INFORMATION SUBMITTED IN ADDITION TO THAT PROVIDED IN CONSUMERS POWER COMPANY SUBMITTALS OF MARCH 26, 1976 AND APRIL 5, 1976

1. The response to Question 6 of the March 26, 1976 letter indicated that procedures and/or design changes are presently under development to proclude the "undesirable function" failure of the mini-flow valves (CV-3027 and CV-3056) and that a response would be submitted at a later date. Circuitry changes have been initiated and will be completed prior to start-up to insure that a single failure will not cause a mini-flow valve to shut during the short-term cooling phase and also to insure that a single failure will not preclude the shutting of at least one mini-flow valve during the long-term cooling phase.

   There are two mini-flow valves installed in series at the Palisades Plant. The purpose of these valves is to provide a bypass flow path during safety injection pump deadheaded operations. In most, if not all, of the break spectrum, initial safety injection pump operation occurs before primary system pressure is reduced to a value below all the safety injection pump discharge heads. For this reason it is necessary for the mini-flow valves to be open to provide a recirculation path when the pumps are operating deadheaded such that pump damage does not occur. The recirculation path is back to the SIRW tank.

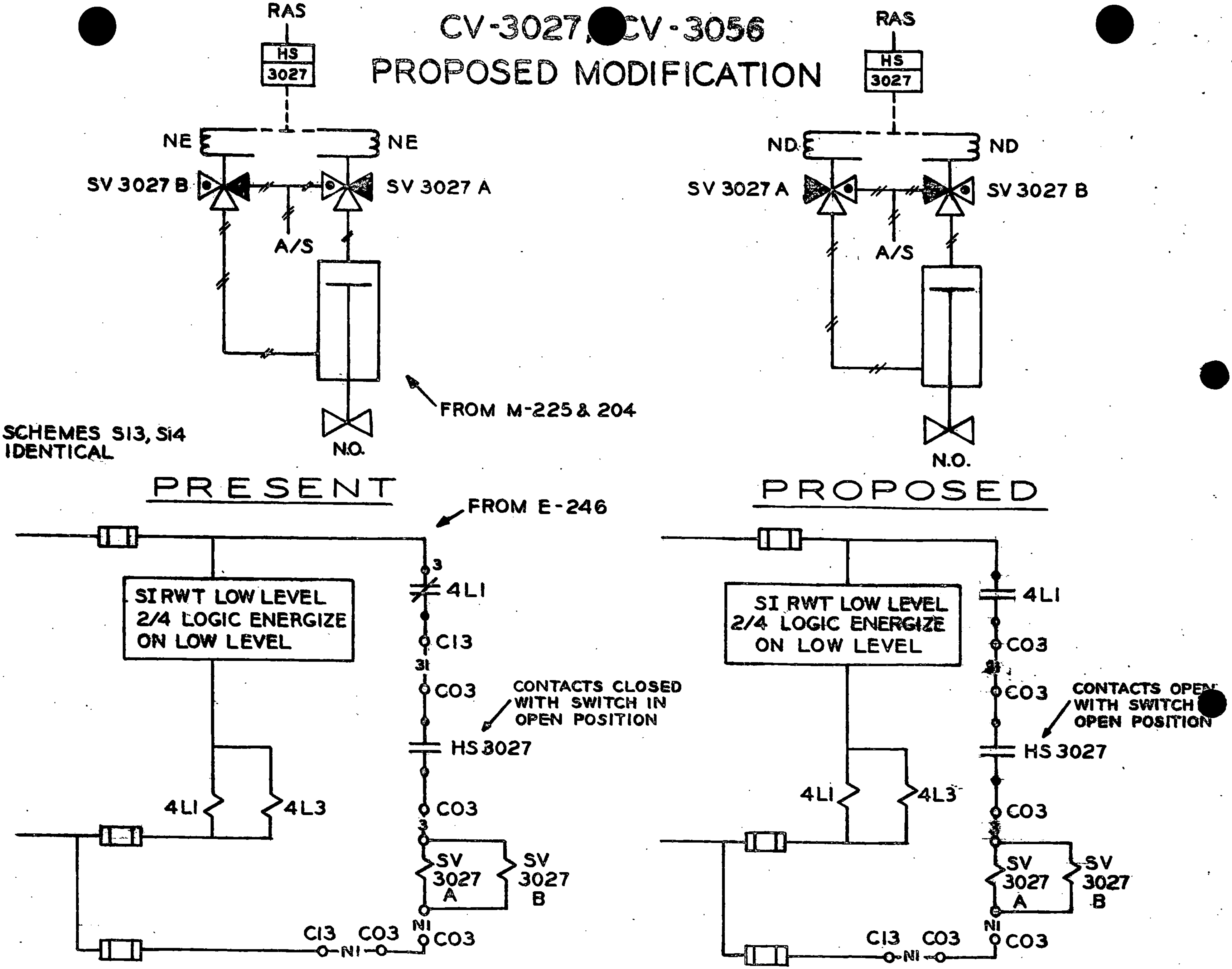
   Upon transfer to the recirculation mode of cooling, it is desirable to close these mini-flow valves to preclude placing some of the water from the sump back into the SIRW tank. Thus, for this case at least, one of the two valves in series must be capable of being closed. The transfer to the recirculation phase occurs about 30 minutes following a Loss of Coolant Accident.

   The valves are Walworth gate valves with a Miller piston operator. Air pressure is required to alter the position of the valves. Two three-way d-c operated solenoid valves are provided, one on the opening side and one on the closing side, to supply and vent air from the valve such that commanded operations are achieved. The solenoid valves, as originally installed, would cause the valve to fail closed on loss of electric power. Loss of air supply would result in the valve failing as is.

   A stick diagram of the valve operator and solenoid valve arrangement is shown on the following figure. This stick diagram provides a good representation of how the valve is actuated. On the same diagram the existing electrical scheme is also shown. As can be seen from that scheme, a single electrical failure (closing of the contacts of HS-3027 or HS-3056) would cause the appropriate valve to go closed as well as any failure which causes the deenergization of both solenoids of each valve.

   The same figure shows a stick diagram of the proposed modification to the solenoid valves and a proposed circuit modification. The result of these proposed modifications is that on a loss of electrical power the solenoid

CV-3027, CV-3056
PROPOSED MODIFICATION



valves for 3027 and 3056 are powered from different d-c buses resulting in the valve failing open. The modified circuit eliminates any electrical single failure which will cause the valve to fail shut. The two valves in series and their separate circuits provide protection against a postulated single failure causing both valves to remain open and thus the mini-flow line not being isolated during the recirculation phase.

The rearrangement of this circuit now requires that operator action be taken to close the mini-flow valves prior to initiation of the recirculation phase (approximately 30 minutes after the LOCA event). In addition, operator action to close these valves is not desirable until the primary coolant system pressure is decreased below the discharge head capability of both the high- and low-pressure safety injection pumps. The closure of the contacts associated with this hand switch in conjunction with a low level in the SIRW tank will initiate mini-flow valve closure. Thus, the closure of the hand switch contacts in conjunction with a nonvalid low level SIRW tank signal could cause the mini-flow valves to go closed prematurely. Thus, we will include in the appropriate operating procedures a requirement that the hand switch associated with the mini-flow valves be positioned such that the mini-flow valves will close automatically on a low level in the SIRW tank after the primary coolant system pressure has decreased to a value below the shutoff discharge pressure of the high-pressure and low-pressure safety injection pumps and prior to SIRW tank low level.

The modifications described in this response are being completed in accordance with the provisions of 10 CFR 50.59. These modifications will be completed prior to plant start-up as will the procedural changes described above.

During a telephone conversation on April 5, 1976 with members of the NRC staff, it was suggested that indicating lights be installed to monitor the status of the contacts associated with the valve actuation circuitry. This would preclude an undetected contact failure followed by a single failure in the other contacts or circuitry associated with this actuation scheme causing a mini-flow valve to shut. Because of the series contact arrangement we have not been able to identify a satisfactory manner of providing the contact status indicator lights. The only arrangements we have been able to devise that would appear to work in a satisfactory manner from the standpoint of the lights involve placing a trickle current on the solenoid valve operating coils. As these coils pick up under very light current conditions which would cause the mini-flow valves to go closed, we do not believe that this is desirable. The switch and relay types that are used in the mini-flow valve circuitry are types that have been used extensively throughout the Palisades Plant. With respect to contact failures, these switches and relays have proven very reliable. We, therefore, have concluded that there is not a need for continuous monitoring of the contact position and instead are incorporating in plant procedures a requirement that contact operability be verified during refueling outages as well as proper contact position. We believe that this will provide reasonable assurance that undetected contact closure will not occur.

In addition, during the same telephone conversation, we were requested to provide information with respect to the design of the air system which provides operating air to these valves. This information is located in Amendment 28 to the FSAR, Section 9.5.1.

2. In our response of April 5, 1976 to Question 5.20 regarding including requirements for power lockout of certain valves in the Technical Specifications, we indicated that the two mini-flow bypass valves were still under review and that further response would be provided at a later date.

   Item 1 of this attachment describes the modifications and procedural controls that will be implemented prior to start-up. As the actions taken to preclude undesirable ECCS single failure effects do not include power lockout, we do not believe that additional Technical Specifications are required.

3. Our March 26, 1976 response to Question 4 of the "Generic Information Request for Review of ECCS in the Electrical Instrumentation and Control Areas" attached to USNRC's March 26, 1976 letter stated that a response would be provided at a later date. Question 4 stated:

   > "Identify all electrical equipment, both safety and nonsafety, that may become submerged as a result of a LOCA. For all such equipment that is not qualified for service in such an environment, provide an analysis to determine the following: (1) The safety significance of the failure of the equipment (eg, spurious operation, loss of function, loss of accident/postaccident monitoring, etc) as a result of flooding, (2) the effects on Class IE electrical power sources serving this equipment as a result of such failures, and (3) the proposed design changes resulting from your analysis. Your response to Item (2) should specifically address breaker and fuse coordination and the isolation capabilities of this aspect of your design."

   In order to identify all electrical equipment that might become submerged as a result of a LOCA (excluding submerged valves, refer to CP Co letter dated February 25, 1976), a survey was made of the containment building and all electrical equipment which was below the LOCA flood level was identified. A detailed review of this equipment and its associated circuitry was then performed to determine if there was any safety significance as a result of flooding and to determine the effects on Class IE electrical power sources serving this equipment. Breaker and fuse coordination was specifically addressed in this review. The results of this review are summarized in the table contained on the following three pages. As a result of this review, we have concluded that there is reasonable assurance that flooding of electrical equipment due to the postulated LOCA event will not result in a reduction of ECCS system capability and, therefore, no design changes are required, except PS-0103 identified as part of the long-term cooling evaluation. Our evaluation and any proposed changes will be included with our report on that subject.

4. Our March 26, 1976 response to Question 7 of the "Generic Information Request for Review of ECCS in the Electrical, Instrumentation and Control Areas" attached to the USNRC March 26, 1976 letter stated that a response would be provided at a later date. Question 7 stated:

> "Identify any electrical interlocks between redundant portions of the ECCS and supporting subsystems. Define the consequence of failure of any interlock on the capability of the ECCS to perform its safety function. Describe any proposed design modifications resulting from this review."

Plant electrical drawings have been reviewed for interlocks between redundant portions of the ECCS and supporting subsystems. As a result of this review, three cross-train interties were identified. These three interties are the interlock between breakers No 52-1217 and No 52-1118 (buses No 11 and No 12), the interties between the Instrument A-C Bus (Y01) and MCC No 1 and No 2 and the intertie between MCC No 1 and No 2 via the battery charger.

The intertie between Buses 11 and 12 is an electrical interlock which prevents manual initiation of breaker closure (there is no automatic transfer action) that would tie the two buses together when Breakers 52-1102 and 52-1202 are closed. This permissive signal is provided to preclude tieing two redundant energized buses together.

As a fault on either Bus 11 or 12 would trip its incoming breaker and operator action might be to attempt to close the tie breakers which might cause transfer of the fault to the other redundant bus, procedural changes will be implemented prior to plant start that require the operator (on loss of one of these buses during a LOCA situation) to attempt to clear the fault and close the incoming breaker prior to taking other action. If there is a fault that cannot be cleared, he will be instructed not to attempt to close the two tie breakers.

PALISADES SUBMERGED ELECTRICAL EQUIPMENT

(DOES NOT INCLUDE SUBMERGED [illegible]VE STUDY)

TAG No.	SCHEMATIC No	POWER SUPPLY TAG No.	VENDOR	FUSE DATA	POWER FEED TO SUPPLY LOCATION	BREAKER SIZE AMP	SAFETY RELATED	CURRENT LOOPS	COMMENTS	BREAKER FUSE CO-ORDINATION	SAFETY SIGNIFICANCE OF EQUIP. FAILURE	EFFECT ON CLASS IE ELECT. EQUIP. (Note 1)
PDT-0122 CB CC CD DB DC DD	E-96 (4)	F-0102 B F-0102 C F-0102 D F-0102 B F-0102 C F-0102 D	FISHER PORTER	1 AMP - INPUT 1/2 AMP - OUTPUT	Y20-5 Y30-5 Y40-5 Y20-5 Y30-5 Y40-5	20	YES	UNGROUNDED	CURRENT LOOP FUSE WOULD BLOW	OK	NONE	R.P.S. TRIP & PRI. LOOP FLOW INDICATION WOULD BE LOST FROM THESE TRANSMITTERS
PDT-0104	E-84 (4)	N/A	N/A		Y01-8	—	NO		Y01 - NOT SAFETY RELATED DIRECT FEED TO TRANSMITTER	OK	NONE	NONE
PT-0101 A PT-0101 B	E-84 (1) E-84 (1)	P-0101 A P-0101 B	FOXBORO MODEL 610 A	3/8 AMP - INPUT 1/8 AMP - OUTPUT (CURRENT LOOP)	Y10-6 Y20-6	20	NO NO	UNGROUNDED		OK	NONE	NONE
PT-0102 A B C D	E-84 (2)	P-0102 A P-0102 B P-0102 C P-0102 D			Y10-5 Y20-5 Y30-5 Y40-5		YES					R.P.S. TRIP S.I. & PRI. LOOP PRESS. IND. WOULD BE LOST FROM THESE TRANS.
PT-0103 PT-0131 A B 0132 A B 0133 A B 0141 A B 0142 A B 0143 A B	E-84 (3) E-97 (4)	MULTIPLE MULTIPLE	FOXBORO	FUSE #1, #4, #5 INPUT 5 Amp each #2, #3, #6, #7, #15, #16, #11, #12, #13, #14 OUTPUT 1/10 Amp	Y01-26	—	NO	—	REMOTE AMPLIFIER Y01 - NOT SAFETY RELATED	OK	NONE	NONE
PT-0702 0704	E-69	—	—	local breakers = 10A For FW Reg Sys. INDIVIDUAL LOOPS HAVE SMALL FUSES	Y10-30-BKR4 Y20-40-BKR4	20 20	NO		FEEDWATER CONTROL SYSTEM TRANSMITTERS	OK	NONE	NONE
PT 0751 A B C D	E-83	P-0751 A P-0751 B P-0751 C P-0751 D	FOXBORO MODEL 610 A	3/8 AMP - INPUT 1/8 AMP - OUTPUT	Y10-5 Y20-5 Y30-5 Y40-5	20	YES	UNGROUNDED	CURRENT LOOP FUSE WOULD BLOW	OK	NONE	R.P.S. TRIP & LOSS OF PRESS IND. ON E-50A S.G.
PT-1001	E-66 (3)	P/S 1080	F&P MULTIPLE	1/16 Amp OUTPUT	Y01-27	—	NO	P/S (-) GND	CURRENT LIMITER ON POWER SUPPLY - Y01 NOT SAFETY RELATED	OK	NONE	NONE
PS-0101	E 290	—	—				NO	—	K07 - ANNUNCIATOR		NONE	NONE
PS-0103	E-242				52-167		YES	—	EFFECTS LONG TERM COOLING	OK	SEE NOTE 2	SEE NOTE 2
PS-0935	E-233	NA	NA		52-171		NO			OK	NONE	NONE
FS-0927 0928 0929 0930	E-183	NA	NA	30 Amp	252-103 252-203 252-104 252-204		NO			OK	NONE	NONE
FT-0701 0702 0703 0704	E-69 (1)	—	—	local breakers = 10A for FW Reg. System individual loops have small fuses	Y10-30-Bkr 4 Y20-40-Bkr 4	20	NO		FEEDWATER CONTROL SYSTEM TRANSMITTERS	OK	NONE	NONE
RE-1808	E-623 (1)	—	VICTOREEN	1/4 Amp in INST. 1 Amp out.	Y40-14	20	YES			OK	NONE	POSSIBLE ONE CHANNEL ISOLATION
RE-1817	E-228 (2)	—	VICTOREEN		Y01-34	—	NO		Y01 NOT SAFETY RELATED	OK	NONE	NONE
RE-1817 Pump	E-228 (6)	—	—		L25A-8	—	NO		LIGHTING PANEL - NOT SAFETY RELATED	OK	NONE	NONE

NOTE 1: CLASS IE DID NOT EXIST AT TIME OF PALISADES DESIGN. FOR PURPOSES OF THIS STUDY IT WAS DEFINED AS SAFETY RELATED.

NOTE 2 — SEE LONG TERM COOLING (B^{10} RECRYSTALLIZATION) REPORTS -

JRYOPE, DR HUGHES 4-7-76

PALISADES SUBMERGED ELECTRICAL EQUIPMENT
(DOES NOT INCLUDE SUBMERGED VALVE STUDY)

TAG No.	SCHEMATIC No.	POWER SUPPLY TAG No	POWER SUPPLY VENDOR	POWER SUPPLY FUSE DATA	POWER FEED TO SUPPLY LOCATION	BREAKER SIZE AMP	TRIP ELEMENT SET PT.		SAFETY RELATED	CURRENT LOOP	COMMENTS	BREAKER FUSE CO-ORDINATION	SAFETY SIGNIFICANCE OF EQUIP. FAILURE	EFFECT ON CLASS 1E ELECT. EQUIP.
LT-0101A 0101B 0102A B C D	E-82(1) E-82(1) E-82(4)	L-0101A L-0101B L-0102A L-0102B L-0102C L-0102D	FOXBORO MODEL 610A	3/8 AMP - INPUT 1/8 AMP - OUTPUT (CURRENT LOOP)	Y10-6 Y20-6 Y10-5 Y20-5 Y30-5 Y40-5	20			NO	UNGROUNDED " " " " "		OK	NONE	NONE
LT-0103 0116	E-84(3) E-72(2)	MULTIPLE MULTIPLE	FOXBORO FOXBORO	FUSE #27 INPUT=5A OUTPUT=1/10A FUSE #18	Y01-26				NO NO	— UNGROUNDED	Y01 - NOT SAFETY Related REMOTE AMPLIFIER	OK	NONE	NONE
LT-0701 0702 0703 0704	E-69	—	—	local breakers = 10A for FW Reg system INDIVIDUAL loops HAVE SMALL FUSES	Y10-Y30-BKR4 Y20-Y40-BKR4	20			NO	— — — —	Feedwater Control System TRANSMITTERS	OK	NONE	NONE
LT-0751A B C D	E-78	L-0751A L-0751B L-0751C L-0751D	FOXBORO MODEL 610A	3/8 Amp - INPUT 1/8 Amp - OUTPUT (CURRENT LOOP)	Y10-5 Y20-5 Y30-5 Y40-5	20			YES	UNGROUNDED LOOP	CURRENT LOOP FUSE WOULD BLOW	OK	NONE	R.P.S. TRIP & S.G. LEVEL IND. FROM THE LT-0751 SERIES TRANSMITTERS WOULD BE LOST
LT-1001 LT-1012 1014 1016 1018	E-63(2) E-63(1)	P/S 1080 P/S 1080	F&P MULTIPLE	1/16 AMP - OUTPUT	Y01-27				NO	P/S NEGATIVE GROUNDED P/S NEGATIVE GROUNDED	1. CURRENT LIMITER ON POWER SUPPLY 2. RADWASTE CONTROL PANEL MASTER PWR SUPPLY Y01 NOT SAFETY RELATED	OK	NONE	NONE
LS-0358 0360	E-99, E-293	NA NA	NA NA	— —	Y01-13 Y01-13	— —			NO	— —		OK	NONE	NONE
LS-0817 0865 0868 0870	E-293	NA	NA	5 AMP FNM-5	72-219	30	270 MAG		NO	—		OK	NONE	NONE
SV-0101 0148 0150 0152	E-189 E-234	NA	NA	10 Amp (FNM-10) (FUSTRON)	72-219 72-209	30 30	270 MAG 270 (MAG)		NO			OK	NONE	NONE
SV-0862 0864 0865 0867 0869 0870 0873	E-216 E-217 E-216	NA	NA	30 Amp, 250V	52-1208 52-1209 52-1209 52-1108 52-1108 52-1210 52-1210	125	(TM) LT=90 INST=1200		YES	—		OK	NONE	POSSIBLE LOSS OF CONTROL PWR IF VALVE HS IS IN CLOSED POS. CONT. COOLER FANS WILL NOT TRIP - CAN BE OPERATED AT BKR IF NECESSARY
SV-0934	E-239(1)			10 Amp (FNM-10)	72-129	30	270 (MAG)		YES			OK	NONE	NONE
SV-1819 1820 1821 1822	E-228(2) E-228(3) E-228(3) E-228(3)			30 Amp	72-205 72-205 72-205 72-205	100	LT=100 (TM)		NO			OK	NONE	NONE
SV-1823	E-223			30 AMP, 250V	52-1109	225	LT=135 INST=1500 TM		NO			OK	NONE	NONE
SV-2321 2322 2323	E-228(5)				Y01-34	—	—		NO			OK	NONE	NONE

J.R. Yope, DR Hughes 4-7-76

PALISADES SUBMERGED ELECTRICAL EQUIPMENT
(DOES NOT INCLUDE SUBMERGED VALVE STUDY)

TAG No	SCHEMATIC No	SUPPLY BREAKER	BUS	BUS INCOMING BREAKER	EQUIP. SAFETY RELATED	COMMENTS	BREAKER FUSE CO-ORD.	SAFETY SIGNIFICANCE OF EQUIP. FAILURE	EFFECT ON CLASS 1E EQUIP.
P77A P77B	E-233 E-233	52-291 52-171	MCC#2 MCC#1	152-1203 152-1101	NO		OK	NONE	NONE
PRESSURIZER HTR XFMER 15 480V BUS 15	E-253	152-305	1E	152-302 152-303	NO	1E BUS IS NOT A SAFETY RELATED BUS	OK	NONE	NONE
PRESSURIZER HTR XFMER 16 480V BUS 16	E-253	152-211	1D	152-203 152-202 152-213	NO		OK	NONE	NONE
CONT. BLDG ANALYZER SAMPLE PANEL C-102	E-625 (4) E-292	AC-1.27-29 Alarm: K11 (K53) 72-214	LIGHTING DC-72-219 DC	— — —	NO	L27-Not Safety Related Fuse = FNM-5 (K11) SAMPLE PANELS DC SUPPLY	OK ↓	NONE ↓	NONE ↓

JR YOPE, DR HUGHES 4-7-76

The second intertie involves the automatic transfer to an alternate power supply of the Instrument A-C Bus (Y01). The alternate power supplies are MCC1 and MCC2 through a breaker on each MCC. 480-120 V transformers are also installed in each of the power supplies. Based on our review, we have concluded that it is necessary for four single failures to occur at the same time to cause a loss of redundant power supply. First, it is necessary to postulate a fault on the Y01 bus. Second, the feeder breaker on MCC1 must be postulated to fail to trip which then assumes that the fault is of significant magnitude to cause a voltage reduction such that an automatic transfer would occur. Third, it must be assumed that the automatic transfer device fails to disconnect Y01 from the MCC1 feeder and, fourth, that when the automatic transfer shifts to the MCC2 feeder, the feeder breaker to MCC2 fails to trip. As four single failures must be postulated, we have concluded that there is reasonable assurance that redundant portions of the electrical system will not be lost due to a fault on Y01. Therefore, no design modifications are planned.

The interties between MCC1 and MCC2 via the battery chargers have been reviewed. Two battery chargers are provided for each of the two 125 V d-c buses. One of the battery chargers is fed through two breakers (one internal to the charger) from MCC1 and the second charger from MCC2 (also through two breakers). In addition, the one breaker is provided between each charger and its d-c bus. In order to postulate a failure which would disable redundant buses, the following single failures must occur simultaneously:

1. Fault on d-c bus.

2 & 3. Failure of both charger output breakers to trip.

4 & 5. Failure of the two charger incoming breakers to trip on one charger.

6 & 7. Failure of the two charger incoming breakers to trip on the redundant charger.

As seven failures must occur to result in a loss of redundant ECCS power supplies, we have concluded there is reasonable assurance that redundant ECCS power supplies will not be jeopardized in the event of a fault on a 125 V d-c bus. Therefore, no design changes are required.