr. (Psia)	42	42	↓	↓	
	E11GM-HSAE 1	Item 8			RH (%)	100	100	↓	↓	
					Chem.	No	--	--	--	
					Rad. (R)	$1.3X10^6$	$1X10^7$	CofC	28	
	PT-186				Sub.	No	--	--	--	

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment			Qual. Method	Reference
					Parameter	Spec.	Qual.		
22	Pressure								
	Pressure Transmitter	52	I	30d	Temp. (F)	235	316	CofC	29
	Rosemount	Pg.10			Pr. (Psia)	42	85	↓	↓
	1152GP	Item 4			RH (%)	100	100	↓	↓
					Chem.	No	--	--	--
	PT-IA-070				Rad. (R)	$1.3X10^6$	$5X10^6$	CofC	29
					Sub.	No	--	--	--
23									
	Level Transmitter	49	I	30d	Temp. (F)	235	286	Test	31
	Westinghouse	Pg.8			Pr. (Psia)	42	75	↓	↓
	59DP4C997050	All			RH (%)	100	100	↓	↓
					Chem.	No	--	--	--
	LT-3180 through				Rad. (R)	1.3X106	$2X10^8$	Test	31
	LT-3187				Sub.	No	--	--	--
24									
	Switch	49	I	1d	Temp. (F)	235	250	Spec.	2
	Jo-Bell Products	Pg.2			Pr. (Psia)	42	45	↓	↓
		Items5-8			RH (%)	100	100	↓	↓
	R232A-2XP(R)				Chem.	No	--	--	--
					Rad. (R)	$5.9X10^6$	Sat	Eval	2
	LS-3562 through				Sub.	Yes	Sat	Eval	2
	LS-3565								

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment Parameter	Spec.	Qual.	Qual. Method	Reference	
25	Switch									
	Rochester Instr.	49	O	30d	Temp. (F)	90	120	Eval	40	Note 12
	ET-215 (T-2)	Pg.1			Pr. (Psia)	15	15	↓	40	
		Items 9-12			RH (%)	80	80	↓	42	Note 12, 15
	FS-2520 through				Chem.	No	No	--	--	
	FS-2523				Rad. (R)	No	No	--	--	
					Sub.	No	No	--	--	
								1		
26	Switch									
	Static-O-Ring	52	I	90m	Temp. (F)	235	250	CofC	23,25,62	See footnote 7
	9TA-S411SSX12	Pg.3			Pr. (Psia)	42	42	Eval	23,62	
		Items 4-11			RH (%)	100	100	Eval	23,62	
	PS-1G11A through				Chem.	No	-- [4]			
	PS-1G11H				Rad. (R)	$3.6X10^4$	$3.6X10^4$ [4]	Eval	24	
					Sub.	No	--	---	--	
27										
	Switch	50	O	30d	Temp. (F)	100	200	Eval	44	Note 13
	Static-O-Ring	Pg.6			Pr. (Psia)	15	15	↓	↓	
	4NN-E-411-VXSTT	Items 7-10			RH (%)	100	100	↓	↓	Note 13
	12L-AA5-FSS				Chem.	No	--	--	--	
					Rad. (R)	No	--	--	--	
	PS-636				Sub.	No	--	--	--	
	PS-637									
	PS-7064A									
	PS-7064B									

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment: Parameter	Spec.	Qual.	Qual. Method	Reference	
28	Switch	52								
	Yarway	Pg.4	I	90m	Temp. (F)	235	270	Similiarly	2,16,14,15	
	4320C	Items 1-8			Pr. (Psia)	42	42	↓	↓	
	4420C				RH (%)	100	100	↓	↓	
					Chem.	No	--	--	--	
	LS-RE09A through				Rad. (R)	$3.6X10^{4}$	$3.6X10^{4}$	Eval	--	See footnote 7
	LS-RE09H				Sub.	No	--	--	--	
29										
	Indicator	50	O	30d	Temp. (F)	90	140	Cofc	30	Note 12
	Analogic Meas.	Pg.10			Pr. (Psia)	15	15	↓	↓	
	PI2445/6/2	Item 6			RH (%)	80	95	↓	↓	Note 12
					Chem.	No	--	--	--	
	PI-IA05				Rad. (R)	No	--	--	--	
					Sub.	No	--	--	--	
30										
	Indicator	49	O	24h	Temp. (F)	90	140	Eval	40,41	Note 12
		Pg.3			Pr. (Psia)	15	15	↓	↓	
	Bailey Meter	Item 2			RH (%)	80	80	↓	↓	Note 12
	R00B (IM)				Chem.	No	--	--	--	
					Rad. (R)	No	--	--	--	
	LI-3400				Sub.	No	--	--	--	

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment: Parameter	Spec.	Qual.	Qual. Method	Reference	
31	Indicator									
		49	0	30d	Temp. (F)	90	140	Eval	2	Note 12
	Bailey Meter/	Pg.1			Pr. (Psia)	15	15	↓	↓	
	S3-F2	Items 5-8			RH (%)	80	80	↓	↓	Note 12,15
					Chem.	No	--	--	--	
	FI-2333 through				Rad. (R)	No	--	--	--	
	FI-2336				Sub.	No	--	--	--	
32										
	Indicator	49	6	30d	Temp. (F)	90	122	Eval	54	Note 12
		Pg.6			Pr. (Psia)	15	15	↓	↓	
	Foxboro/65PVOGH	Item 1			RH (%)	80	80	↓	↓	Note 12
					Chem.	No	--	--	--	
	PI-412				Rad. (R)	No	--	--	--	
					Sub.	No	--	--	--	
33										
	Indicator	52	0	30d	Temp. (F)	90	132	Eval	48	Note 12
	Sigma9270-22	Pg. 6			Pr. (Psia)	15	15	↓	↓	
		Items 4,6			RH (%)	80	80	↓	↓	Note 12
	9270-01	Pg. 11			Chem.	No	--	--	--	
		Item 5			Rad. (R)	No	--	--	--	
	PIS-173				Sub.	No	--	--	--	
	PIS-187									
	PIS-367									

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc	Time Needed	Environment: Parameter	Spec.	Qual.	Qual. Method	Reference	
34	Power Supply									
	Barton/291	49	0	30d	Temp. (F)	100	100	Eval	2,38	Note 13
		Pg.2			Pr. (Psia)	15	15	↓	↓	
	ES-2160 through	Items 1-4			RH (%)	100	100	↓	↓	Note 13,16
	ES-2163	Pg.3			Chem.	No	--			
		Item 3			Rad. (R)	No	--			
					Sub.	No	--			
35										
	Power Supply	49	0	30d	Temp. (F)	90	122	Eval	43	Note 12
	Foxboro 610A	Pg.6			Pr. (Psia)	15	15			
		Item 2			RH (%)	80	100			Note 12
	ES-2165				Chem.	No	--			
					Rad. (R)	No	--			
					Sub.	No	--			
36										
	Power Supply 1	50	0	30d	Temp. (F)	90	140	CofC	47	Note 12
	Rosemount	Pg.10			Pr. (Psia)	15	15	↓	47	
	SPS-2101P	Item 5			RH (%)	80	80	Eval		Note 12,15
					Chem.	No	--			
	ES-1A80				Rad. (R)	No	--			
					Sub.	No	--			

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment: Parameter	Spec.	Qual.	Qual. Method	Reference	
37	Power Panel	49	O	30d	Temp. (F)	100	140	Eval	2,37	Note 13
	ITE/P115	Pg.7			Pr. (Psia)	15	15	↓	↓	
		Item 1			RH (%)	100	100	--	--	Note 13
	Panel 3Y				Chem.	No	--	--	--	
					Rad. (R)	No	--	--	--	
					Sub.	No	--	--	--	
38	Differential Pressure Switch	49	O	30d	Temp. (F)	100	200	Eval	39	Note 13
	ITT Barton/289A	Pg.2			Pr. (Psia)	15	15	↓	↓	
		Item 9-11			RH (%)	100	100	↓	↓	Note 13,16
	PDIS-7814 through				Chem.	No	--			
	PDIS-7816				Rad. (R)	No	--			
					Sub.	No	--			
39	Motor Operated	50	O	30d	Temp. (F)	90	235	Test	12,46	
	Valve	Pg.5			Pr. (Psia)	15	42	↓	12,46	
	Rotork/14A	Items6,7			RH (%)	80	100	↓	12,46	
	Limitorque SMA-00				Chem.	No	--	--	--	
					Rad. (R)	$1.3X10^5$	$3X10^6$	Eval	15	
	MO-7072				Sub.	No	--	--	--	
	MO-7066									

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment Parameter	Environment Spec.	Environment Qual.	Qual. Method	Reference	
40	Transmitter									
	Pressure	52	O	30d	Temp. (F)	100	200	Eval	32	Note 13
		Pg.6			Pr. (Psia)	15	15	↓	↓	
	Rosemount	Items 3,5			RH (%)	100	100	↓	↓	Note 13
	1151GP	Pg.11			Chem.	No	--	--	--	
		Item 4			Rad. (R)	No	--	--	--	
					Sub.	No	--	--	--	
	PI-173									
	PI-187									
	PI-174									
41										
	Terminal Blocks	52	I	30d	Temp. (F)	235	235	Eval	14,33	
					Pr. (Psia)	42	42	↓	↓	
	Crouse Minds	Pg.10			RH (%)	100	100	↓	↓	
	FIC-222	Item 11			Chem.	No	--	--	--	
					Rad. (R)	1.3×10^6	Sat	Eval	14,33	
					Sub.	No	--	--	--	
42	Solenoid Valves	50	I	2m	Temp. (F)	235	240	Similiarity and V.Data	20	
	ASCO/831622				Pr. (Psia)	42	42	↓	20	
	with	Pg11			RH (%)	100	100	↓	20	
	HVIA 90-441-1A	Item 1			Chem.	No	--	--		
	conversion				Rad. (R)	1.1×10^5*	2×10^8	V.Data	20,63,64	
					Sub.	Yes	Sat	Eval	Note 1	
	SV-NC27 A2A through									
	SV-NC27 F5B									

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment: Parameter	Spec.	Qual.	Qual. Method	Reference
43	Transmitter	49							
	Flow	Pg 1	I	30d	Temp. (F)	235	235	CofC	2,13
		Item 3			Pr. (Psia)	42	42	↓	↓
	Barton/386				RH (%)	100	100	↓	↓
					Chem.	No	--	--	--
	FT-2162				Rad. (R)	$7X10^6$	$2X10^8$	Test	13
					Sub.	Yes	Sat	CofC	13
44	Solenoid Valve							Similarity and	
	ASCO	52	I	2m	Temp. (F)	235	235	V.Data	20
		Pg.11			Pr. (Psia)	42	42	↓	↓
	B31622 with	Items 8-10			RH (%)	100	100	↓	↓
	HVA-90-441-1A				Chem.	No	No	--	
	Conversion or				Rad. (R)	$5X10^5$*	$4X10^6$	V.Data	20
	HVA-90-405-2A conversion				Sub.	Yes	Sat	V.Data	20
	SV-NC-22A,B								
	SV-NC-22F through J								
	SV-NC-22C,D								
45	Solenoid Valve								
	ASCO/	52	I	10m	Temp. (F)	235	340	V.Data	1
	B30060RF	Pg 7			Pr. (Psia)	42	42	↓	↓
		Item 6			RH (%)	100	100	↓	↓
	SV-4892				Chem.	No	No	--	--
					Rad. (R)	$1.5X10^5$*	$4X10^6$	V.Data	1,19
					Sub.	No	No	--	--

Reactor: Big Rock Point Plant — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment Parameter	Spec.	Qual.	Qual. Method	Reference	
46	Switch									
	Yarway	52	I	2m	Temp. (F)	235	270	Similarity	2,16,14,18	
	4320	Pg.10			Pr. (Psia)	42	42	↓	↓	
	LS-RE06A	Item 7-10			RH (%)	100	100			
	LS-RE06B				Chem.	No	--	--	--	
	LS-RE20A				Rad. (R)	$1.5X10^4$	$3.6X10^4$	Cofc	2,16,14,18	
	LS-RE20B				Sub.	No	--	--	--	
47	Power Supply	49	O	24hr						
		Pg.3			Temp. (F)	100	100	Eval	2,38	Note 13
	Barton/297	Item 3			Pr. (Psia)	15	15	↓	↓	
					RH (%)	100	100			Note 13,16
	ES-3171				Chem.	No	--	--	--	
					Rad. (R)	No	--	--	--	
					Sub.	No	--	--	--	
48	Motor		I	10min						
	Operated Valve				Temp. (F)	235	235	Test	2,12	
					Pr. (Psia)	42	42	↓	↓	
	Limitorque				RH (%)	100	100			
	SMA-2-60				Chem.	--	--	--	--	
					Rad. (R)	$1.5X10^5$	$3X10^6$	Eval	2	
					Sub.	No	--	--	--	
	MO-7050									

Reactor: Big Rock Point — Systematic Evaluation Program

	Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment Parameter	Spec.	Qual.	Qual. Method	Reference	
49	Motor Operated Valve		I	--	Temp. (F)	235	--	--	--	This valve has been disabled in the closed position
					Pr. (Psia)	42	--	--	--	
	Limitorque				RH (%)	100	--	--	--	
	SMA-000-5				Chem.	--	--	--	--	
					Rad. (R)	--	--	---	--	
	MO-7065				Sub.	--	--	--	--	
50	Misc Splices		I	30d	Temp. (F)	235	235	--	61	
					Pr. (Psia)	42	42	--	61	
					RH (%)	100	100	--	61	
	Various Vendors				Chem.	--	--	--	--	
					Rad. (R)	1.3×10^6	1.3×10^6	--	61	
					Sub.	--	--	--	--	
51	Junction Boxes JB-170,170A,170B	52 pg 6	I	30d	Temp. (F)	235	235	Eval	4,2,26	
					Pr. (Psia)	42	42	↓	↓	
	JB-180,JB-IG11A thru D	item 12			RH (%)	100	100			
					Chem.	--	--	--	--	
					Rad. (R)	1.3×10^6	Sat	Eval	4,2,26	
					Sub.	--	--	--	--	

Reactor: Big Rock Point Plant — Systematic Evaluation Program

Equipment Type	SEP Submittal Reference	Loc.	Time Needed	Environment			Qual. Method	Reference	
				Parameter	Spec.	Qual.			
52									
Transmitter Level Barton 1386	52 pg 3 item 1	I	30d	Temp. (F)	235	235	Cofc	2.13	
				Pr. (Psia)	42	42	↓	↓	
				RH (%)	100	100			
LT 3171				Chem.-	--	--	--	--	
				Rad. (R)	4.1×10^6	2×10^8	Test	13	
				Sub.	--	--	--	--	

* Radiation dose linearly extrapolated for data in Attachment 1.

Notes

1. If the evaluation or test shows that the cable or splice can withstand 100% relative humidity, and chemical spray, it is assumed that it can with stand submergence as the conditions (wetting of the outside) are similiar. It is not likely that the solenoid valves SV-4876, SV-4869 and SV-4891 will become submerged before performing their safety function, however if they do become submerged and fail the system will go to a fail safe condition.

2. The values in the "time needed" column are based on the 0.008ft^2 break in the primary coolant piping or steam line. For environmental conditions see Reference 34, figure 1. For justification of the actuation times see Reference 24.

3. Values for the specified radiation dose were obtained by combining the data in Reference 35, 36, and 53 with that of Note 2 above.

4. The specified environmental data for equipment outside of containment was derived from References 45, 46, and 53.

5. Reference 49 stated that if the radiation levels were less that 10^5Rads documentation is not applicable. Reference 53 shows that the radiation levels in the outside containment locations is much less that 10^5Rads over a 30 day period following a LOCA.

6. The definition of "Qualified by Evaluation" was provided in a May 15, 1975 letter (RBSewell to Division of Reactor Licensing) in response to staff questions concerning Special Report No 21, "Investigation of and Correction of Discrepancies Associated With Equipment Required to Operate During a Postulated Loss of Coolant Accident." This definition specified the following:

   "The term 'Qualified by Evaluation' says that certain equipment which must function in the LOCA environment was investigated and a judgment made with respect to its ability to withstand the LOCA environment and perform its required function with reasonable assurance.

   The equipment so qualified was reviewed to determine:
   1. Its location;

   2. Its operating principles;

   3. Which materials used in its construction are essential to reasonably assure operability;

   4. If the essential materials remain functional under postulated LOCA conditions. This was established through one or a combination of the following:

      a. Standard engineering handbooks,

      b. Telephone contacts with vendors regarding unusual materials,

      c. Vendor catalogs and design application data, and

      d. Where possible, comparison of Big Rock Point equipment to qualified models of current manufacture, and

      e. Experience.

(No 6 Contd)

Based upon the above information and consistent with the FHSR and the applicable design and equipment specifications at the time of procurement, a judgment was made regarding the ability of the equipment to perform its safety function with reasonable assurance in the LOCA environment."

7. Core spray level and pressure actuation switches are evaluated to withstand radiation levels of at least 3.6×10^4 rad. Attachment 1, Table 1, of Reference 49 lists the integrated absorbed dose after LOCA. Inherent in this table is the concept that release begins (ie, core melt starts) at time t = 0. Since the core spray system is obviously designed to operate (the pertinent control functions being accomplished) prior to the beginning of core melt, it is conservative to assume that the need for the level and pressure actuation switches is over well within the first minute of the postulated core melt. Thus, since the radiation dose for submerged components one minute after inception of core release is 3.4×10^4, it is concluded that the radiation qualification of the core spray level and pressure switches is satisfactory.

8. The existence of cable splices within containment for safety-related systems at Big Rock Point was initially identified and addressed in the Big Rock Point Fire Safety Analysis dated March 29, 1977. At that time, Consumers Power Company committed to modify these splices to ensure their environmental qualification initially for waterproofing and later extended to include LOCA conditions. These splices have been wrapped with waterproof tape (see Reference 60). An evaluation was made (see Reference 61) which demonstrates their ability to remain functional during and after a LOCA.

9. Although the specific type test referenced for the RDS penetration qualification stipulated a maximum temperature of 223°F, an alternate test conducted successfully on similar penetrations provided additional data. The test parameters were: 280°F for 30 minutes, then 220°F for 30 minutes and finally 150°-170°F over the next 1.75 hours with an approximate 24-hour hold period. These test parameters are not fully consistent with the conditions specified in the qualification envelope of Attachment 1; however, in all cases, the test parameters cited above meet or exceed the containment temperature transient predictions for the various coolant pipe break sizes that were considered in constructing the qualification envelope. Thus, it is concluded that the environmental qualification documentation that exists for the RDS penetrations is adequate to ensure their capability to perform as designed.

10. There is approximately 250,000 feet of cabling supplied by Anaconda, Okonite, Plastic Wire and Cable Corp, Rome Cable and General Electric that was part of the initial construction package at Big Rock Point. This wiring is used for both safety-related and nonsafety-related equipment; no wiring segregation or detailed identification has been accomplished or is contemplated. The cables have been tested and shown capable of withstanding LOCA temperatures, although no other type testing has been done. Because of the age of the cabling, it is anticipated that no further documentation will be retrievable.

11. This instrument is located in a room where the normal dose is 10r/hr at power and 350mr/hr at shutdown. The plant is down a minimum of 6 weeks per year so that the average dose is 8.9r/hr which equals $3.1X10^{8}$r over 40 years. This instrument will also be submerged during a LOCA. The LOCA dose is $7X10^{6}$. The combination of the LOCA dose and normal dose is less than the dose for which the instrument is qualified.

12. Environmental conditions within the main control room at any time are not expected to exceed 90°F and/or 80% RH. Information found in Reference 46 substantiates this claim.

13. Environmental conditions within the Cable Penetration Room, lay down area and shop during postulated Main Steam piping breaks will result in relative humidity of 100% but no greater than ambient temperatures. It is not expected that these temperatures will exceed 100°F References 46, 57, and 58 substantiate this claim.

14. The effect of pressure in this case is to force moisture into the cracks possibly resulting in a short. However since it is temperature and radiation qualified the damage will be so minor that a short would not develope.

15. References state that the piece of equipment is rated for 75% relative humidity. It is not expected that the relative humidity in the control room will exceed 75% for any significant length of time, if indeed it ever reaches that value. It is considered that the probability of this occuring at the same time as a LOCA is insignificant. In addition general industrial use of the equipment would indicate that it will function at higher than 75% humidity since such levels are common in unheated or un-air-conditioned areas.

16. This piece of equipment is rated at 80% relative humidity. It is not expected that the realtive humidity in these areas will exceed 80% for any significant length of time, if indeed it ever reaches that value. It is considered that the probability of this occuring at the same time as a LOCA is insignificant. In addition, general industrial use of the equipment would indicate that it will function at higher than 80% humidity since such levels are common in unheated or un-air-conditioned areas. The only time when it is known that the humidity will exceed 80% is when there is a steam line break outside of containment. This equipment is not required for outside containment breaks.

17. The cable was rated at 5×10^{6} Rads and the splice at 1.0×10^{6} Rads because of the materials used in its construction. Reference 37 points out that using FSHR assumptions may reduce the dose by a factor of 2-4. We therefore believe that the uncertainties in the specified radiation envelopes the dose to which these are qualified.

References:

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3. RBCherba, "Radiation Resistance of Big Rock Control Cable," BRP-TF-204, May 22, 1975.

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6. AMP Engineering Test Report, GPR-575-98, May 14, 1974.

7. Consumers Power Company Research and Testing Laboratory Report I-8-A-75, May 6, 1975.

8. East-West Technology Corp., "Environmental Test Report on TRC Model 72V Type 1, "Y Pattern Solenoid Motor Valve," 798-4, October 22, 1974.

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11. Franklin Institute Research Laboratories, Report F-C4033-1.

12. Franklin Institute Research Laboratories, Report F-C4124.

13. ITT Barton Report, RI-386-2.

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26. RBCherba, "Big Rock Point Junction Box Recommendations," May 30, 1975, BRP-TF-223.

27. Conax Corp., IPS-73.4, February 15, 1978.

28. Foxboro Company, "Statement of Compliance with Specification I-1," April 28, 1975, BRP-TF-158E, File #516574.

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30. Analogic Corporation, "Certificate of Compliance on Purchase Order 85480," February 9, 1977.

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33. ACBarry, "Qualification Report for Electrical Equipment," June 22, 1976.

34. DABixel to DKDavis, February 24, 1976.

35. RAEnglish, "Audit of Dose Analysis for Big Rock Point Containment Following Loss of Coolant Accident," May 20, 1975.

36. RWSinderman/WPStrodl, "Big Rock Point Plant - Radiation Dose in Containment Loss of Coolant Accident with Fuel Clad Perforation," February 10, 1975.

37. BRP-TF File 21.1, Post Incident Equipment Review.

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40. WCCooper, "Big Rock Point Plant Instrument Investigation," March 17, 1975, BRP-TF File A.34.

41. Bailey Meter Company General Catalog.

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ATTACHMENT 2

Electrical Equipment-Environmental

Qualification and

Requirements

(CPCo updated original submittal)

Rev 11-22-78

Big Rock Point
Sheet 1 of 11

Tag No	System	Function	Location Area	Location Sub	Location Room	Manufacturer/ Model (Type)	Limiting Environmental Qualification Criteria	Environmental Design Qualification Pressure Psia	Temperature °F	Humidity %	Radiation	Chemicals	Method of Qualification
FT-2164	FT3	Enclosure Spray Flow Transmitter	C	No	400 West	ITT Barton/ 386 (224)	Environment 1	41.7	235	100	2×10^8	NA	Manufacturers certificate of compliance. Model was radiation tested as documented in ITT Barton Report #RI-386-2. Ref: 2,13
FT-2161		Enclosure Backup Spray Flow Trans											
FT-2162		Core Spray Flow Transmitter		Yes	424								
FT-2163		Core Backup Spray Flow Transmitter		No	400 West								
FI-2111	FI3	Enclosure Spray Flow Indication	O	No	307	Bailey Meter/ S4-F2	Normal Environment	14.7	40-140	100	NA	NA	Not required. Located in control room and will experience normal operating ambient conditions. Ref: 2 Note 12,15
FI-2114		Enclosure Backup Spray Flow Ind											
FI-2115		Core Spray Flow Indication											
FI-2116		Core Backup Spray Flow Indication											
FS-2520	FT3	Enclosure Spray Flow Switch	O	No	307	Rochester Instrument/ FT-215 (T-2)	Normal Environment	14.7	32-120	80	NA	NA	Not required. Located in control room and will experience normal ambient conditions. Ref: 40,42 Note: 12,15
FS-2521		Enclosure Backup Spray Flow Switch											
FS-2522		Core Spray Flow Switch											
FS-2523		Core Backup Spray Flow Switch											

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Tag No.	System	Function	Location			Manufacturer/ Model (Type)	Limiting Environmental Qualification Criteria	Environmental Design Qualification					Method of Qualification
			Area	Sub	Room			Pressure Psia	Temperature °F	Humidity %	Radiation	Chemicals	
E3-2160	FP5	Enclosure Spray Flow Indicating Loop Power Supply	O	No	165	ITT Barton/ 291	Normal Environment	14.7	35-100	100	NA	NA	Not required. Located in station power room and will experience normal ambient conditions. Ref: 2,38 Note 13,16
E3-2161		Enclosure Backup Spray Flow Indicating Loop Power Supply											
E3-2162		Core Spray Flow Indicating Power Supply											
E3-2163		Core Backup Spray Flow Indicating Power Supply											
E3-E65	FP3	Enclosure Sump Level Switch El 576'	C	Yes	407	Jo-Bell Products/ R-2XZA-2XP(R)	Environment 1	44.7	250	100	Satisfactory	NA	Qualified by evaluation. (See Footnote 1 for definition of "Qualified by Evaluation.") Letter R B Bevell to Division of Reactor Licensing dated 5/15/75 written to document equipment qualification. Note: LT3171 is qualified as a backup system, and can be used in lieu of these switches. No automatic controls associated with sump level switches. Ref: 2
E3-E64		Enclosure Sump Level Switch El 579'											
E3-E61		Enclosure Sump Level Switch El 587'			424								
E3-E62		Enclosure Sump Level Switch El 595'		No									
FD13-7814	FP3	Core Spray Hx Strainer Δp	O	No	427	ITT Barton/ 289A	Normal Environment	14.7	35-200	100	NA	NA	Not required. Located outside containment and will experience normal ambient conditions. Ref: 39 Note 13,16
FD13-7815		Fire System Strainer Δp #5761			104								
FD13-7816		Fire System Strainer Δp #5759			134								

Big Rock Point
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Tag No	System	Function	Location			Manufacturer/ Model (Type)	Limiting Environmental Qualification Criteria	Environmental Design Qualification					Method of Qualification
			Area	Sub	Room			Pressure Psia	Temperature °F	Humidity %	Radiation	Chemicals	
LT-3171	FIS	Enclosure Sump Level Transmitter	C	No	422	ITT Barton/ 386	Environment 1	41.7	235	100	2×10^8 R	NA	Refer to FT-2164 method of qualification. Ref: 2,11
LI-3400	FIS	Enclosure Sump Level Indication	O	No	307	Bailey Meter/ N00B (PM)	Normal Environment	14.7	40-140	80	NA	NA	Not required. Located in control room and will experience normal operating ambient conditions. Ref: 40,41 Note 12
LS-3171	FIS	Enclosure Sump Level Loop Power Supply	O	No	105	ITT Barton/ 297	Normal Environment	14.7	35-100	100	NA	NA	Not required. Located in station power room and will experience normal operating ambient conditions. Ref: 2,39 Note 13,16
FS-1611A	FIS	Actuate HO-7061 Pressure Switch Primary System	C	No	Near 447	Static O-ring 9TA B41183X12	Environment 1	41.7	250	100	$>3.6 \times 10^4$ R	NA	Manufacturer's letter of quotation stating model's ability to comply with CP Co Specification I-1, specification for instrument and supervisory control equipment, Rev A, 2/11/75. Refer to Footnote 2. Ref: 23,24,25,62 See Footnote 7
FS-1611B		Actuate HO-7051											
FS-1611C		Actuate HO-7061											
FS-1611D		Actuate HO-7051											
FS-1611E		Actuate HO-7070		Yes	418								
FS-1611F		Actuate HO-7071											
FS-1611G		Actuate HO-7070											
FS-1611H		Actuate HO-7071											

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Tag No	System	Function	Location: Area	Location: Sub	Location: Room	Manufacturer/ Model (Type)	Limiting Environmental Qualification Criteria	Environmental Design Qualification: Pressure Psia	Temperature °F	Humidity %	Radiation	Chemicals	Method of Qualification
12-8039A	FW	Actuate MO-7061 Level Switch Reactor Vessel	C	Yes	418	Yarway/4420C	Environment 1	41.7	270	100	3.6×10^4 R	NA	Manufacturer's certificate of compliance stating model's ability to comply with CP Co Specification 1-1, specification for instrument and supervisory control equipment, Rev A, 2/11/75. A Model 4416C was tested by WAB for temperature, pressure and relative humidity. The environmental specifications for Models 4416C and 4420C are identical. There is a minor difference in the operating parameters. Refer to Footnote 2. Ref: 2,16,14,18 See Footnote 7
12-8039B		Actuate MO-7051											
12-8039C		Actuate MO-7061											
12-8039D		Actuate MO-7051											
12-8039E		Actuate MO-7070											
12-8039F		Actuate MO-7071											
12-8039G		Actuate MO-7070											
12-8039H		Actuate MO-7071											
MO-7064	FW	Enclosure Spray Valve Rotork 3/4 Hp	C	No	446	Rotork/14 A Syncroset (125 V D-C)	Environment 1	41.7	235	100	5×10^6 R	NA	Type tested for pressure, temperature, relative humidity and water spray by Franklin Institute. Documented in F-C4124 report. Radiation qualified by evaluation as documented in internal memo, R B Cherba to file, dated 5/29/75. Ref: 2,12,15
MO-7068		Enclosure Backup Spray Valve Limitorque 1/3 Hp				Limitorque/ SMA-00 (480 - 3 Ø)							
MO-1	FW	Enclosure Backup Spray Valve GE Reversing Starter	O	No	105	General Electric/ CR-106-CO	Normal Environment	14.7	140	100	NA	NA	Located in station power room and will experience normal operating ambient conditions. Ref: 2 Note 13,4,5
52-2005	FW	Enclosure Backup Spray Valve ACB	O	No	105	General Electric TEC 36015	Normal Environment	14.7	50-140	100	NA	NA	Located in station power room and will experience normal operating ambient conditions. Ref: 2 Note 13,4,5

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Tag No.	System	Function	Location: Area	Location: Sub	Location: Room	Manufacturer/ Model (Type)	Limiting Environmental Qualification Criteria	Environmental Design Qualification: Pressure Psia	Temperature °F	Humidity %	Radiation	Chemicals	Method of Qualification
MO-7054	P13	Core Spray Valve Limitorque 1/2 Hp	C	No	400	Limitorque/ SMA-00 (125 V D-C)	Environment 1	41.7	235	100	3×10^6 R	NA	Refer to MO-7064 for method of qualification.
MO-7061		Core Spray Valve Limitorque 1/2 Hp											Ref: 2,12,15
MO-7070		Core Backup Spray Valve Rotork 2 Hp	C	No	451	Rotork/1¼ A Syncroset (480 V - 3 ϕ)							
MO-7071		Core Backup Spray Valve Rotork 2 Hp											
MO-7069		Spray Cross-Connect Valve Rotork 2 Hp	C	No	Out-side 400	Rotork/1¼ A Syncroset (480 V - 3 ϕ)							De-energized and disabled open. Ref: 2,12,15
MO-7072		Core Spray Hx Bypass Valve Rotork 2 Hp	O	No	427	Rotork/1¼ A Syncroset (125 V D-C)	Normal Environment	42	235	100	1×10^6 R	NA	Located outside containment and will experience normal ambient operating conditions. Ref: 12,46,15
MO-7066		Core Spray Hx Cooling Water Inlet Valve Limitorque				Limitorque/ SMA-00 (480 V - 3 ϕ)							
PT-146	P13	Core Spray Pressure Transmitter	C	Yes	436	Foxboro E11GM-HBAE1	Environment 1	41.7	235	100	1×10^7 R	NA	Manufacturer's certificate of compliance stating model's ability to comply with CP Co Specification 1-1, specification for instrument and supervisory control equipment, Rev A, 2/11/75. Ref: 28
MO-7050	C13	Main Steam Isolation Valve	C	No	-	Limitorque SMA-2-60	Environment 1	41.7	235	100	3×10^6 R	NA	Refer to MO-7064 for method of qualification
MO-7065	C13	Main Steam Drain Valve	C	No		Limitorque SMA-0005	Environment-1	—	—	—	—	—	Valve disabled in closed position
Misc Splices			C	No			Environment 1	235	42	100	1.3×10^6 R	NA	Ref: 61

Tag No	System	Function	Location: Area	Location: Sub	Location: Room	Manufacturer/ Model (Type)	Limiting Environmental Qualification Criteria	Pressure Psia	Temperature °F	Humidity %	Radiation	Chemicals	Method of Qualification
PI-412	PCS	Pressure Indicator for PT-186	0	No	307	Foxboro 65PV0HG	Normal Environment	14.7	41-122	80	NA	NA	*. Located in control room and will experience normal ambient operating conditions. Ref: 54 Note 12
PS-2465	PCS	PT-186 Power Supply	|	|	|	Foxboro 610A	|	|	|	100	|	|	Ref: 12,13 Note 12
PT-171	PCS	Enclosure Pressure Transmitter (Vacuum Relief Auto Control)	0	No	110	Rosemount/ 1152GP4	Normal Environment	14.7	-20 to 200	100	|	NA	Located in cable penetration room and/or control room and will experience normal ambient operating conditions. Ref: 32 Note 13
PIS-171	|	Pressure Indicator for PT-171	|	|	307	Bigma/9270	|	|	132	80	NA	|	Ref: 48 Note 12
PT-187	|	Enclosure Pressure Transmitter (Vacuum Relief Auto Control)	|	|	110	Rosemount/ 1152GP4	|	|	-20 to 200	100	|	|	Ref: 43 Note 12
PI-187	|	Pressure Indicator for PT-187	|	|	307	Bigma/9270	|	|	132	80	NA	|	Ref: 48 Note 12
PS-696	PCS	Actuate MO-7068 Enclosure Pressure Switch	0	No	110	Static O-ring 4NN-E-411-VX5TT	Normal Environment	14.7	200	100	NA	NA	2. Located in cable penetration room and will experience normal ambient operating conditions during LOCA.
PS-697	|	Actuate MO-7068 Enclosure Pressure Switch	|	|	|	|	|	|	|	|	|	|	Ref: 44 Note 13
PS-7064A	PCS	Actuate MO-7064 Pressure Switch	0	No	110	Static O-Ring 12L-AA5-FBB	Normal Environment	14.7	200	100	NA	NA	Located in cable penetration room and will experience normal ambient operating
PS-7064B	|	Actuate MO-7064 Pressure Switch	|	|	|	|	|	|	|	|	|	|	conditions during LOCA. Ref: 44 Note 13
	PCS CIS	Cable 1970	C	Yes	-	Kerite/(FR)	Environment 1	96.7	325	100	1.2×10^8 R	NA	Qualified by type test conducted by Franklin Institute and documented in F-C2737-Ref: 9 Note 1
JB-160, 161, 164, 166, 167, 170, 170, A,B 171, A,B 180		Junction Boxes Within Containment	C	Yes	-	Metal Enclosure With Gasketed Covers	Environment 1	41.7	235	100	DAT	NA	Qualified by evaluation as documented in letter J D Westbrook to R B Cherba dated 5/29/75. Ref: 2,4,26

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Tag No	System	Function	Location			Manufacturer/ Model (Type)	Limiting Environmental Qualification Criteria	Environmental Design Qualification					Method of Qualification
			Area	Sub	Room			Pressure Psia	Temperature °F	Humidity %	Radiation	Chemicals	
Panel 37	PIS	Sphere Instrument and Control Power Panel	O	No	105	ITE/P115	Normal Environment	14.7	50-140	100	NA	NA	Not required. Located in station power room and will experience normal ambient operating conditions. Ref: 2,37 Note 13
–	PIS CIS	Cable Splices for Control Cables	C	No	436	Amp/Certi-Seal Wire Connectors #324990 and #324549	Environment 1	42	392	100	1.3×10^6	NA	Qualified by type test for temperature, conducted by CP Co Research and Testing Laboratory, Report No I-B-A15 dated 1/21/75. Ref: 55,61,36,50 Note 14 See Note 8 & 17 Qualified by evaluation for remainder
SV-4879	CIS	Air to CV-4091, CV-4092, CV-4093	C	No	Outside 426	ASCO/B31620 (3-Way 115 VAC)	Environment 1	41.7	240	100	1×10^6	NA	Same method as used to qualify SV-4891 and memo from plant personnel documenting change Ref: 1,2,19,52
SV-4869		Air to CV-4031	C	Yes	424	ASCO/B300601F (3-Way 115 VAC) with HVA-90-441-1A	Environment 1	41.7	340	100	4×10^6	NA	Qualified by evaluation as documented in letter D E Hoeggenburg to H B Cherba dated 4/8/75 in response to telephone conversation with manufacturer, and indicated type test results. Ref: 1,2,19 Note 6
SV-4891		Air to CV-4025											
SV-4892	RMS	Air to CV-4049	C	No	Cable Penetration								Ref: 1,19
SV-4876	CIS	Air to CV-4027	C	Yes	424	ASCO/HTXB300 C01RF (3-Way 115 VAC)	Environment 1	41.7	415	100	6×10^6	NA	Ref: 1,2,19 Note 1 See Note 6

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Tag No	System	Function	Location			Manufacturer/ Model (Type)	Limiting Environmental Qualification Criteria	Environmental Design Qualification					Method of Qualification
			Area	Sub	Room			Pressure Psia	Temperature °F	Humidity %	Radiation	Chemicals	
LT-3180	B163	Channel "A" Reactor Wtr Level	C	No	418	Westinghouse/ 5983C99 7050	Environment 1	74.7	286	100	2×10^8	NA	Qualified by type test conducted by Franklin Institute as documented by F-C3715. Ref: 31
LT-3181		Channel "B" Reactor Wtr Level											
LT-3182		Channel "C" Reactor Wtr Level											
LT-3183		Channel "D" Reactor Wtr Level											
LT-3184		Channel "A" Steam Drum Level			445								
LT-3185		Channel "B" Steam Drum Level											
LT-3186		Channel "C" Steam Drum Level											
LT-3187		Channel "D" Steam Drum Level											

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Tag No	System	Function	Location Area	Location Sub	Location Room	Manufacturer/ Model (Type)	Limiting Environmental Qualification Criteria	Pressure Psia	Temperature °F	Humidity %	Radiation	Chemicals	Method of Qualification
SV-4980	RDS	Reactor Depress Isolation Valve	C	No	452	ASCO/HTB31677 (NEMA 4)	Environment 1	41.7	240° Intermittent:220° Continuous	100	$2X10^8$	NA	Qualified by vendor documentation for pressure, temperature, relative humidity, and radiation. Intermittent defined as up to one hour service at maximum temperature. Ref: 20,63,64' 240° to 1 hour 220° continuous
SV-4981		Reactor Depress Isolation Valve											
SV-4982		Reactor Depress Isolation Valve											
SV-4983		Reactor Depress Isolation Valve											
SV-4984	RDS	Reactor Depress Valve	C	No	452	Target Rock/ 73V003(6" x 10")	Environment 1	84.7	300	100	$3.3X10^7$	NA	Qualified by type test conducted by East-West Technology Corp as documented in Report #798-4. Ref: 8
SV-4985		Reactor Depress Valve											
SV-4986		Reactor Depress Valve											
SV-4987		Reactor Depress Valve											
H64	RDS	Sphere Penetration	C	No	436	Conax/N4205	Environment 1	60 [illegible]	280	100	$2.3X10^7$	NA	Qualified by evaluation similar penetration tested to conditions stated Ref: 22,27 See Note 9
H65		Sphere Penetration											
H81		Sphere Penetration											
H83		Sphere Penetration											
	RDS	Cable	C	Yes	-	Raychem	Environment 1	84.7	270	100	$4x10^8$	NA	Qualified by type test conducted by Franklin Institute as documented in Test Report F-C 4033-1. Ref: 11 Note:1

Tag No	System	Function	Location: Area	Location: Sub	Location: Room	Manufacturer/ Model (Type)	Limiting Environmental Qualification Criteria	Environmental Design Qualification: Pressure Psia	Temperature °F	Humidity %	Radiation	Chemicals	Method of Qualification
TB-240, 242,	RHS	Misc Junction Boxes	C	Yes	-	Metal Enclosure With Gasketed Covers Rumsey Electrical	Environment 1	41.7	235	100	$1X10^8$	NA	Qualified by evaluation, based on NUS-TM-ED-116 test report. Radiation qualification strictly by evaluation. Ref: 33
-	FCS	Cable for Core Spray Valve Relocation Mod FC-196	C	Yes	-	Cerro Wire & Cable Co/(FR)	Environment 1	84.7	280	100	$2x10^8$	NA	Qualified by type test conducted by Franklin Institute Report F-C 3798, March 1974. Ref: 10 Note 1
-	-	Cable (Installed 1960-1969)	C	Yes		From Various Sources	Environment 1	42	250	100	7.10^6	NA	Qualified by type test, for temperature only, conducted by CP Co Research and Testing Laboratory. Qualified by evaluation for radiation as documented by letter R B Cherba dated 5/22/75. Refer to Footnote 5 Ref: 3,7,36 See Note 10 & 17
PT-1A07C	RVG	Reactor Pressure Transmitter	C	Yes	405	Rosemount/ 1152GP	Environment 1	84.7	316	100	$5x10^6$	NA	Qualified by manufacturer's certificate of compliance. Ref: 29
ES-1A08	RVG	Power Source for Reactor Pressure Transmitter Loop	O	No	307	Rosemount/ SPS-2101P	Normal Environment	14.7	140	95	-	NA	Not required. Located in control room and will experience normal ambient operating conditions. Ref: 47 Note 12,15
PI-1A05	RVG	Reactor Pressure Indicator	O	No	307	Analogic Measureometer/ P12445/0/2	Normal Environment	14.7	140	95	-	NA	Ref: 30 Note 12
LS-RE06A	RDS	West Steam Drum 60" Level Switch	C	No	400	Yarway/4320PE	Environment 1	41.7	270	100	$1.6x10^?$	NA	Refer to Qualification Methodology for RE09 (Page 4). Modifications as described in the NRI test were made. Refer to BO-BRP-78-10 of 2/17/78. Ref: 2,16,14,18
LS-RE06B	RDS	East Steam Drum 60" Level Switch	C	No	400	Yarway/4320PE	Environment 1	41.7	270	100	$1.6x10^?$	NA	
LS-RE20A	RDS	Steam Drum Low Water Level Sw	C	No	400	Yarway/4320PE	Environment 1	41.7	270	100	$1.6x10^?$	NA	
LS-RE20B	RDS	Steam Drum Low Water Level Sw	C	No	400	Yarway/4320PE	Environment 1	41.7	270	100	$1.6x10^?$	NA	
TB's associated with SV-4930 thru SV-4933	RDS	MISC Junction Boxes	C	No	—	Crouse Hinds/ FDC-222 Terminal Box W/GE terminal block/CR151B4	Environment 1	41.7	235	100	SAT	NA	Qualified by evaluation, based on NUS-TM-ED-116 test report. Reference Catalytic Memo from AOBarry to RBasso, dated 6/22/76 "Qualification Report for Electrical Equipment." Ref: 14,33

Tag No.	System	Function	Location: Area	Location: Sub	Location: Room	Manufacturer/ Model (Type)	Limiting Environmental Qualification Criteria	Environmental Design Qualification: Pressure Psia	Temperature °F	Humidity %	Radiation	Chemicals	Method of Qualification
SV-[illegible] A:A Thru SV-[illegible] F:B	[illegible]	Scram Pilot Valves	C	Yes	401	ASCO/831622 With HVIA 90-441-1A Conversion	Environment 1	41.7	240° Intermitten 220° Continuous	100	$2X10^8$	NA	Refer to Qualification Methodology for SV 4980 (Page 9). Refer to Footnote 6. Ref: 20,63,64 Note 1
-	-	Containment Electrical Penetration	C	No	436	Hundel/Potted	Environment 1	44.7	274	100	Sat	NA	Qualified by evaluation as documented by letter R H Wade to W B Skibitsky dated 2/16/78 (Wade 01-78). Ref: 5,65,66
-	-	Containment Electrical Penetrations				Amphenol Borg Electronics Corp/Coaxial		42	235		$6X10^4$		Ref: 67,68,69
PT-174	[illegible]	Enclosure Pressure Transmitter	O	No	110	Rosemount/ 1153HP5 [illegible]	Environment 1	14.7	-20 to 200	100	$1.2 \ 10^7 R$	NA	Located outside of containment and will experience normal ambient operating conditions. Ref: 32 Note 13
PI-[illegible]		Enclosure Pressure Indicator			307	Sigma/9270			132	80	NA		Ref: 40 Note 12
-	[illegible]	Wire Terminal Connections	C	No	-	Amp Special Products	Environment 1	41.7	235	100	$7X10^8$	NA	Qualified by vendor supplied documentation based on engineering test report "Amp GER-575-98" conducted by AMP and Franklin Institute Ref: 6
-	[illegible]	Terminal Blocks	C	No	-	States Block/ NT	Environment 1	41.7	235	100	$1x10^8$	NA	Qualified by evaluations based on NUS-TM-ED-116 test report. Reference Catalytic Memo from AOBarry to REBasso dated 6/22/76, "Qualification Report for Electrical Equipment". Ref: 14,33
SV-[illegible] 27A, B	[illegible]	Scram Header Pilot Valves	C	Yes	401	ASCO/831622 With HVA 90-441-1A Conversion	Environment 1	41.7	240° Intermitten 220° Continuous	100	$1x10^6$	NA	Refer to qualification methodology for SV-4980 (Page 9). Ref: 20
SV-[illegible] 27F, G H, J	[illegible]	Dump Tank Vent Valves	C	Yes	401	ASCO HVA 90-405-2A	Environment 1	41.7	240° Intermitten 220° Continuous	100	$1x10^6$	NA	Refer to qualification methodology for SV-4980 (Page 9). Ref: 20
SV-[illegible] 22 C, D	[illegible]	Dump Tank Isolation Valves	C	Yes	401	ASCO 831632 With HVA 90-441-1A Conversions							

Notes

1. If the evaluation or test shows that the cable or splice can withstand 100% relative humidity, and chemical spray, it is assumed that it can with stand submergence as the conditions (wetting of the outside) are similiar. It is not likely that the solenoid valves SV-4876, SV-4869 and SV-4891 will become submerged before performing their safety function, however if they do become submerged and fail the system will go to a fail safe condition.

2. The values in the "time needed" column are based on the $0.008ft^2$ break in the primary coolant piping or steam line. For environmental conditions see Reference 34, figure 1. For justification of the actuation times see Reference 24.

3. Values for the specified radiation dose were obtained by combining the data in Reference 35, 36, and 53 with that of Note 2 above.

4. The specified environmental data for equipment outside of containment was derived from References 45, 46, and 53.

5. Reference 49 stated that if the radiation levels were less that 10^5Rads documentation is not applicable. Reference 53 shows that the radiation levels in the outside containment locations is much less that 10^5Rads over a 30 day period following a LOCA.

6. The definition of "Qualified by Evaluation" was provided in a May 15, 1975 letter (RESewell to Division of Reactor Licensing) in response to staff questions concerning Special Report No 21, "Investigation of and Correction of Discrepancies Associated With Equipment Required to Operate During a Postulated Loss of Coolant Accident." This definition specified the following:

   "The term 'Qualified by Evaluation' says that certain equipment which must function in the LOCA environment was investigated and a judgment made with respect to its ability to withstand the LOCA environment and perform its required function with reasonable assurance.

   The equipment so qualified was reviewed to determine:
   1. Its location;

   2. Its operating principles;

   3. Which materials used in its construction are essential to reasonably assure operability;

   4. If the essential materials remain functional under postulated LOCA conditions. This was established through one or a combination of the following:

      a. Standard engineering handbooks,

      b. Telephone contacts with vendors regarding unusual materials,

      c. Vendor catalogs and design application data, and

      d. Where possible, comparison of Big Rock Point equipment to qualified models of current manufacture, and

      e. Experience.

(No 6 Contd)

Based upon the above information and consistent with the FHSR and the applicable design and equipment specifications at the time of procurement, a judgment was made regarding the ability of the equipment to perform its safety function with reasonable assurance in the LOCA environment.

7. Core spray level and pressure actuation switches are evaluated to withstand radiation levels of at least 3.6×10^4 rads. Attachment 1, Table 1, of Reference 49 lists the integrated absorbed dose after LOCA. Inherent in this table is the concept that release to fuel (ie, core melt started) at time t = 0. Since the core spray system is obviously designed to operate (the pertinent control functions being accomplished) prior to the beginning of core melt, it is conservative to assume that the need for the level and pressure actuation switches is over well within the first minute of the postulated core melt. Thus, since the radiation dose for submerged components one minute after inception of core melt is 3.4×10^4, it is concluded that the radiation qualification of the core spray level and pressure switches is satisfactory.

8. The existence of cable splices within containment for safety-related systems at Big Rock Point was initially identified and addressed in the Big Rock Point Fire Safety Analysis dated March 29, 1977. At that time, Consumers Power Company committed to modify these splices to ensure their environmental qualification initially for waterproofing and later extended to include LOCA conditions. These splices have been wrapped with waterproof tape (see Reference 60). An evaluation was made (see Reference 61) which demonstrates their ability to remain functional during and after a LOCA.

9. Although the specific type test referenced for the RDS penetration qualification stipulated a maximum temperature of 223°F, an alternate test conducted successfully on similar penetrations provided additional data. The test parameters were: 280°F for 30 minutes, then 220°F for 30 minutes and finally 150°-170°F over the next 1.75 hours with an approximate 24-hour hold period. These test parameters are not fully consistent with the conditions specified in the qualification envelope of Attachment 1; however, in all cases, the test parameters cited above meet or exceed the containment temperature transient predictions for the various coolant pipe break sizes that were considered in constructing the qualification envelope. Thus, it is concluded that the environmental qualification documentation that exists for the RDS penetrations is adequate to ensure their capability to perform as designed.

10. There is approximately 250,000 feet of cabling supplied by Anaconda, Okonite, Plastic Wire and Cable Corp, Rome Cable and General Electric that was part of the initial construction package at Big Rock Point. This wiring is used for both safety-related and nonsafety-related equipment; no wiring segregation or detailed identification has been accomplished or is contemplated. The cables have been tested and shown capable of withstanding LOCA temperatures, although no other type testing has been done. Because of the age of the cabling, it is anticipated that no further documentation will be retrievable.

11. This instrument is located in a room where the normal dose is 10r/hr at power and 350mr/hr at shutdown. The plant is down a minimum of 6 weeks per year so that the average dose is 8.9r/hr which equals $3.1X10^{8}$r over 40 years. This instrument will also be submerged during a LOCA. The LOCA dose is $7X10^{6}$. The combination of the LOCA dose and normal dose is less than the dose for which the instrument is qualified.

12. Environmental conditions within the main control room at any time are not expected to exceed 90°F and/or 80% RH. Information found in Reference 46 substantiates this claim.

13. Environmental conditions within the Cable Penetration Room, lay down area and shop during postulated Main Steam piping breaks will result in relative humidity of 100% but no greater than ambient temperatures. It is not expected that these temperatures will exceed 1[illegible]°F References 46, 57, and 58 substantiate this claim.

14. The effect of pressure in this case is to force moisture into the cracks possibly resulting in a short. However since it is temperature and radiation qualified the damage will be so minor that a short would not develope.

15. References state that the piece of equipment is rated for 75% relative humidity. It is not expected that the relative humidity in the control room will exceed 75% for any significant length of time, if indeed it ever reaches that value. It is considered that the probability of this occuring at the same time as a LOCA is insignificant. In addition general industrial use of the equipment would indicate that it will function at higher than 75% humidity since such levels are common in unheated or un-air-conditioned areas.

16. This piece of equipment is rated at 80% relative humidity. It is not expected that the realtive humidity in these areas will exceed 80% for any significant length of time, if indeed it ever reaches that value. It is considered that the probability of this occuring at the same time as a LOCA is insignificant. In addition, general industrial use of the equipment would indicate that it will function at higher than 80% humidity since such levels are common in unheated or un-air-conditioned areas. The only time when it is known that the humidity will exceed 80% is when there is a steam line break outside of containment. This equipment is not required for outside containment breaks.

17. The cable was rated at 5×10^{6} Rads and the splice at 1.0×10^{6} Rads because of the materials used in its construction. Reference 37 points out that using FSHR assumptions may reduce the dose by a factor of 2-4. We therefore believe that the uncertainties in the specified radiation envelopes the dose to which these are qualified.

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