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May 27, 1976

Regulatory Docket File

Re Indian Point Unit No. 2
Docket No. 50-247
Facility Operating License
No. DPR-26

Director of Nuclear Reactor Regulation
Attn: Mr. Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Our letters to you of February 19, 1976 and April 22, 1976 addressed the potential for submerged electrical equipment within the Indian Point Unit No. 2 containment following a postulated loss-of-coolant accident as well as our compliance with the Commission's Branch Technical Position EICSB 18. Enclosure 1 to this letter describes and summarizes the final results of our investigation of submerged electrical components inside containment. Enclosure 2 provides updated listings of submerged components and the details of the investigation. These enclosures supplement the information provided in our earlier letters and complete our response in these matters.

In addition, as a result of recent telecons with the Regulatory Staff, we have been advised that additional information pertaining to various single failure criterion must be provided for the Staff to complete their 10 CFR 50, Appendix K, ECCS review for Indian Point Unit No. 2. These inquiries were the subject of a conference call on May 14, 1976 between members of your staff and our staff. As requested by Regulatory Staff, we are submitting herewith (Enclosure 3) a discussion of our position and planned actions concerning each of the items addressed during the May 14, 1976 conference call.

It is our opinion that most of the items in question do satisfy the single failure criterion. Those items for which we feel further assurance of redundancy is desireable and capable of being performed during the present refueling outage will be resolved by completing the modifications described in Enclosure 3 prior to startup following refueling.

It should be noted that these modifications will be in addition to many other modifications previously scheduled for the present refueling outage and currently being performed to improve the reliability of safety-related systems. Enclosure 4 contains a

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listing of these projects presently underway. However, as stated above and discussed in Enclosure 3, we will expand our planned activities to allow for performance of modifications in response to those single failure inquiries which we have identified as requiring specific action to further assure redundancy and compliance with single failure criteria.

Additionally, as requested during the May 14, 1976 telecon, enclosed are seven (7) copies of the following electrical one-line drawings:

(1) Dwg. 540 F 921 - Main One-Line Diagram.

(2) Dwg. 540 F 923 - 480 V One-Line Diagram.

(3) Dwg. 9321-F-3006 (Rev. 29) - Single line diagrams for Emergency 480 V Motor Control Centers MCC 26A & MCC 26B and 118 V AC Instrument Buses.

(4) Dwg. 9321-F-3008 (Rev. 21) - Single line Diagram for 125 V D.C. System.

Very truly yours,

William J. Cahill, Jr.
Vice President

Enc.

ENCLOSURE 1

Indian Point Unit No. 2

In Con Edison's April 22, 1976 submittal, a listing of electrical components that could potentially become submerged during the post-LOCA period was provided. An additional electrical component that may also become submerged following a postulated LOCA should be added to the list. Level Transmitter LT-1003 on the Reactor Coolant Drain Tank has been determined to be located below the maximum calculated flood level. There are no consequences to ECCS performance or plant safety as a result of the flooding of that component.

Additionally, Con Edison's earlier listing indicated that various electrical penetrations would become submerged following a postulated LOCA. These electrical penetrations have now been specifically identified. Table 13 of Attachment C (Enclosure 2) provides a listing and evaluation of the effect on plant safety of those submerged electrical penetrations. As noted in Table 13, the following two proposed modifications will be completed during the present refueling outage.

(1) Penetration H-69: This penetration, which contains the power supply to motor control center MCC 28, is de-energized upon reactor trip due to an SI signal or undervoltage and plant safety, therefore, is not compromised by its submergence during the post-LOCA period. Nevertheless, fuses will be installed in series with the existing

circuit breaker in this line to provide redundant fault protection as an added measure of plant protection.

(2) Penetration H-70: This penetration contains the emergency lighting feed to lighting panel 218 within containment and is powered from DC power panel 22. As was done for the identical situation on Indian Point Unit No. 3, a new circuit breaker in series with new fuses will be installed in the emergency lighting circuit for Panel 218. This circuit breaker will be locked open except during access to containment and will assure that penetration H-70 is de-energized during accident conditions.

As demonstrated in Table 13 of Attachment C (Enclosure 2), submergence of containment penetrations H-58, H-59, H-60, H-61, H-63, H-64, H-66, H-67, H-68, H-69 and H-70 will not compromise their containment isolation function.

A final updated listing of safety-related submerged components is set forth with Attachment A (Enclosure 2) to this letter. Similarly, a final updated listing of non-safety related submerged components is set forth in Attachment B (Enclosure 2).

As requested by the NRC, an evaluation was made of the effect each submerged electrical component may have on power sources supplying safety-related components or on plant safety. This evaluation is presented in Tables 1 through 14 in Attachment C

(Enclosure 2). Each table identifies the submerged component, the circuit and power source from which it is supplied, as well as all the other components on that circuit. For each component, the effect on ECCS performance, containment isolation and other safety-related functions affecting plant safety if that component or circuit were lost has been evaluated.

In each case, the circuits were investigated to identify existence of primary and/or backup protection. Failure of the primary protection device (fuse) was then postulated and all circuits subsequently lost (by clearing of associated breaker) were identified. The safety significance of these circuits was reviewed and determined. In all, almost 200 circuit functions were evaluated with acceptable results. In all cases, fuse sizing and breaker ratings are coordinated with the load requirements of the specific components or circuit.

In certain instances, the clearing (de-energizing) of some submerged components (due to a trip on SI signal or undervoltage) was considered in the post-LOCA evaluation of ECCS performance or plant safety. This tripping function is in addition to individual fault protection provided by either fuses or circuit breakers.

As noted in Tables 7 and 12, the following two proposed modifications will be completed during the present refueling outage in order to provide redundant fault protection and render these circuits consistent with the others:

(1) Valves 1163, 1164, 1165, 1166, 1167 (Table 7): To incorporate secondary fault protection, fuses will be installed in series with the existing circuit breaker for this circuit. This modification will provide an added measure of plant protection during the post-LOCA period.

(2) LT-1003 (Table 12): A fuse will be installed in series with the existing circuit breaker for this circuit. Again, this will provide redundant fault protection and further assure plant safety.

Included in Tables 1 through 13 of Attachment C (Enclosure 2) are the times for actual submergence of each electrical component. These times for submergence to occur were determined based on the following factors:

a. The elevation of each submerged electrical component, as determined during the physical survey of that containment.

b. The containment volume per inch of elevation up to the maximum calculated water level of Elevation 50'-1". (See February 19, 1976 Con Edison letter to NRC for details).

c. Injection rates into the reactor coolant system consistent with operational requirements of the SI and spray systems during the injection and recirculation phase. This assumes maximum operation of SI pumps, RHR pumps and spray pumps operating (i.e., maximum safeguards) during these periods.

It is noted that as part of the changeover to the recirculation phase, only one spray pump continues

in operation delivering water from the RWST to the containment.

d. RWST and spray additive tank (NaOH Tank) filled and emptying into containment.

e. Four accumulators filled to the maximum allowed by the Technical Specifications and emptying into containment.

f. At time of break, all RCS spillage to containment (including inventory of accumulators) is assumed to occur at Time = 0 for purposes of determining earliest time at which component submergence occurs. Additional spillage due to SI injection and spray operation (Item "c" above) is conservatively assumed to start at T=0 for this calculation.

Based on Items "a" through "f" above, the maximum water level at Elevation 50'-1" (e.g., 422, 479 gallons injected into containment and/or spilled to containment floor) is reached at approximately 47 minutes after the postulated accident. The flooding rate for Indian Point Unit No. 2 is identical to that for Indian Point Unit No. 3.

During a recent telecon, the NRC requested information concerning the seismic acceptability of any items relocated as a result of the submerged electrical component study. As discussed in our February 19, 1976 letter to the NRC, Valves 856A, B and D and portions of their associated piping are being relocated during the present refueling outage so the motor operators for these

valves are located above the maximum calculated flood level. No modifications are being made to the valves or their operators. The new piping runs and associated supports have been reviewed in accordance with the Indian Point Unit No. 2 seismic Class I criteria and found acceptable.

The solenoids for Valves 891B and 891D and Flow Transmitters FT-925, FT-926 and FT-946B are simply being relocated upward on existing seismic Class I structures so as to be above the maximum flood level. These modifications will not affect the seismic capabilities of these components.

As discussed in our April 22, 1976 letter, there are eleven motor-operated valves required to be de-energized in order to comply with the NRC's Branch Technical Position EICSB 18. In addition, since redundant position indication in the central control room is required for these valves, separate limit switches are being installed on each of the eleven valves for that purpose. For Indian Point Unit No. 3, the supports on which the redundant position indication limit switches are mounted have been satisfactorily evaluated as seismic Class I structures. Since the modifications being made to Indian Point Unit No. 2 in this regard are identical to the Indian Point Unit No. 3 modifications, this seismic design acceptability also applies to Indian Point Unit No. 2.

During the same telecon, the NRC requested that the surveillance requirements incorporated in the Indian Point Unit No. 3 Technical Specifications, concerning periodic verification of valve

mechanical stop adjustments for the motor-operated valves in the high-head safety injection lines to the cold legs, be be addressed for Indian Point Unit No. 2 as well. These valves (856A, C, D and E for IP2) are adjusted during pre-operational flow tests to provide balanced flow to the reactor coolant system. To assure that these valves do not become maladjusted during Indian Point Unit No. 2 reactor operation, Con Edison concurs that the following additions be included in the Indian Point Unit No. 2 Technical Specifications:

(1) conduct a flow test of the high-head safety injection system after any modification is made to either its piping and/or valve arrangement.

(2) verify that the mechanical stops on Valves 856A, C, D and E are set at the position measured and recorded during the most recent emergency core cooling system operational flow test or flow test conducted in accordance with (1) above. This surveillance procedure shall be performed following any maintenance on these valves or their associated motor operators and at a convenient outage if the position of the mechanical stops have not been verified in the preceeding three months.

These specifications were acceptable to the NRC staff for Indian Point Unit No. 3.

ENCLOSURE 2

ATTACHMENT A

Indian Point Unit No. 2

Safety-Related Submerged Components (Maximum Calculated Water Level Within Containment Elevation 50'-1")

Valves: 856A*
856B*
856D*
891B**
891D**

Flow Transmitters: 925*
926*
946B*

Level Transmitter: 938***

Containment Electrical Penetrations:

H-58	H-66
H-59	H-67
H-60	H-68
H-61	H-69
H-63	H-70

* To be relocated
** Solenoids to be relocated
*** Designed for submerged service in borated water at 295 F at a pressure of 69 psig

ENCLOSURE 2

ATTACHMENT B

Indian Point Unit No. 2

Non-Safety Related Submerged Electrical Components
(Maximum Calculated Flood Level Within Containment
Elevation 50'-1")

Valves:	123	896B	955E	1164
	200B	896C	955F	1165
	200C	896D	1003A	1166
	212	955C	1003B	1167
	896A	955D	1163	1609

Reactor Coolant Drain Tank Pump 21 & Junction Box
Reactor Coolant Drain Tank Pump 22 & Junction Box

Containment Sump Pump 29 & Level Switch
Containment Sump Pump 210 & Level Switch

Junction Box - Rack #14, Zone #24 of WCPPS

LT-1003
TT-1058

TE-122
TE-126

LT-1133
LT-1134
LT-1135
LT-1136
LT-1137

ENCLOSURE 2

ATTACHMENT C

Indian Point Unit No. 2

Submerged Electrical Component Study
List of Tables

Description	Table No.	No. of Sheets
Miscellaneous Components	1	1
Circuit No. 3, 125 V.D.C. Distribution Panel #21	2	6
" " 5, " " " " #21	3	3
" " 4, " " " " #22	4	2
" " 12, " " " " #22	5	2
" " 15, " " " " #22	6	3
" " 9, " " " " #23	7	1
" " 3, 118 V.A.C. Instrument Bus #21	8	2
" " 14, " " " " #21	9	2
" " 15, " " " " #22	10	2
" " 16, " " " " #23	11	2
" " 3, " " " " #24	12	1
Containment Electrical Penetrations	13	1
Legend	14	2

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS-MISCELLANEOUS COMPONENTS

Submerged Component	Function	Electrical Status		Effect on ECCS/ Plant Safety- Post-LOCA Period		Time after SI to reach Submergence (Minutes)	Power Source	Electrical Fault Protection
		Normal Plant Operation	Post LOCA Period	Req'mt.	Effects			
RCDT Pump #21 & J.Box	Drain Tank Pump (WDS)	Energized	De-energized (Trip on SI signal or under-voltage	None	None	20 2'-10"	MCC #28 Compt. 1E	Individually fused 80A
RCDT Pump #22 & J. Box	"	"	"	"	"	20	MCC #28 Compt. 1K	Individually fused 100A
Sump Pump #29 & Switch	Containment Sump Pump (W.D.S.) & Level Switch	"	"	"	"	7 (1'-2") 3 (6")	MCC #28 Compt. 4C	Individually fused 30A
Sump Pump #210 & Switch	"	"	"	"	"	7 3	MCC #28 Compt. 4E	"
Rack 14 Zone 24 J. Box	WC and PPS Indication Lights	"	"	"	"	8 (1'-4")	120V AC dist. Panel #21 Circuit #24	20A circuit breaker

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

(Note: Final Post LOCA Flood Level 4'-1" above Floor Elevation 46'-0")

CIRCUIT #3 - 125V DC DIST. PANEL #21
(Circuit Protection - 20 Amp. Bkr.)

Submerged Component	Function	Valve Status		Effect on ECCS Perf/ Plant Safety during Post-LOCA Period		Components Submerged		Time after SI condition to reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt.	Effect	Comp.	Elev. above Floor		
Valve 200B (M.O)	Letdown Orifice Stop Valve CVCS	Closed	Closed F.C.	None	None	L.S.	4'-1"	47	Individ. fused 3A
Valve 200C (M.O.)	"	Open	"	"	"	"	3'-0"	21	"

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #3, 125V.D.C. DISTRIBUTION PANEL #21

Component	Function	Effect on ECCS Perf./ Plant Safety for Loss of Electrical Power to Component and (Component Status)
Valve 200A	Letdown Orifice Valve	None (Closed & F.C.)
519	Water to PRT (Cont. Iso. Va.)	None (Closed on "T" Signal & F.C.)
876A	Spray Additive Tank Outlet Va.	None (Valve opens on "P" Signal & F.O.; 876A Redundant to 876B)
1813	Cont. Spray Pump Test Line Valve to RWST	None (N.C. & F.C.)
201	Letdown Line (Cont. Iso. Va.)	None (Closed on "T" Signal & Fail Closed)
863	N_2 to Accumulators (Cont. Iso. Va.)	None (Fail Closed)
793	CCW Return from XLDHX (Cont. Iso. Va.)	None (Closed on "T" Signal & Fails Closed)
791	CCW Supply to XLDHX (Cont. Iso. Va.)	None (" " ")
1702	RCDT Pump Disch. to HUT (Cont. Iso. Va.)	None (" " ")
1723	Cont. Sump Pump Disch. to HUT (Cont. Iso. Va.)	None (" " ")
1410	IVSWS Header Supply Valve	None (Valve opens on SI Signal & F.O.; redundant to 1413)
1786	RCDT to Vent. Hdr. (Cont. Iso. Va.)	None (Valve closes on SI Signal & F.C.)
956A	Press. Sample Line to Samp. System (Cont. Iso. Va.)	None (Closed, "T" Signal to close & F.C.)
956G	Accum. Sample Line to Samp. System (Cont. Iso. Va.)	" " " "
956E	RCS Sample Line to Samp. System (Cont. Iso. Va.)	" " " "

TABLE 2

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #3, 125V.D.C. DISTRIBUTION PANEL #21

Component	Function	Effect on ECCS Perf./ Plant Safety for Loss of Electrical Power to Component and (Component Status)
Valve 956C	Press. Sample Line (Cont. Iso. Va.)	None (Closed, "T" Signal to close & F.C.)
FCV-417	Main F.W. Control Va. to Steam Gen. #21	None (closed due to SI or reactor trip signal & F.C.)
FCV-427	Main F.W. Control Va. to Steam Gen. #22	" " " "
882, 856B, 894B, 894D, 843	D.C. Power to Monitor Light Position Indication on Control Board	None (White monitor light for position status not illuminated; separate and redundant position indication available)
956J	Gross Failed Fuel Detector System Isolation Valve	None ("T" Signal to Close and F.C.)
FCV-437	Main Feed Water Control Valve to Steam Generator #23	None (Closed on SI or reactor trip and F.C.)
FCV-447	Main Feed Water Control Valve to Steam Generator #24	None (Closed on SI or reactor trip and F.C.)

INDIAN POINT UNIT NO. 2 TABLE 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #3 , 125V.D.C. DISTRIBUTION PANEL #21

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
SOV-1534 (PCV-1234)	Rad. Monitor R-11 Air Sample Return to Containment (SOV Controls Cont. Iso. Va. PCV-1234)	None (closed "T" Signal to close & F.C.) Loss of Power closes PCV-1234
SOV-1536 (PCV-1236)	Rad. Monitor Air Sample from Containment (SOV Controls Cont. Iso. Va. PCV-1236)	None (Closed, "T" Signal to close & F.C.) Loss of Power closes PCV-1236
SOV-1538 (PCV-1238)	Penetration Pressurization Air to Rad. Monitor Line (SOV-1538 Controls PCV-1238)	None (PCV-1238 open; Phase A Signal to open PCV-1238 and PCV-1238 fails open) PCV-1238 (SOV-1538) redundant to PCV-1239 (SOV-1539)
SOV-1540 (PCV-1240)	Penetration Pressurization Air to Rad. Monitor Line (SOV-1540 controls PCV-1240)	None (PCV-1240 open; Phase A Signal to open PCV-1240 and PCV-1240 fails open) PCV-1240 (SOV-1540) redundant to PCV-1241 (SOV-1541)
SOV-1523 (PCV-1223)	Stm. Gen. 21 Sample Line from Containment (SOV Controls Cont. Iso. Va. PCV-1223)	None (Closed, "T" Signal to close & F.C.) Loss of Power closes PCV-1223
SOV-1524 (PCV-1224)	Stm. Gen. 22 Sample Line from Containment (SOV Controls Cont. Iso. Va. PCV-1224)	None (Closed, "T" Signal to close & F.C.) Loss of Power closes PCV-1224
SOV-1525 (PCV-1225)	Stm. Gen. 23 Sample Line from Containment (SOV Controls Cont. Iso. Va. PCV-1225)	None (Closed, "T" Signal to close & F.C.) Loss of Power closes PCV-1225
SOV-1526 (PCV-1226)	Stm. Gen. 24 Sample Line from Containment (SOV Controls Cont. Iso. Va. PCV-1226)	None (Closed, "T" Signal to close & F.C.) Loss of Power closes PCV-1226

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #3 , 125V.D.C. DISTRIBUTION PANEL #21

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
SOV-1527 (PCV-1227)	Stm. Gen. Blowdown Tank Spray Line (SOV-1527 Controls PCV-1227)	None (Fails closed) Loss of Power Closes PCV-1227
SOV-1314 (PCV-1214)	Stm. Gen. 21 Blowdown Line from Cont. (SOV Controls Cont. Iso. Va. PCV-1214)	None ("T" Signal to Close & F.C.) Loss of Power Closes PCV-1214
SOV-1315 (PCV-1215)	Stm. Gen. 22 Blowdown Line from Cont. (SOV Controls Cont. Iso. Va. PCV-1215)	None ("T" Signal to Close & F.C.) Loss of Power Closes PCV-1215
SOV-1316 (PCV-1216)	Stm. Gen. 23 Blowdown Line from Containment (SOV Controls Cont. Iso. Va. PCV-1216)	None ("T" Signal to Close & F.C.) Loss of Power Closes PCV-1216
SOV-1317 (PCV-1217)	Stm. Gen. 24 Blowdown Line from Containment (SOV Controls Cont. Iso. Va. PCV-1217)	None ("T" Signal to Close & F.C.) Loss of Power Closes PCV-1217
SOV-1429 (PCV-1229)	Stm. Jet Air Ejector Disch. to Cont. Bldg. (SOV-1429 Controls Cont. Iso. Va. PCV-1229)	None (PCV-1229 closed; Phase A Signal to Close PCV-1229 and PCV-1229 Fails Closed)
SOV-1430 (PCV-1230)	Stm. Jet Air Ejector Disch. to Cont. Bldg. (SOV-1430 Controls Cont. Iso. Va. PCV-1230)	None (PCV-1230 Closed; Phase A Signal to Close) Loss of Power Closes PCV-1230
SOV-1431 (PCV-1231)	Penetration Pressurization Air to Stm. Jet Air Ejector Disch. Line (SOV-1431 Controls PCV-1231)	None (PCV-1231 open; PCV-1231 (SOV-1431) redundant to PCV-1233 (SOV-1433)) Phase A Signal to Open PCV-1231 and PCV-1233).

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #3 , 125V.D.C. DISTRIBUTION PANEL #21

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
SOV-1428 (PCV-1228)	Instrument Air to Containment (SOV Controls Cont. Iso. Va. PCV-1228)	None (Closed, "T" Signal to Close & F.C.)
SOV-1433 (PCV-1233)	Penetration Pressurization Air to Stm. Jet Air Ejector Disch. Line (SOV-1433 Controls PCV-1233)	None (PCV-1233 open; Phase A Signal to Open PCV-1233 & PCV-1231) PCV-1233 F.O. & redundant to PCV-1231
SOV-1132 (PCV-1132)	Stm. Jet Air Ejector Stm. Supply (SOV-1132 Controls PCV-1132)	None (PCV-1132 Fails Open)
SOV-1133 (PCV-1133)	Priming Ejector Stm. Supply (SOV-1133 Controls PCV-1133)	None (PCV-1133 Fails Open)
Cont. Recirc. Fan & Motor	Bearing Vibration Coil Reset Circuit	None

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #5 - 125VDC DIST. PNL #21
(Circuit Protection - 20 Amp.Bkr.)

Note: Final Post LOCA Flood Level 4'-1" above Floor Elevation 46'-0"

Submerged Component	Function	Valve Status		Effect on ECCS Perf/ Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
Valve 212 (A.O.)	Pressurizer Aux. Spray Line Valve (RCS)	Closed	Closed F.C.	None	None	SOV	3'-1-1/2"	23	Indiv. Fused
896A (A.O.)	Accumulator #21 Drain Valve (SIS)	"	"	"	"	L.S.	2'-3"	15	"
896C (A.O.)	Accumulator #23 Drain Valve (SIS)	"	"	"	"	L.S.	2'-3"	15	"

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT NO. 5, 125 V.D.C. DISTRIBUTION PANEL #21

Component	Function	Effect on ECCS Perf./ Plant Safety for Loss of Electrical Power to Component and (Component Status)
Valve 456	Power Operated Pressurizer Relief Valve	None (Closed & F.C.)
516	Pressurizer Relief Tank Vent Valve	None (N.C. & F.C.)
261A	R.C.P. #1 Seal Leak Off Valve	None (N.O. & F.O.)
261C	" " " " " "	None (N.O. & F.O.)
553A	Primary Water to R.C.P. Standpipe	None (N.C. & F.C.)
553C	" " " " "	None (N.C. & F.C.)
215	Excess Letdown Divert Valve to Drain Tank or SWHX	None (Fail to SWHX)
268	V.C.T. Vent Valve	None (N.C. & F.C.)
204A	Charging Line Valve	None (N.O. & F.O.)
LCV-112A	Inlet Valve to V.C.T. (3-way valve)	None (Fail to VCT)
FCV-110A	Flow Control Valve for Reactor Makeup Control System	None (N.C. & F.O.)
FCV-110B	"	None (Closed & F.C.)
FCV-111A	"	None (Closed & F.C.)
FCV-111B	"	None (Closed & F.C.)
890C	Accum. #23 Fill Line Valve	None (Closed & F.C.)
890A	" #21 " " "	None (Closed & F.C.)
839A	S.I.S. Test Line Valve	None (Closed & F.C.)
839B	" " " "	None (Closed & F.C.)

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT NO. 5, 125 V.D.C. DISTRIBUTION PANEL #21

Component	Function	Effect on ECCS Perf./ Plant Safety for Loss of Electrical Power to Component and (Component Status)
839E	S.I.S. Test Line Valve	None (Closed & F.C.)
839F	" " " "	None (Closed & F.C.)
891A	Accum. #21 Vent Valve (Cont.Iso.Va.)	None (Closed & F.C.)
891C	" #23 " " " " "	None (Closed & F.C.)
SOV-1170	Ser.Wtr. from Cont. Fan Coolers; SOV-1170 controls S.W. Bypass Valve TCV-1104	TCV-1104 opens on SI and (fails open); TCV-1104 (SOV-1170) redundant to Va. TCV-1105 (SOV-1171)
SOV-1276	Ser.Wtr. from Diesel-Generators; SOV-1276 controls S.W. Bypass Valve FCV-1176	FCV-1176 opens on SI Signal and (Fails Open); FCV-1176 (SOV-1276) redundant to Valve FCV-1176A (SOV-1276A)
SOV-1171	Ser.Wtr. from Cont. Fan Coolers; SOV-1171 controls S.W. Bypass Valve TCV-1105	TCV-1105 opens on SI and fails open; TCV-1105 (SOV-1171) redundant to Valve TCV-1104 (SOV-1170)
SOV-1276A	Ser.Wtr. from Diesel Generators; SOV-1276A controls S.W. Bypass Valve FCV-1176A	FCV-1176A opens on SI Signal and fails open; FCV-1176A (SOV-1276A) redundant to valve FCV-1176 (SOV-1276)

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #4 - 125VDC DIST. PNL #22
(Circuit Protection - 20 Amp.Bkr.)

Note: Final Post LOCA Flood Level 4'-1" above Floor Elevation 46'-0"

Submerged Component	Function	Valve Status		Effect on ECCS Perf/ Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to reach Submergence (Minutes)	Electrical Fault Protectio
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
955C (A.O.)	Accumulator #21 Sample Valve (SS)	Closed	Closed F.C.	None	None	L.S.	3'-1"	22	Indiv. Fused
955D (AO)	Accumulator #22 Sample Valve (SS)	"	"	"	"	"	1'-11"	12	"
955E (AO)	Accumulator #23 Sample Valve (SS)	"	"	"	"	"	1'-9"	11	"
955F (AO)	Accumulator #24 Sample Valve (SS)	"	"	"	"	"	1'-11"	12	"

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT # 4, - 125VDC DIST. PNL. #22

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
Valve 951	Pressurizer Sample Line Valve	None (Closed & F.C.)
953	" " "	" " "
955A	R.C. Sample Line Valve	" " "
955B	" " " "	" " "
959	RHRS Loop Sample Line Valve	" " "

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #12 - 125V.D.C. DISTRIB. PNL. 22 (Note: Final Post-LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

(Circuit Protection - 20 Amp. Bkr.)

Submerged Component	Function	Valve or Component Status		Effect on ECCS Perf. / Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electric Fault Protecti
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
Valve LCV-1003A (A.O.)	RCDT Level Control Valve to RCDT Pump Suction (WDS)	Open	Closed F.C.	None	None	SOV L.S.	3'-5" 2'-5"	30 16	Individ Fused 3A
Valve LCV-1003B (A.O.)	"	"	"	"	"	"	"	"	"
Valve 1609 (A.O.)	Drain Valve to Cont. Sump from RCDT or PRT (WDS)	Closed	"	"	"	"	3'-5" 2'-5-1/2"	"	"

TABLE 5

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #12, 125V.D.C. DISTRIBUTION PANEL 22

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
Valve PCV-1036A	G.D.T. Inlet Valve	None (Fail Closed)
PCV-1036B	G.D.T. Outlet Valve to Gas Analyzer	" " "
PCV-1037A	G.D.T. Inlet Valve	" " "
PCV-1037B	G.D.T. Outlet Valve	" " "
PCV-1038A	G.D.T. Inlet Valve	" " "
PCV-1038B	G.D.T. Outlet Valve	" " "
PCV-1039A	G.D.T. Inlet Valve	" " "
PCV-1039B	G.D.T. Outlet Valve	" " "
Valve SOV-1629	G.D.T. Outlet Valve to HUT Valves	" " "
SOV-1630	G.D.T. Outlet Valve to HUT Valves	" " "
SOV-1631	G.D.T. Outlet Valve to HUT Valves	" " "
SOV-1632	G.D.T. Outlet Valve to HUT Valves	" " "
SOV-1677	W.G.C. Va. to Shutdown G.D.T. Isolation	" " "
RCV-018	Liq. RWS Disch. Valve to River	" " "

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #15 - 125V.D.C. DIST. PNL #22 (Note: Final Post-LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

(Circuit Protection - 20 Amp. Bkr.)

Submerged Component	Function	Valve Status		Effect on ECCS Perf. Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrica Fault Protectio
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
Valve 896B (A.O.)	Accumulator #22 Drain Line Valve to RCDT (SIS)	Closed	Closed F.C.	None	None	L.S.	2'-3"	15	Individual fused 3A
Valve 896D (A.O.)	Accumulator #24 Drain Line Valve to RCDT (SIS)	"	"	"	"	"	2'-3"	15	"

TABLE 6

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #15, 125V.D.C. DISTRIBUTION PANEL #22

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
alve PCV-453C	Power Operated Pressurizer Relief Valve	None (Fail Closed)
553B	Primary Water to R.C.P. Stand Pipe	None (Fail Closed)
553D	Primary Water to R.C.P. Stand Pipe	None (Fail Closed)
261B	R.C.P. #1 Seal Leak Off Valve	None (Open & F.O.)
261D	R.C.P. #1 Seal Leak Off Valve	None (Open & F.O.)
246	R.C.P. #1 Seal Bypass Valve	None (Closed & F.C.)
523	PRT Drain Valve	None (Closed & F.C.)
213	Excess Letdown Line Valve	None (Closed & F.C.)
204B	Charging Line Valve	None (Open & F.O.)
LCV-459	Letdown Line Valve	None (Closed & F.C.)
310	Letdown Divert Flow Valve (DBDM or Bypass)	None (Fail to DBDM)
560	Primary Water to PRT	None (Closed & F.C.)
RCV-017	CCW Surge Tank Vent Valve	None (Fail Closed)
839C	SIS Test Line Valve	None (Closed & F.C.)
839D	SIS Test Line Valve	None (Closed & F.C.)
839G	SIS Test Line Valve	None (Closed & F.C.)
839H	SIS Test Line Valve	None (Closed & F.C.)
TCV-149	Letdown Divert Flow Valve (VCT or Demineralizer	None (Fail to VCT)

TABLE 6

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #15, 125V.D.C. DISTRIBUTION PANEL #22

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
Valve 890B	Accumulator Fill Line #22	None (Closed & F.C.)
890D	" " " #24	" " "
891B	Accumulator Gas Fill #22	" " "
891D	" " " #24	" " ".

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #9 - 125V.D.C. DIST. PNL. 23 (Note: Final Post-LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

(Circuit Protection - 20 Amp. Bkr.)

Submerged Component	Function	Valve Status		Effect on ECCS Perf. Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
Valve 1163 (A.O.)	Cont. Recirc. Fan Condensate Measuring System (WDS)	Open	Open	None	None	SOV L.S.	3'-1" 1'-3"	22 7	20A C.B. 30A Fuse*
Valve 1164 (A.O.)	"	"	"	"	"	"	3'-1" 1'-3"	22 7	"
Valve 1165 (A.O.)	"	"	"	"	"	"	3'-1" 1'-3"	22 7	"
Valve 1166 (A.O.)	"	"	"	"	"	"	3'-1" 1'-3"	22 7	"
Valve 1167 (A.O.)	"	"	"	"	"	"	3'-1" 1'-3"	22 7	"

*Fuse to be installed during present outage

Note: No other components powered from this circuit

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #3 - 118V.A.C. INST. BUS #21 (Note: Final Post-LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

(Circuit Protection - 15 Amp. Bkr.)

Submerged Component	Function	Valve or Component Status		Effect on ECCS Perf./ Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
TE-122	Excess Let-down Heat Exchanger Temp. (CVCS)	Energized	Energized	None	None	RTD	1'-11"	12	Individual Fused 3/8A
TE-126	Regenerative Heat Ex-changer Temp. (CVCS)	Energized	Energized	None	None	RTD	2'-1"	14	Individual Fused 3/8A

Note: The external power supply provided for these transmitters limits the maximum current to the milli-amp range even when instrument is immersed or shorted.

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT # 3,- 118VAC INST. BUS #21

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
Racks "A5" and "A6"	CVCS	none
TIC-100	Batch Tank Temp.	"
TIC-149	Non-Regenerative Heat Exchanger Demin. Bypass	"
LT-112	VCT Level	"
FT-110	Boric Acid Blend	"
FM-110	" " "	"
TIC-103	B.A.T. Heater Control	"
TIC-107	" " "	"
CI-1136	Flash Evaporator Distillate	"

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #14, 118V.A.C. INST. BUS #21
(Circuit Protection - 15 Amp. Bkr.)

(Note: Final Post-LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

Submerged Component	Function	Valve Status		Effect on ECCS Perf./ Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrica Fault Protectio
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
HCV-123	Excess Let-down Heat Exchanger Control Valve (CVCS)	Closed	Closed F.C.	None	None	L.S.	2'-3-1/2"	15	Individua Fused 3/8A

Note: The external power supply provided for this controller limits the maximum current to the milli-amp range even when instrument is immersed or shorted.

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #14, 118V.A.C. INSTRUMENT BUS #21

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
HC-130	Non-Regen. Hx CCW Temperature Control Switch	None
HC-135	Letdown Line Pressure Control Switch	None
HC-104	Boric Acid Tank Recirc. Control Switch	None
HC-105	Boric Acid Tank Recirc. Control Switch	None
HC-142	Charging Line Flow Control Switch	None
HC-123	Excess Letdown Hx Flow Control Switch	None
HC-133	RHRS Alternate Flow to CVCS Control Switch	None

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #15 - 118VAC INST. BUS #22
(Circuit Protection - 15 Amp. Bkr.)

(Note: Final Post LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

Submerged Component	Function	Valve or Component Status		Effect on ECCS Perf. / Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrica Fault Protectio
		Normal Plant Operation	Post-LOCA Period	Req'mt.	Effect	Comp.	Elev. above Floor		
LT-1133	Condensate Collection Sys.-Cont. Fan Coolers (WDS)	Energized	Energized	None	None	Trans-mitter	3'-2"	23	Individua Fused 3/8A
LT-1134	"	"	"	"	"	"	3'-2"	23	"
LT-1135	"	"	"	"	"	"	3'-2"	23	"
LT-1136	"	"	"	"	"	"	3'-2"	23	"
LT-1137	"	"	"	"	"	"	3'-2"	23	"

NOTE: The external power supplies provided for these transmitters limit the maximum current to the milli-amp range even when instrument is immersed or shorted.

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #15, 118 V.A.C. INSTRUMENT BUS #22

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
AR-1102	Cont. Dew Point Measuring System Recorder	None
AR-1102-R	"	None
LC-1210-S	Provides Level Control Signal to LCV-1163 for Fan Cooler, Weir #21	"
LC-1211-S	Provides Level Control Signal to LCV-1164 for Fan Cooler, Weir #22	"
LC-1212-S	Provides Level Control Signal to LCV-1165 for Fan Cooler, Weir #23	"
LC-1213-S	Provides Level Control Signal to LCV-1166 for Fan Cooler, Weir #24	"
LC-1214-S	Provides Level Control Signal to LCV-1167 for Fan Cooler, Weir #25	"

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #16 - 118VAC INST. BUS # 23 (Note: Final Post-LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

(Circuit Protection - 15 Amp. Bkr.)

Submerged Component	Function	Valve or Component Status		Effect on ECCS Perf. Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
TT-1058	RCDT Temp. Transmitter (WDS)	Energized	Energized	None	None	Trans.	1'-6"	9	Individual Fused 1/4A (see note)

Note: The external power supply provided for this transmitter limits the maximum current to the milli-amp range even when instrument is immersed or shorted.

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #16, 118 V.A.C. INSTRUMENT BUS # 23

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
FT-1126-3	WC&PPS High Flow Zone 3	None
FT-1126-3A	WC&PPS Low Flow Zone 3	None
SOV-1196	Sol. Valve to Bypass Flow Transmitters Zone 3	None
SOV-1213	Sol. Valve to Bypass Low Flow Transmitters Zone 3	None
PC-1203S	Provides Signal to SOV-1203 to Admit N_2 on Low Pressure Zone 3	None
SOV-1203	Sol. Valve to Actuate PCV-1203 to Admit N_2 to System Zone 3	None

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #3 - 118VAC INST. BUS # 24
(Circuit Protection - 15 Amp. Bkr.)

(Note: Final Post-LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

Submerged Component	Function	Valve or Component Status		Effect on ECCS Perf. / Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
LT-1003	Reactor Coolant Drain Tank Level Transmitter	Energized	Energized	None	None	J. Box	3'-5½"	30	15a CB and 20A* Fuse

NOTE: No other components powered from this circuit.
*To be installed during present refueling outage.

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA

CONDITIONS - ELECTRICAL PENETRATIONS

Penetration	Function	Electrical Status		Effect on ECCS/ Plant Safety - Post LOCA Period		Time after SI to Reach Submergence (Minutes)	Power Source	Electric Fault Protecti
		Normal Plant Operation	Post LOCA Period	Req'mt.	Effects			
H-58 H-59 H-60 H-61	Reactor Control Rod Drive Cables	Energized	De-Energized (Trip on SI or under-voltage)	None	None	16 2'-4"	M.G. Set #21 M.G. Set #22 MCC #29	Reactor Trip Bkr Deenerg Penetrat
H-63 H-64 H-67 H-68	Pressurizer Heater Cables	"	"	"	"	16	480V Buses 2A, 3A, 5A	800a Ckt. Bkr
H-66	Containment Leak Rate Test	De-Energized	De-energized		"	16	—	—
H-70	Containment Lighting Fdrs, Panels 215 221 216 217 218	Energized " " " Deenergized	De-energ. (Trip on SI or U.V.) " "	" " " " "	" " " " "	16	120/208V Ltg bus " " 480V Ltg. Bus DC Pwr. Panel #22	100a C.B " " 90a C.B 40a* C & 60a* fus
H-69	Feed to MCC #28 (Cont.)	"	"	"	"	16	480V Swgr. #21 Section 16B	350a C. & 400a Fuse *

*These disconnecting devices will be installed during the present outage { 40a C.B. to be locked open during operation.

LEGEND

W.D.S.	-	Waste Disposal System
W.C. & P.P.S.	-	Weld Channel and Penetration Pressurization System
SI	-	Safety Injection
CVCS	-	Chemical Volume and Control System
AO	-	Air Operated
FC	-	Fail Closed
LS	-	Limit Switch
SIS	-	Safety Injection System
FW	-	Feed Water
RCDT	-	Reactor Coolant Drain Tank
PRT	-	Pressurizer Relief Tank
IVSWS	-	Isolation Valve Seal Water System
RCS	-	Reactor Coolant System
RWST	-	Refueling Water Storage Tank
CCW	-	Component Cooling Water
FO	-	Fail Open
NC	-	Normally Closed
NO	-	Normally Open
VCT	-	Volume Control Tank
RCP	-	Reactor Coolant Pump
GDT	-	Gas Decay Tank
WGC	-	Waste Gas Compressor
HUT	-	Hold Up Tank
RWS	-	Radioactive Waste System
SS	-	Sampling System

RHRS - Residual Heat Removal System

Phase A Signal - "SI" or "T" - Containment Isolation Signal; "S" Open Valve on SI

Phase B Signal - Containment Spray or "P" Containment Isolation Signal

SWHX - Seal Water Heat Exchanger

XLDHX - Excess Letdown Heat Exchanger

DBDM - Deborating Demineralizer

FAI - Fail As Is

J. Box - Junction Box

SOV - Solenoid Valve

SW - Service Water

ENCLOSURE 3

Indian Point Unit No. 2

ITEM 1 - VALVES 851A&B - CROSSOVER VALVES FOR HIGH HEAD SI PUMPS 21 & 23

A. Question: The Staff inquired whether a single failure in conjunction with a partial loss of offsite power could potentially close both crossover valves and render the high head system incapable of providing flow in both SI lines from a minimum of two SI pumps.

B. Response: Our analysis indicates that no single failure could negate the proper functioning of the safety system.

During an SI coincident with a loss of offsite power, the onsite Diesels 21, 22 & 23 will start and within 10 seconds will be ready to accept safeguard load from their 480V safeguard buses. In the loading sequence, SI pump 21 will start in 14.1 seconds after loss of offsite power (this time includes the 10 seconds for the diesel to come up to speed and close on to the safeguard bus). SI pump 22 will start in 13.3 seconds and SI pump 23 in 13 seconds. The motor operated crossover valves 851A (851B) are normally open and will not close until 17.5 seconds (18.5 seconds) after the associated SI pump motor fails to start.

Closure times of valves 851A and 851B are, therefore, consistent with times required for diesel electrical tie-in. No circuitry changes are necessary to assure against premature closure of these crossover valves.

ITEM 2 - RHR VALVES 730 and 731 AND ASSOCIATED INTERLOCKS

A. Question: The Staff questioned the redundancy of the pressure and valve interlocks.

B. Response: The single pressure channel, PC-403, senses reactor coolant system pressure and opens permissive contacts in the opening circuitry of valves 730 and 731. Opening of either valve is thereby prevented by this permissive pressure interlock whenever the reactor coolant system is at pressure. This design feature serves as a back up to administrative controls which also precludes operation of these valves whenever the Reactor Coolant System is at pressure.

To provide further assurance against malfunction of the pressure interlock, a second independent pressure transmitter will be installed to provide a separate, independent signal to one of the two valves. The existing pressure transmitter will provide its signal to the other valve. This redundant design will assure that malfunction of a pressure interlock will not result in the simultaneous opening of both valves 730 and 731.

We have been advised, however, that the delivery of materials for this modification will require approximately four (4) months. Until this modification can be completed, valves 730 and 731 will be de-energized in the closed position whenever the reactor coolant system (RCS) pressure is above the RHR system design pressure. This precaution will assure that the valves will not be opened whenever high reactor coolant system pressure exists. The de-energizing of valves 730 and 731 in the closed position will, therefore, satisfy the intent of the proposed installation of redundant pressure interlocks.

Valves 730 and 731 are also interlocked with parallel valves 888 A and B (RHRHXs to High Head System Intertie). A potential single failure item has been postulated whereby electrical grounding of these interconnected interlocks would result in the inability to remotely open both valve 888A and 888B. It was determined that this interlock system should be modified to provide a more unitized interlock arrangement. Therefore, valve 730 will be interlocked with valve 888A and valve 731 will be interlocked with valve 888B. Availability of a path for delivery of recirculated fluid to the suction of the high head pumps will, therefore, be assured by this proposed unitization. This modification will be performed during the present refueling outage.

ITEM 3 - SWITCHOVER FROM INJECTION TO RECIRCULATION (8 SWITCH SEQUENCE

A. Question: The Staff inquired whether certain switches, if not properly positioned, could prevent automatic initiation of redundant safety equipment.

B. Response: Three separate forms of switch position indication exist to support the administrative controls which preclude operation of these switches until required under a postulated loss of coolant accident. These are:

1) The position of the switch handles themselves.
2) The single green light ("switch off") and at least three red lights (energized as successive switch functions are completed) associated with each switch, and
3) The "RECIRC. SWITCH OFF NORMAL" audible and visual annunciator alarm provided on panel SB1F.

However to further assure that redundant safeguard functions are not defeated in the unlikely event of a malpositioned switch, we will incorporate changes to these circuits similar to those provided at Indian Point Unit No. 3. In those cases where a single switch affects redundant components, contacts which open upon safety injection actuation will be added in series with the switch or interposing relay contacts. This will defeat the Recirc. Switch Function during the first phase of safety injection operation. Switches and associated functions to be interlocked in this manner are as follows:

Switch 3

"43/RS-3" trip to each RHR pump.

Switch 6

1) "43/RS-6" open signal to valves 888A & B.

2) "43/RS-6" close signal to valves 746 and 747.

Switch 7

"43/RS-7" trip to each SI pump.

These changes will be completed during the present refueling outage.

ITEM 4 - AUTOMATIC TRANSFER CIRCUITS

A. 480V Bus Ties

Question: The Staff questioned whether the 480V A.C. redundant buses might be automatically tied together.

Response: The automatic closing feature associated with 480V safeguard bus tie breakers 2AT5A, 2AT3A & 3AT6A was previously removed. The subject circuit breakers can be closed only by operator action. The existing design does not allow redundant 480 volt safeguard buses to be automatically tied together.

B. Onsite DC Power System

Question: The Staff questioned whether the failure of the DC auto transfer devices could result in cross-connecting the batteries.

Response: There are seven auto transfer circuits for Indian Point 2 safeguard equipment use. (Diesels 21, 22, 23, 480V buses 2A, 3A, 5A and 6A). Cables from redundant DC panels in separately routed cable trays supply the load via the auto transfer device. There is physical cable separation from the redundant DC power sources to the auto transfer devices. There are two circuit interrupting devices between the auto transfer device and the DC bus. Since no single failure in the transfer device could cause the loss of either DC bus, we consider the present design reliable and no circuitry changes are deemed necessary.

ITEM 4 (Continued)

C. 118V AC Instrument Buses

Question: The Staff raised the question that one of the instrument buses is not fed from a diesel-backed MCC. In addition the back up feed for the instrument buses is also from a non-safeguard power supply. The Staff is questioning the installation's capability to perform its safety function.

Response: All safety related components fed from the four 118V AC instrument buses (with the exception of the Containment Spray Pump initiation logic) fail in the safe (trip) direction on loss of power. Therefore, if an SI coincident with loss of off site power and a single failure is postulated the proper function of the safety system is not jeopardized.

Power supplies for the containment spray actuation logic are supplied by safeguards power sources such that minimum requirements for system redundancy as specified in Table 3.3 of the Indian Point Unit No. 2 Technical Specifications are satisifed.

ITEM 5 - DESCRIPTION OF SEPARATION AND REDUNDANCY FOR INSTRUMENT CHANNELS, POWER AND CONTROL CABLES

A. Question: The Staff requested more detail information on separation and redundancy.

B. Response: The Indian Point 2 reactor protection and engineered safety system cable circuits are routed in four instrument channels, three power channels and three control channels to provide and preserve the basic redundancy and independence of systems. In addition, cables are further separated in trays in accordance with voltage level, size and function. Cables assigned to their channels will remain in their respective channels throughout the run. The physical channeling is accomplished by either separate trays or trays with metal barriers and in some cases by separate conduit. In general, redundant circuits are separated horizontally rather than vertically. The separation distances vary from 1", when the separation is maintained by the use of 4" high 16 gauge sheet metal barriers within the tray, to three feet. Where physical conditions prevented horizontal separation, vertical separation was utilized. The vertical channel separation varies from 7-1/2 inches to 19 inches.

The minimum vertical separation of 7-1/2 inches between redundant power trays and between power and control trays is supplemented with a 1/4" transite barrier. There are fire stops and fire barriers of glass wool, ceramic fiber blankets, fiberglass and Flamastic 71A used throughout the plant to provide additional reliability.

For additional information refer to Indian Point FSAR Supplements3 & 12, Volume 5, Questions 7.6 & 7.7.

ITEM 6 - SAFETY INJECTION BLOCK SWITCH

A. Question: The Staff inquired whether the existing single switch may permit bypassing of both redundant safeguards initiation circuits for low pressurizer pressure/low pressurizer level initiation signal.

B. Response: Malpositioning of the Safety Injection Bypass Switch is prevented from defeating either train of Pressurizer Pressure/Level Logic at pressure by automatic bypass removal circuitry (PC455C, PC456C & PC457C) which is designed in accordance with the single failure criteria. However, to preclude effects on both logic trains of low pressurizer pressure/level due to any failure of the common Safety Injection Block Switch, a second independent switch will be provided. Circuitry will be modified so that each switch is only associated with one of the two redundant logic trains. This modification will be performed during the present refueling outage.

ITEM 7 - BYPASS OF REDUNDANT ENGINEERED SAFETY FEATURE LOGIC TRAINS

A. Question: The Regulatory Staff questioned whether the potential exists for bypassing both redundant ESF circuits during testing.

B. Response: Unit No. 2 does not have similar test circuitry to to that provided for Unit No. 3, so this problem is not completely applicable. (Actuation relay continuity at Unit No. 2 is verified by ohmeter rather than the test relay and test light combinations in use at Unit No. 3). Individual logic relay matrices on each train may be bypassed by operation of any of their associated logic relay test switches (function by function bypasses rather than complete train bypass). However, to further support administrative procedures, which preclude operation of logic relay test switches of opposite trains simultaneously, separate annunciation for each train ("safeguards train A in test" and "safeguards train B in test") will be provided during the present refueling outage.

ITEM 8 - LOW HEAD INJECTION LINE FLOW INSTRUMENTATION

A. Question: The Staff inquired whether the single failure of a battery would result in the loss of two of the four low head line flow transmitters (FT-946 A,B,C and D). Since the emergency procedure for a postulated LOCA requires verifying flow in three of the four flow meters during the switchover to recirculation, sufficient information would not be available for the operator to proceed.

B. Response: Indian Point Unit No. 2 Emergency Procedure E-2A presently requires verifying that 3 of the 4 transmitters indicate flows $\geq$ 300 gpm before switching to low head recirculation. The corresponding Indian Point Unit No. 3 emergency procedure was modified during licensing of that unit to allow the operator to proceed based on only 2 flow meters indicating flows $\geq$ 600 gpm through each one. The Staff has indicated that a similar approach for Indian Point Unit No. 2 would be acceptable and, therefore, IP 2 Emergency Procedure E-2A will be modified to reflect this change.

ITEM 9 - DIESEL FUEL OIL TRANSFER PUMPS

A. Question: The Staff inquired whether the fuel transfer pumps are powered from non-safeguard MCC's and may not be available when needed.

B. Response: The diesel fuel oil transfer pumps are fed from MCC 27 and 29. Although both MCC's are automatically disconnected on an SI, the operators have approximately 1 hour as a minimum (nearly 2 hours assuming a full Day Tank) after the SI to restore the power supply to the subject pumps from the CCR. Since there is ample time available for required operator action, no changes to the existing design are deemed necessary.

ITEM 10 - DIESEL FUEL OIL TRANSFER CIRCUITS

A. Question: The Staff questioned whether the failure of the manual sequencing switch could prevent fuel transfer to all three diesel Day Tanks.

B. Response: The operating sequence of the 2Hp fuel transfer pumps is determined by positioning a sequence selector switch. In our opinion, there are great advantages in having the capability to supply fuel from any of the three oil storage tanks to any of the diesel Day Tanks such as the present design provides.

It should also be noted that the Day Tanks have nearly 2 hour fuel supply capacity when full and a minimum of 1 hour supply before the low level alarm alerts the operators in the CCR that a Day Tank is 50% full and the fuel transfer pumps failed to start. Even if there was a selector switch failure, which we feel is extremely unlikely, contacts could be bypassed on an emergency basis in the allotted time.

We believe that the present system flexibility to supply fuel for the diesel Day Tanks is advantageous and reliable. Therefore, no changes to the system design are deemed necessary.

ITEM 11 - VALVES 743 AND 1870: MINIFLOW VALVES FOR RHR PUMPS

A. Question: A postulated single failure involving motor operated valve 743 or 1870 could potentially result in the spurious closure of one of these RHR Pump miniflow valves.

B. Response: To assure that a postulated single failure of valve 743 or 1870 would not cause interruption of RHR pump miniflow, it was determined that these two valves should be locked in the open position with their supplies physically disconnected. Proper safeguards positioning of the two valves would, thereby, be assured.

ENCLOSURE 4

Indian Point Unit No. 2

1. Modification Resulting From Submerged Electrical Study:

   (a) Relocation of valves 856 A,B & D and associated piping.

   (b) Relocation of solenoids for accumulator N_2 fill line isolation valves 891 B & D.

   (c) Relocation of Flow Transmitters FT-925, 926 and 946 B.

   (d) Installation of additional fuses and/or circuit breakers for four circuits powering electrical equipment that could potentially become submerged following a postulated LOCA. These improvements will provide redundant fault protection for the four lines and render them consistent with the other circuits.

2. Ventilation System Modifications:

   (a) PAB Exhaust - installation of carbon filters.

   (b) FSB Exhaust - installation of carbon filters.

   (c) Post Accident Ventilation System - installation of carbon filters.

   (d) Installation of flow instrument in plant vent.

3. Appendix J - 10 CFR 50:

   Performance of Type A,B and C Containment Leak Tests in accordance with Appendix J to 10 CFR 50. In addition, pressure gauges are being installed in both the personnel and equipment airlocks to assure repressurization of the hatch seals following each closure of the airlock doors.

4. Miscellaneous Modifications:

   (a) Installation of feedwater low flow bypass valves.

   (b) Modification to accumulator level transmitters as necessary to comply with new accumulator levels required by the Final Acceptance Criteria (FAC) for ECCS.

(c) Installation of Metal Impact and Loose Parts Monitoring System for the Reactor Coolant System.

(d) Modifications to improve design of Westinghouse BFD relays and W-2 switches.

(e) Installation of Blowdown Tank Vent Iodine Sampling System.

(f) Modifications to correct thermal overstressing of tubing in the sample line containment penetration.

William J. Cahill, Jr.
Vice President

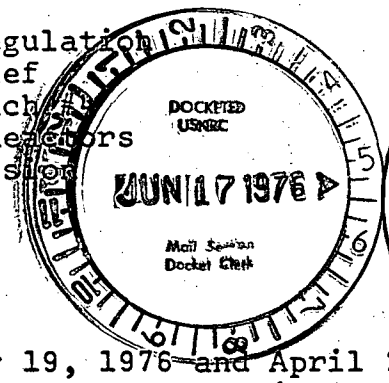
Consolidated Edison Company of New York, Inc.
4 Irving Place, New York, N Y 10003
Telephone (212) 460-3819

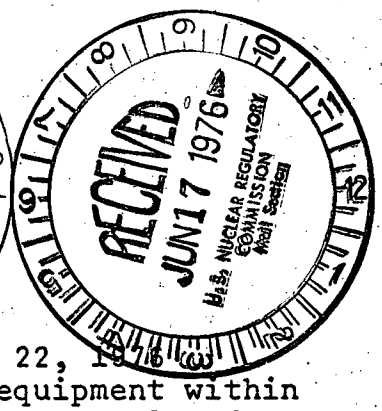
May 27, 1976

Re Indian Point Unit No. 2
Docket No. 50-247
Facility Operating License
No. DPR-26

Regulatory Docket File

Director of Nuclear Reactor Regulation
Attn: Mr. Robert W. Reid, Chief
Operating Reactors Branch
Division of Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555





Gentlemen:

Our letters to you of February 19, 1976 and April 22, 1976 addressed the potential for submerged electrical equipment within the Indian Point Unit No. 2 containment following a postulated loss-of-coolant accident as well as our compliance with the Commission's Branch Technical Position EICSB 18. Enclosure 1 to this letter describes and summarizes the final results of our investigation of submerged electrical components inside containment. Enclosure 2 provides updated listings of submerged components and the details of the investigation. These enclosures supplement the information provided in our earlier letters and complete our response in these matters.

In addition, as a result of recent telecons with the Regulatory Staff, we have been advised that additional information pertaining to various single failure criterion must be provided for the Staff to complete their 10 CFR 50, Appendix K, ECCS review for Indian Point Unit No. 2. These inquiries were the subject of a conference call on May 14, 1976 between members of your staff and our staff. As requested by Regulatory Staff, we are submitting herewith (Enclosure 3) a discussion of our position and planned actions concerning each of the items addressed during the May 14, 1976 conference call.

It is our opinion that most of the items in question do satisfy the single failure criterion. Those items for which we feel further assurance of redundancy is desireable and capable of being performed during the present refueling outage will be resolved by completing the modifications described in Enclosure 3 prior to startup following refueling.

It should be noted that these modifications will be in addition to many other modifications previously scheduled for the present refueling outage and currently being performed to improve the reliability of safety-related systems. Enclosure 4 contains a

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listing of these projects presently underway. However, as stated above and discussed in Enclosure 3, we will expand our planned activities to allow for performance of modifications in response to those single failure inquiries which we have identified as requiring specific action to further assure redundancy and compliance with single failure criteria.

Additionally, as requested during the May 14, 1976 telecon, enclosed are seven (7) copies of the following electrical one-line drawings:

(1) Dwg. 540 F 921 - Main One-Line Diagram.

(2) Dwg. 540 F 923 - 480 V One-Line Diagram.

(3) Dwg. 9321-F-3006 (Rev. 29) - Single line diagrams for Emergency 480 V Motor Control Centers MCC 26A & MCC 26B and 118 V AC Instrument Buses.

(4) Dwg. 9321-F-3008 (Rev. 21) - Single line Diagram for 125 V D.C. System.

Very truly yours,

William J. Cahill, Jr.

William J. Cahill, Jr.
Vice President

Enc.

ENCLOSURE 1

Indian Point Unit No. 2

In Con Edison's April 22, 1976 submittal, a listing of electrical components that could potentially become submerged during the post-LOCA period was provided. An additional electrical component that may also become submerged following a postulated LOCA should be added to the list. Level Transmitter LT-1003 on the Reactor Coolant Drain Tank has been determined to be located below the maximum calculated flood level. There are no consequences to ECCS performance or plant safety as a result of the flooding of that component.

Additionally, Con Edison's earlier listing indicated that various electrical penetrations would become submerged following a postulated LOCA. These electrical penetrations have now been specifically identified. Table 13 of Attachment C (Enclosure 2) provides a listing and evaluation of the effect on plant safety of those submerged electrical penetrations. As noted in Table 13, the following two proposed modifications will be completed during the present refueling outage.

(1) Penetration H-69: This penetration, which contains the power supply to motor control center MCC 28, is de-energized upon reactor trip due to an SI signal or undervoltage and plant safety, therefore, is not compromised by its submergence during the post-LOCA period. Nevertheless, fuses will be installed in series with the existing

circuit breaker in this line to provide redundant fault protection as an added measure of plant protection.

(2) Penetration H-70: This penetration contains the emergency lighting feed to lighting panel 218 within containment and is powered from DC power panel 22. As was done for the identical situation on Indian Point Unit No. 3, a new circuit breaker in series with new fuses will be installed in the emergency lighting circuit for Panel 218. This circuit breaker will be locked open except during access to containment and will assure that penetration H-70 is de-energized during accident conditions.

As demonstrated in Table 13 of Attachment C (Enclosure 2), submergence of containment penetrations H-58, H-59, H-60, H-61, H-63, H-64, H-66, H-67, H-68, H-69 and H-70 will not compromise their containment isolation function.

A final updated listing of safety-related submerged components is set forth with Attachment A (Enclosure 2) to this letter. Similarly, a final updated listing of non-safety related submerged components is set forth in Attachment B (Enclosure 2).

As requested by the NRC, an evaluation was made of the effect each submerged electrical component may have on power sources supplying safety-related components or on plant safety. This evaluation is presented in Tables 1 through 14 in Attachment C

(Enclosure 2). Each table identifies the submerged component, the circuit and power source from which it is supplied, as well as all the other components on that circuit. For each component, the effect on ECCS performance, containment isolation and other safety-related functions affecting plant safety if that component or circuit were lost has been evaluated.

In each case, the circuits were investigated to identify existence of primary and/or backup protection. Failure of the primary protection device (fuse) was then postulated and all circuits subsequently lost (by clearing of associated breaker) were identified. The safety significance of these circuits was reviewed and determined. In all, almost 200 circuit functions were evaluated with acceptable results. In all cases, fuse sizing and breaker ratings are coordinated with the load requirements of the specific components or circuit.

In certain instances, the clearing (de-energizing) of some submerged components (due to a trip on SI signal or undervoltage) was considered in the post-LOCA evaluation of ECCS performance or plant safety. This tripping function is in addition to individual fault protection provided by either fuses or circuit breakers.

As noted in Tables 7 and 12, the following two proposed modifications will be completed during the present refueling outage in order to provide redundant fault protection and render these circuits consistent with the others:

(1) Valves 1163, 1164, 1165, 1166, 1167 (Table 7): To incorporate secondary fault protection, fuses will be installed in series with the existing circuit breaker for this circuit. This modification will provide an added measure of plant protection during the post-LOCA period.

(2) LT-1003 (Table 12): A fuse will be installed in series with the existing circuit breaker for this circuit. Again, this will provide redundant fault protection and further assure plant safety.

Included in Tables 1 through 13 of Attachment C (Enclosure 2) are the times for actual submergence of each electrical component. These times for submergence to occur were determined based on the following factors:

a. The elevation of each submerged electrical component, as determined during the physical survey of that containment.

b. The containment volume per inch of elevation up to the maximum calculated water level of Elevation 50'-1". (See February 19, 1976 Con Edison letter to NRC for details).

c. Injection rates into the reactor coolant system consistent with operational requirements of the SI and spray systems during the injection and recirculation phase. This assumes maximum operation of SI pumps, RHR pumps and spray pumps operating (i.e., maximum safeguards) during these periods.

It is noted that as part of the changeover to the recirculation phase, only one spray pump continues

in operation delivering water from the RWST to the containment.

d. RWST and spray additive tank (NaOH Tank) filled and emptying into containment.

e. Four accumulators filled to the maximum allowed by the Technical Specifications and emptying into containment.

f. At time of break, all RCS spillage to containment (including inventory of accumulators) is assumed to occur at Time = 0 for purposes of determining earliest time at which component submergence occurs. Additional spillage due to SI injection and spray operation (Item "c" above) is conservatively assumed to start at T=0 for this calculation.

Based on Items "a" through "f" above, the maximum water level at Elevation 50'-1" (e.g., 422, 479 gallons injected into containment and/or spilled to containment floor) is reached at approximately 47 minutes after the postulated accident. The flooding rate for Indian Point Unit No. 2 is identical to that for Indian Point Unit No. 3.

During a recent telecon, the NRC requested information concerning the seismic acceptability of any items relocated as a result of the submerged electrical component study. As discussed in our February 19, 1976 letter to the NRC, Valves 856A, B and D and portions of their associated piping are being relocated during the present refueling outage so the motor operators for these

valves are located above the maximum calculated flood level. No modifications are being made to the valves or their operators. The new piping runs and associated supports have been reviewed in accordance with the Indian Point Unit No. 2 seismic Class I criteria and found acceptable.

The solenoids for Valves 891B and 891D and Flow Transmitters FT-925, FT-926 and FT-946B are simply being relocated upward on existing seismic Class I structures so as to be above the maximum flood level. These modifications will not affect the seismic capabilities of these components.

As discussed in our April 22, 1976 letter, there are eleven motor-operated valves required to be de-energized in order to comply with the NRC's Branch Technical Position EICSB 18. In addition, since redundant position indication in the central control room is required for these valves, separate limit switches are being installed on each of the eleven valves for that purpose. For Indian Point Unit No. 3, the supports on which the redundant position indication limit switches are mounted have been satisfactorily evaluated as seismic Class I structures. Since the modifications being made to Indian Point Unit No. 2 in this regard are identical to the Indian Point Unit No. 3 modifications, this seismic design acceptability also applies to Indian Point Unit No. 2.

During the same telecon, the NRC requested that the surveillance requirements incorporated in the Indian Point Unit No. 3 Technical Specifications, concerning periodic verification of valve

mechanical stop adjustments for the motor-operated valves in the high-head safety injection lines to the cold legs, be be addressed for Indian Point Unit No. 2 as well. These valves (856A, C, D and E for IP2) are adjusted during pre-operational flow tests to provide balanced flow to the reactor coolant system. To assure that these valves do not become maladjusted during Indian Point Unit No. 2 reactor operation, Con Edison concurs that the following additions be included in the Indian Point Unit No. 2 Technical Specifications:

(1) conduct a flow test of the high-head safety injection system after any modification is made to either its piping and/or valve arrangement.

(2) verify that the mechanical stops on Valves 856A, C, D and E are set at the position measured and recorded during the most recent emergency core cooling system operational flow test or flow test conducted in accordance with (1) above. This surveillance procedure shall be performed following any maintenance on these valves or their associated motor operators and at a convenient outage if the position of the mechanical stops have not been verified in the preceeding three months.

These specifications were acceptable to the NRC staff for Indian Point Unit No. 3.

ENCLOSURE 2

ATTACHMENT A

Indian Point Unit No. 2

Safety-Related Submerged Components (Maximum Calculated Water Level Within Containment Elevation 50'-1")

Valves:	856A*		
	856B*		
	856D*		
	891B**		
	891D**		
Flow Transmitters:	925*		
	926*		
	946B*		
Level Transmitter:	938***		
Containment Electrical Penetrations:	H-58	H-66	
	H-59	H-67	
	H-60	H-68	
	H-61	H-69	
	H-63	H-70	

* To be relocated

** Solenoids to be relocated

*** Designed for submerged service in borated water at 295 F at a pressure of 69 psig

ENCLOSURE 2

ATTACHMENT B

Indian Point Unit No. 2

Non-Safety Related Submerged Electrical Components
(Maximum Calculated Flood Level Within Containment
Elevation 50'-1")

Valves:	**123**	**896B**	**955E**	1164
	200B	896C	955F	1165
	200C	896D	1003A	1166
	212	955C	1003B	1167
	896A	955D	1163	1609

Reactor Coolant Drain Tank Pump 21 & Junction Box
Reactor Coolant Drain Tank Pump 22 & Junction Box

Containment Sump Pump 29 & Level Switch
Containment Sump Pump 210 & Level Switch

Junction Box - Rack #14, Zone #24 of WCPPS

LT-1003
TT-1058

TE-122
TE-126

LT-1133
LT-1134
LT-1135
LT-1136
LT-1137

ENCLOSURE 2

ATTACHMENT C

Indian Point Unit No. 2

Submerged Electrical Component Study
List of Tables

Description	Table No.	No. of Sheets
Miscellaneous Components	1	1
Circuit No. 3, 125 V.D.C. Distribution Panel #21	2	6
" " 5, " " " " #21	3	3
" " 4, " " " " #22	4	2
" " 12, " " " " #22	5	2
" " 15, " " " " #22	6	3
" " 9, " " " " #23	7	1
" " 3, 118 V.A.C. Instrument Bus #21	8	2
" " 14, " " " " #21	9	2
" " 15, " " " " #22	10	2
" " 16, " " " " #23	11	2
" " 3, " " " " #24	12	1
Containment Electrical Penetrations	13	1
Legend	14	2

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS-MISCELLANEOUS COMPONENTS

Submerged Component	Function	Electrical Status		Effect on ECCS/ Plant Safety- Post-LOCA Period		Time after SI to reach Submergence (Minutes)	Power Source	Electrical Fault Protection
		Normal Plant Operation	Post LOCA Period	Req'mt.	Effects			
RCDT Pump #21 & J. Box	Drain Tank Pump (WDS)	Energized	De-energized (Trip on SI signal or under-voltage	None	None	20 2'-10"	MCC #28 Compt. 1E	Individually fused 80A
RCDT Pump #22 & J. Box	"	"	"	"	"	20	MCC #28 Compt. 1K	Individually fused 100A
Sump Pump #29 & Switch	Containment Sump Pump (W.D.S.) & Level Switch	"	"	"	"	7 (1'-2") 3 (6")	MCC #28 Compt. 4C	Individually fused 30A
Sump Pump #210 & Switch	"	"	"	"	"	7 3	MCC #28 Compt. 4E	"
Rack 14 Zone 24 J. Box	WC and PPS Indication Lights	"	"	"	"	8 (1'-4")	120V AC dist. Panel #21 Circuit #24	20A circuit breaker

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

(Note: Final Post LOCA Flood Level 4'-1" above Floor Elevation 46'-0")

CIRCUIT #3 - 125V DC DIST. PANEL #21
(Circuit Protection - 20 Amp. Bkr.)

Submerged Component	Function	Valve Status		Effect on ECCS Perf/ Plant Safety during Post-LOCA Period		Components Submerged		Time after SI condition to reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt.	Effect	Comp.	Elev. above Floor		
Valve 200B (A.O)	Letdown Orifice Stop Valve CVCS	Closed	Closed F.C.	None	None	L.S.	4'-1"	47	Individ. fused 3A
Valve 200C (A.O.)	"	Open	"	"	"	"	3'-0"	21	"

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #3, 125V.D.C. DISTRIBUTION PANEL #21

Component	Function	Effect on ECCS Perf./ Plant Safety for Loss of Electrical Power to Component and (Component Status)
Valve 200A	Letdown Orifice Valve	None (Closed & F.C.)
519	Water to PRT (Cont. Iso. Va.)	None (Closed on "T" Signal & F.C.)
876A	Spray Additive Tank Outlet Va.	None (Valve opens on "P" Signal & F.O.; 876A Redundant to 876B)
1813	Cont. Spray Pump Test Line Valve to RWST	None (N.C. & F.C.)
201	Letdown Line (Cont. Iso. Va.)	None (Closed on "T" Signal & Fail Closed)
863	N_2 to Accumulators (Cont. Iso. Va.)	None (Fail Closed)
793	CCW Return from XLDHX (Cont. Iso., Va.)	None (Closed on "T" Signal & Fails Closed)
791	CCW Supply to XLDHX (Cont. Iso. Va.)	None (" " ")
1702	RCDT Pump Disch. to HUT (Cont. Iso. Va.)	None (" " ")
1723	Cont. Sump Pump Disch. to HUT (Cont. Iso. Va.)	None (" " ")
1410	IVSWS Header Supply Valve	None (Valve opens on SI Signal & F.O.;redundant to 1413)
1786	RCDT to Vent. Hdr. (Cont. Iso. Va.)	None (Valve closes on SI Signal & F.C.)
956A	Press. Sample Line to Samp. System (Cont. Iso. Va.)	None (Closed, "T" Signal to close & F.C.)
956G	Accum. Sample Line to Samp. System (Cont. Iso. Va.)	" " " "
956E	RCS Sample Line to Samp. System (Cont. Iso. Va.)	" " " "

TABLE 2

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #3, 125V.D.C. DISTRIBUTION PANEL #21

Component	Function	Effect on ECCS Perf./ Plant Safety for Loss of Electrical Power to Component and (Component Status)
Valve 956C	Press. Sample Line (Cont. Iso. Va.)	None (Closed, "T" Signal to close & F.C.)
FCV-417	Main F.W. Control Va. to Steam Gen. #21	None (closed due to SI or reactor trip signal & F.C.)
FCV-427	Main F.W. Control Va. to Steam Gen. #22	" " " "
882, 856B, 894B, 894D, 843	D.C. Power to Monitor Light Position Indication on Control Board	None (White monitor light for position status not illuminated; separate and redundant position indication available)
956J	Gross Failed Fuel Detector System Isolation Valve	None ("T" Signal to Close and F.C.)
FCV-437	Main Feed Water Control Valve to Steam Generator #23	None (Closed on SI or reactor trip and F.C.)
FCV-447	Main Feed Water Control Valve to Steam Generator #24	None (Closed on SI or reactor trip and F.C.)

TABLE 2

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #3 , 125V.D.C. DISTRIBUTION PANEL #21

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
SOV-1534 (PCV-1234)	Rad. Monitor R-11 Air Sample Return to Containment (SOV Controls Cont. Iso. Va. PCV-1234)	None (closed "T" Signal to close & F.C.) Loss of Power closes PCV-1234
SOV-1536 (PCV-1236)	Rad. Monitor Air Sample from Containment (SOV Controls Cont. Iso. Va. PCV-1236)	None (Closed, "T" Signal to close & F.C.) Loss of Power closes PCV-1236
SOV-1538 (PCV-1238)	Penetration Pressurization Air to Rad. Monitor Line (SOV-1538 Controls PCV-1238)	None (PCV-1238 open; Phase A Signal to open PCV-1238 and PCV-1238 fails open) PCV-1238 (SOV-1538) redundant to PCV-1239 (SOV-1539)
SOV-1540 (PCV-1240)	Penetration Pressurization Air to Rad. Monitor Line (SOV-1540 controls PCV-1240)	None (PCV-1240 open; Phase A Signal to open PCV-1240 and PCV-1240 fails open) PCV-1240 (SOV-1540) redundant to PCV-1241 (SOV-1541)
SOV-1523 (PCV-1223)	Stm. Gen. 21 Sample Line from Containment (SOV Controls Cont. Iso. Va. PCV-1223)	None (Closed, "T" Signal to close & F.C.) Loss of Power closes PCV-1223
SOV-1524 (PCV-1224)	Stm. Gen. 22 Sample Line from Containment (SOV Controls Cont. Iso. Va. PCV-1224)	None (Closed, "T" Signal to close & F.C.) Loss of Power closes PCV-1224
SOV-1525 (PCV-1225)	Stm. Gen. 23 Sample Line from Containment (SOV Controls Cont. Iso. Va. PCV-1225)	None (Closed, "T" Signal to close & F.C.) Loss of Power closes PCV-1225
SOV-1526 (PCV-1226)	Stm. Gen. 24 Sample Line from Containment (SOV Controls Cont. Iso. Va. PCV-1226)	None (Closed, "T" Signal to close & F.C.) Loss of Power closes PCV-1226

TABLE 2

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #3 , 125V.D.C. DISTRIBUTION PANEL #21

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
SOV-1527 (PCV-1227)	Stm. Gen. Blowdown Tank Spray Line (SOV-1527 Controls PCV-1227)	None (Fails closed) Loss of Power Closes PCV-1227
SOV-1314 (PCV-1214)	Stm. Gen. 21 Blowdown Line from Cont. (SOV Controls Cont. Iso. Va. PCV-1214)	None ("T" Signal to Close & F.C.) Loss of Power Closes PCV-1214
SOV-1315 (PCV-1215)	Stm. Gen. 22 Blowdown Line from Cont. (SOV Controls Cont. Iso. Va. PCV-1215)	None ("T" Signal to Close & F.C.) Loss of Power Closes PCV-1215
SOV-1316 (PCV-1216)	Stm. Gen. 23 Blowdown Line from Containment (SOV Controls Cont. Iso. Va. PCV-1216)	None ("T" Signal to Close & F.C.) Loss of Power Closes PCV-1216
SOV-1317 (PCV-1217)	Stm. Gen. 24 Blowdown Line from Containment (SOV Controls Cont. Iso. Va. PCV-1217)	None ("T" Signal to Close & F.C.) Loss of Power Closes PCV-1217
SOV-1429 (PCV-1229)	Stm. Jet Air Ejector Disch. to Cont. Bldg. (SOV-1429 Controls Cont. Iso. Va. PCV-1229)	None (PCV-1229 closed; Phase A Signal to Close PCV-1229 and PCV-1229 Fails Closed)
SOV-1430 (PCV-1230)	Stm. Jet Air Ejector Disch. to Cont. Bldg. (SOV-1430 Controls Cont. Iso. Va. PCV-1230)	None (PCV-1230 Closed; Phase A Signal to Close) Loss of Power Closes PCV-1230
SOV-1431 (PCV-1231)	Penetration Pressurization Air to Stm. Jet Air Ejector Disch. Line (SOV-1431 Controls PCV-1231)	None (PCV-1231 open; PCV-1231 (SOV-1431) redundant to PCV-1233 (SOV-1433)) Phase A Signal to Open PCV-1231 and PCV-1233).

TABLE 2

DIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #3 , 125V.D.C. DISTRIBUTION PANEL #21

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
SOV-1428 (PCV-1228)	Instrument Air to Containment (SOV Controls Cont. Iso. Va. PCV-1228)	None (Closed, "T" Signal to Close & F.C.)
SOV-1433 (PCV-1233)	Penetration Pressurization Air to Stm. Jet Air Ejector Disch. Line (SOV-1433 Controls PCV-1233)	None (PCV-1233 open; Phase A Signal to Open PCV-1233 & PCV-1231) PCV-1233 F.O. & redundant to PCV-1231
SOV-1132 (PCV-1132)	Stm. Jet Air Ejector Stm. Supply (SOV-1132 Controls PCV-1132)	None (PCV-1132 Fails Open)
SOV-1133 (PCV-1133)	Priming Ejector Stm. Supply (SOV-1133 Controls PCV-1133)	None (PCV-1133 Fails Open)
Cont. Recirc. Fan & Motor	Bearing Vibration Coil Reset Circuit	None

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #5 - 125VDC DIST. PNL #21
(Circuit Protection - 20 Amp.Bkr.)

Note: Final Post LOCA Flood Level 4'-1" above Floor Elevation 46'-0"

Submerged Component	Function	Valve Status		Effect on ECCS Perf/ Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
Valve 212 (A.O.)	Pressurizer Aux. Spray Line Valve (RCS)	Closed	Closed F.C.	None	None	SOV	3'-1-1/2"	23	Indiv. Fused-3a
896A (A.O.)	Accumulator #21 Drain Valve (SIS)	"	"	"	"	L.S.	2'-3"	15	"
896C (A.O.)	Accumulator #23 Drain Valve (SIS)	"	"	"	"	L.S.	2'-3"	15	"

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT NO. 5, 125 V.D.C. DISTRIBUTION PANEL #21

Component	Function	Effect on ECCS Perf./ Plant Safety for Loss of Electrical Power to Component and (Component Status)
Valve 456	Power Operated Pressurizer Relief Valve	None (Closed & F.C.)
516	Pressurizer Relief Tank Vent Valve	None (N.C. & F.C.)
261A	R.C.P. #1 Seal Leak Off Valve	None (N.O. & F.O.)
261C	" " " " " "	None (N.O. & F.O.)
553A	Primary Water to R.C.P. Standpipe	None (N.C. & F.C.)
553C	" " " " "	None (N.C. & F.C.)
215	Excess Letdown Divert Valve to Drain Tank or SWHX	None (Fail to SWHX)
268	V.C.T. Vent Valve	None (N.C. & F.C.)
204A	Charging Line Valve	None (N.O. & F.O.)
LCV-112A	Inlet Valve to V.C.T. (3-way valve)	None (Fail to VCT)
FCV-110A	Flow Control Valve for Reactor Makeup Control System	None (N.C. & F.O.)
FCV-110B	"	None (Closed & F.C.)
FCV-111A	"	None (Closed & F.C.)
FCV-111B	"	None (Closed & F.C.)
890C	Accum. #23 Fill Line Valve	None (Closed & F.C.)
890A	" #21 " " "	None (Closed & F.C.)
839A	S.I.S. Test Line Valve	None (Closed & F.C.)
839B	" " " "	None (Closed & F.C.)

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT NO. 5, 125 V.D.C. DISTRIBUTION PANEL #21

Component	Function	Effect on ECCS Perf./ Plant Safety for Loss of Electrical Power to Component and (Component Status)
839E	S.I.S. Test Line Valve	None (Closed & F.C.)
839F	" " " "	None (Closed & F.C.)
891A	Accum. #21 Vent Valve (Cont.Iso.Va.)	None (Closed & F.C.)
891C	" #23 " " " " "	None (Closed & F.C.)
SOV-1170	Ser.Wtr. from Cont. Fan Coolers; SOV-1170 controls S.W. Bypass Valve TCV-1104	TCV-1104 opens on SI and (fails open); TCV-1104 (SOV-1170) redundant to Va. TCV-1105(SOV-1171)
SOV-1276	Ser.Wtr. from Diesel-Generators; SOV-1276 controls S.W. Bypass Valve FCV-1176	FCV-1176 opens on SI Signal and (Fails Open); FCV-1176 (SOV-1276)re-dundant to Valve FCV-1176A (SOV-1276A)
SOV-1171	Ser.Wtr. from Cont. Fan Coolers; SOV-1171 controls S.W. Bypass Valve TCV-1105	TCV-1105 opens on SI and fails open; TCV-1105 (SOV-1171) redundant to Valve TCV-1104 (SOV-1170)
SOV-1276A	Ser.Wtr. from Diesel Generators; SOV-1276A controls S.W. Bypass Valve FCV-1176A	FCV-1176A opens on SI Signal and fails open; FCV-1176A (SOV-1276A) redundant to valve FCV-1176 (SOV-1276)

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #4 - 125VDC DIST. PNL #22
(Circuit Protection - 20 Amp.Bkr.)

Note: Final Post LOCA Flood Level 4'-1" above Floor Elevation 46'-0"

Submerged Component	Function	Valve Status		Effect on ECCS Perf/ Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
955C (A.O.)	Accumulator #21 Sample Valve (SS)	Closed	Closed F.C.	None	None	L.S.	3'-1"	22	Indiv. Fused-3a
955D (AO)	Accumulator #22 Sample Valve (SS)	"	"	"	"	"	1'-11"	12	"
955E (AO)	Accumulator #23 Sample Valve (SS)	"	"	"	"	"	1'-9"	11	"
955F (AO)	Accumulator #24 Sample Valve (SS)	"	"	"	"	"	1'-11"	12	"

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT # 4, - 125VDC DIST. PNL. #22

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
Valve 951	Pressurizer Sample Line Valve	None (Closed & F.C.)
953	" " "	" " "
955A	R.C. Sample Line Valve	" " "
955B	" " " "	" " "
959	RHRS Loop Sample Line Valve	" " "

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT # 12 - 125V.D.C. DISTRIB. PNL. 22 (Note: Final Post-LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

(Circuit Protection - 20 Amp. Bkr.)

Submerged Component	Function	Valve or Component Status		Effect on ECCS Perf. Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
Valve LCV-1003A (A.O.)	RCDT Level Control Valve to RCDT Pump Suction (WDS)	Open	Closed F.C.	None	None	SOV L.S.	3'-5" 2'-5"	30 16	Individual Fused 3A
Valve LCV-1003B (A.O.)	"	"	"	"	"	"	"	"	"
Valve 1609 (A.O.)	Drain Valve to Cont. Sump from RCDT or PRT (WDS)	Closed	"	"	"	"	3'-5" 2'-5-1/2"	"	"

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #12, 125V.D.C. DISTRIBUTION PANEL 22

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
Valve PCV-1036A	G.D.T. Inlet Valve	None (Fail Closed)
PCV-1036B	G.D.T. Outlet Valve to Gas Analyzer	" " "
PCV-1037A	G.D.T. Inlet Valve	" " "
PCV-1037B	G.D.T. Outlet Valve	" " "
PCV-1038A	G.D.T. Inlet Valve	" " "
PCV-1038B	G.D.T. Outlet Valve	" " "
PCV-1039A	G.D.T. Inlet Valve	" " "
PCV-1039B	G.D.T. Outlet Valve	" " "
Valve SOV-1629	G.D.T. Outlet Valve to HUT Valves	" " "
SOV-1630	G.D.T. Outlet Valve to HUT Valves	" " "
SOV-1631	G.D.T. Outlet Valve to HUT Valves	" " "
SOV-1632	G.D.T. Outlet Valve to HUT Valves	" " "
SOV-1677	W.G.C. Va. to Shutdown G.D.T. Isolation	" " "
RCV-018	Liq. RWS Disch. Valve to River	" " "

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #15 - 125V.D.C. DIST. PNL #22 (Note: Final Post-LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

(Circuit Protection - 20 Amp. Bkr.)

Submerged Component	Function	Valve Status		Effect on ECCS Perf. / Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
Valve 896B (A.O.)	Accumulator #22 Drain Line Valve to RCDT (SIS)	Closed	Closed F.C.	None	None	L.S.	2'-3"	15	Individual fused 3A
Valve 896D (A.O.)	Accumulator #24 Drain Line Valve to RCDT (SIS)	"	"	"	"	"	2'-3"	15	"

INDIAN POINT UNIT NO. 2 TABLE 6

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #15, 125V.D.C. DISTRIBUTION PANEL #22

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
Valve PCV-453C	Power Operated Pressurizer Relief Valve	None (Fail Closed)
553B	Primary Water to R.C.P. Stand Pipe	None (Fail Closed)
553D	Primary Water to R.C.P. Stand Pipe	None (Fail Closed)
261B	R.C.P. #1 Seal Leak Off Valve	None (Open & F.O.)
261D	R.C.P. #1 Seal Leak Off Valve	None (Open & F.O.)
246	R.C.P. #1 Seal Bypass Valve	None (Closed & F.C.)
523	PRT Drain Valve	None (Closed & F.C.)
213	Excess Letdown Line Valve	None (Closed & F.C.)
204B	Charging Line Valve	None (Open & F.O.)
LCV-459	Letdown Line Valve	None (Closed & F.C.)
310	Letdown Divert Flow Valve (DBDM or Bypass)	None (Fail to DBDM)
560	Primary Water to PRT	None (Closed & F.C.)
RCV-017	CCW Surge Tank Vent Valve	None (Fail Closed)
839C	SIS Test Line Valve	None (Closed & F.C.)
839D	SIS Test Line Valve	None (Closed & F.C.)
839G	SIS Test Line Valve	None (Closed & F.C.)
839H	SIS Test Line Valve	None (Closed & F.C.)
TCV-149	Letdown Divert Flow Valve (VCT or Demineralizer	None (Fail to VCT)

INDIAN POINT UNIT NO. 2 TABLE 6

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #15, 125V.D.C. DISTRIBUTION PANEL #22

Component	Function	Effect on RCCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
Valve 890B	Accumulator Fill Line #22	None (Closed & F.C.)
890D	" " " #24	" " "
891B	Accumulator Gas Fill #22	" " "
891D	" " " #24	" " "

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #9 - 125V.D.C. DIST. PNL. 23 (Note: Final Post-LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

(Circuit Protection - 20 Amp. Bkr.)

Submerged Component	Function	Valve Status		Effect on ECCS Perf. Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
Valve 1163 (A.O.)	Cont. Recirc. Fan Condensate Measuring System (WDS)	Open	Open	None	None	SOV L.S.	3'-1" 1'-3"	22 7	20A C.B. 30A Fuse*
Valve 1164 (A.O.)	"	"	"	"	"	"	3'-1" 1'-3"	22 7	"
Valve 1165 (A.O.)	"	"	"	"	"	"	3'-1" 1'-3"	22 7	"
Valve 1166 (A.O.)	"	"	"	"	"	"	3'-1" 1'-3"	22 7	"
Valve 1167 (A.O.)	"	"	"	"	"	"	3'-1" 1'-3"	22 7	"

*Fuse to be installed during present outage

Note: No other components powered from this circuit

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT # 3 - 118V.A.C. INST. BUS #21 (Note: Final Post-LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

(Circuit Protection - 15 Amp. Bkr.)

Submerged Component	Function	Valve or Component Status		Effect on ECCS Perf./ Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
TE-122	Excess Let-down Heat Exchanger Temp. (CVCS)	Energized	Energized	None	None	RTD	1'-11"	12	Individually Fused 3/8A
TE-126	Regenerative Heat Ex-changer Temp. (CVCS)	Energized	Energized	None	None	RTD	2'-1"	14	Individually Fused 3/8A

Note: The external power supply provided for these transmitters limits the maximum current to the milli-amp range even when instrument is immersed or shorted.

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT # 3,- 118VAC INST. BUS #21

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
Racks "A5" and "A6"	CVCS	none
TIC-100	Batch Tank Temp.	"
TIC-149	Non-Regenerative Heat Exchanger Demin. Bypass	"
LT-112	VCT Level	"
FT-110	Boric Acid Blend	"
FM-110	" " "	"
TIC-103	B.A.T. Heater Control	"
TIC-107	" " "	"
CI-1136	Flash Evaporator Distillate	"

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #14, 118V.A.C. INST. BUS #21 (Note: Final Post-LOCA Flood Level 4'-1" above Floor Elev. 46'-0")
(Circuit Protection - 15 Amp. Bkr.)

Submerged Component	Function	Valve Status		Effect on ECCS Perf./ Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
HCV-123	Excess Let-down Heat Exchanger Control Valve (CVCS)	Closed	Closed F.C.	None	None	L.S.	2'-3-1/2"	15	Individual Fused 3/8A

Note: The external power supply provided for this controller limits the maximum current to the milli-amp range even when instrument is immersed or shorted.

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #14, 118V.A.C. INSTRUMENT BUS #21

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
HC-130	Non-Regen. Hx CCW Temperature Control Switch	None
HC-135	Letdown Line Pressure Control Switch	None
HC-104	Boric Acid Tank Recirc. Control Switch	None
HC-105	Boric Acid Tank Recirc. Control Switch	None
HC-142	Charging Line Flow Control Switch	None
HC-123	Excess Letdown Hx Flow Control Switch	None
HC-133	RHRS Alternate Flow to CVCS Control Switch	None

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #15 - 118VAC INST. BUS #22 (Note: Final Post LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

(Circuit Protection - 15 Amp. Bkr.)

Submerged Component	Function	Valve or Component Status		Effect on ECCS Perf. Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt.	Effect	Comp.	Elev. above Floor		
LT-1133	Condensate Collection Sys.-Cont. Fan Coolers (WDS)	Energized	Energized	None	None	Trans-mitter	3'-2"	23	Individual Fused 3/8A
LT-1134	"	"	"	"	"	"	3'-2"	23	"
LT-1135	"	"	"	"	"	"	3'-2"	23	"
LT-1136	"	"	"	"	"	"	3'-2"	23	"
LT-1137	"	"	"	"	"	"	3'-2"	23	"

NOTE: The external power supplies provided for these transmitters limit the maximum current to the milli-amp range even when instrument is immersed or shorted.

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #15, 118 V.A.C. INSTRUMENT BUS #22

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
AR-1102	Cont. Dew Point Measuring System Recorder	None
AR-1102-R	"	None
LC-1210-S	Provides Level Control Signal to LCV-1163 for Fan Cooler, Weir #21	"
LC-1211-S	Provides Level Control Signal to LCV-1164 for Fan Cooler, Weir #22	"
LC-1212-S	Provides Level Control Signal to LCV-1165 for Fan Cooler, Weir #23	"
LC-1213-S	Provides Level Control Signal to LCV-1166 for Fan Cooler, Weir #24	"
LC-1214-S	Provides Level Control Signal to LCV-1167 for Fan Cooler, Weir #25	"

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #16 - 118VAC INST. BUS # 23 (Note: Final Post-LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

(Circuit Protection - 15 Amp. Bkr.)

Submerged Component	Function	Valve or Component Status		Effect on ECCS Perf. Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
TT-1058	RCDT Temp. Transmitter (WDS)	Energized	Energized	None	None	Trans.	1'-6"	9	Individual Fused 1/4A (see note)

Note: The external power supply provided for this transmitter limits the maximum current to the milli-amp range even when instrument is immersed or shorted.

INDIAN POINT UNIT NO. 2

OTHER PLANT COMPONENTS (NON-SUBMERGED) POWERED FROM CIRCUIT #16, 118 V.A.C. INSTRUMENT BUS # 23

Component	Function	Effect on ECCS Performance/ Plant Safety for Loss of Electrical Power to Component & (Component Status)
FT-1126-3	WC&PPS High Flow Zone 3	None
FT-1126-3A	WC&PPS Low Flow Zone 3	None
SOV-1196	Sol. Valve to Bypass Flow Transmitters Zone 3	None
SOV-1213	Sol. Valve to Bypass Low Flow Transmitters Zone 3	None
PC-1203S	Provides Signal to SOV-1203 to Admit N_2 on Low Pressure Zone 3	None
SOV-1203	Sol. Valve to Actuate PCV-1203 to Admit N_2 to System Zone 3	None

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA CONDITIONS

CIRCUIT #3 - 118VAC INST. BUS # 24 (Note: Final Post-LOCA Flood Level 4'-1" above Floor Elev. 46'-0")

(Circuit Protection - 15 Amp. Bkr.)

Submerged Component	Function	Valve or Component Status		Effect on ECCS Perf. Plant Safety during Post-LOCA Period		Components Submerged		Time after SI Condition to Reach Submergence (Minutes)	Electrical Fault Protection
		Normal Plant Operation	Post-LOCA Period	Req'mt	Effect	Comp.	Elev. above Floor		
LT-1003	Reactor Coolant Drain Tank Level Transmitter	Energized	Energized	None	None	J. Box	3'-5½"	30	15a CB and 20A* Fu

NOTE: No other components powered from this circuit.
*To be installed during present refueling outage.

PERFORMANCE REVIEW - SUBMERGED ELECTRICAL COMPONENTS WITHIN CONTAINMENT DURING POST-LOCA

CONDITIONS - ELECTRICAL PENETRATIONS

Penetration	Function	Electrical Status		Effect on ECCS/ Plant Safety - Post LOCA Period		Time after SI to Reach Submergence (Minutes)	Power Source	Electrical Fault Protection
		Normal Plant Operation	Post LOCA Period	Req'mt.	Effects			
H-58 H-59 H-60 H-61	Reactor Control Rod Drive Cables	Energized	De-Energized (Trip on SI or under-voltage)	None	None	16 2'-4"	M.G. Set #21 M.G. Set #22 MCC #29	Reactor Trip Bkrs. De-energiz Penetr[illegible]o
H-63 H-64 H-67 H-68	Pressurizer Heater Cables	"	"	"	"	16	480V Buses 2A, 3A, 5A	800a Ckt. Bkrs.
H-66	Containment Leak Rate Test	De-Energized	De-energized		"	16	—	—
H-70	Containment Lighting Fdrs. Panels 215	Energized	De-energ. (Trip on SI or U.V.)	"	"	16	120/208V Ltg bus	100a C.B.
	221	"		"	"		"	" "
	216	"		"	"		"	" "
	217	"	"	"	"		480V Ltg. Bus	90a C.B.
	218	Deenergized	De-energized	"	"		DC Pwr. Panel #22	40a* C.B. & 60a* fuse
H-69	Feed to MCC #28 (Cont.)	"	"	"	"	16	480V Swgr. #21 Section 16B	350a C.B. & 400a Fuse *

*These disconnecting devices will be installed during the present outage. } { 40a C.B. to be locked open during operation. }

LEGEND

W.D.S.	-	Waste Disposal System
W.C. & P.P.S.	-	Weld Channel and Penetration Pressurization System
SI	-	Safety Injection
CVCS	-	Chemical Volume and Control System
AO	-	Air Operated
FC	-	Fail Closed
LS	-	Limit Switch
SIS	-	Safety Injection System
FW	-	Feed Water
RCDT	-	Reactor Coolant Drain Tank
PRT	-	Pressurizer Relief Tank
IVSWS	-	Isolation Valve Seal Water System
RCS	-	Reactor Coolant System
RWST	-	Refueling Water Storage Tank
CCW	-	Component Cooling Water
FO	-	Fail Open
NC	-	Normally Closed
NO	-	Normally Open
VCT	-	Volume Control Tank
RCP	-	Reactor Coolant Pump
GDT	-	Gas Decay Tank
WGC	-	Waste Gas Compressor
HUT	-	Hold Up Tank
RWS	-	Radioactive Waste System
SS	-	Sampling System

RHRS - Residual Heat Removal System

Phase A Signal - "SI" or "T" - Containment Isolation Signal; "S" Open Valve on SI

Phase B Signal - Containment Spray or "P" Containment Isolation Signal

SWHX - Seal Water Heat Exchanger

XLDHX - Excess Letdown Heat Exchanger

DBDM - Deborating Demineralizer

FAI - Fail As Is

J. Box - Junction Box

SOV - Solenoid Valve

SW - Service Water

ENCLOSURE 3

Indian Point Unit No. 2

ITEM 1 - VALVES 851A&B - CROSSOVER VALVES FOR HIGH HEAD SI PUMPS 21 & 23

A. Question: The Staff inquired whether a single failure in conjunction with a partial loss of offsite power could potentially close both crossover valves and render the high head system incapable of providing flow in both SI lines from a minimum of two SI pumps.

B. Response: Our analysis indicates that no single failure could negate the proper functioning of the safety system.

During an SI coincident with a loss of offsite power, the onsite Diesels 21, 22 & 23 will start and within 10 seconds will be ready to accept safeguard load from their 480V safeguard buses. In the loading sequence, SI pump 21 will start in 14.1 seconds after loss of offsite power (this time includes the 10 seconds for the diesel to come up to speed and close on to the safeguard bus). SI pump 22 will start in 13.3 seconds and SI pump 23 in 13 seconds. The motor operated crossover valves 851A (851B) are normally open and will not close until 17.5 seconds (18.5 seconds) after the associated SI pump motor fails to start.

Closure times of valves 851A and 851B are, therefore, consistent with times required for diesel electrical tie-in. No circuitry changes are necessary to assure against premature closure of these crossover valves.

ITEM 2 - RHR VALVES 730 and 731 AND ASSOCIATED INTERLOCKS

A. Question: The Staff questioned the redundancy of the pressure and valve interlocks.

B. Response: The single pressure channel, PC-403, senses reactor coolant system pressure and opens permissive contacts in the opening circuitry of valves 730 and 731. Opening of either valve is thereby prevented by this permissive pressure interlock whenever the reactor coolant system is at pressure. This design feature serves as a back up to administrative controls which also precludes operation of these valves whenever the Reactor Coolant System is at pressure.

To provide further assurance against malfunction of the pressure interlock, a second independent pressure transmitter will be installed to provide a separate, independent signal to one of the two valves. The existing pressure transmitter will provide its signal to the other valve. This redundant design will assure that malfunction of a pressure interlock will not result in the simultaneous opening of both valves 730 and 731.

We have been advised, however, that the delivery of materials for this modification will require approximately four (4) months. Until this modification can be completed, valves 730 and 731 will be de-energized in the closed position whenever the reactor coolant system (RCS) pressure is above the RHR system design pressure. This precaution will assure that the valves will not be opened whenever high reactor coolant system pressure exists. The de-energizing of valves 730 and 731 in the closed position will, therefore, satisfy the intent of the proposed installation of redundant pressure interlocks.

Valves 730 and 731 are also interlocked with parallel valves 888 A and B (RHRHXs to High Head System Intertie). A potential single failure item has been postulated whereby electrical grounding of these interconnected interlocks would result in the inability to remotely open both valve 888A and 888B. It was determined that this interlock system should be modified to provide a more unitized interlock arrangement. Therefore, valve 730 will be interlocked with valve 888A and valve 731 will be interlocked with valve 888B. Availability of a path for delivery of recirculated fluid to the suction of the high head pumps will, therefore, be assured by this proposed unitization. This modification will be performed during the present refueling outage.

ITEM 3 - SWITCHOVER FROM INJECTION TO RECIRCULATION (8 SWITCH SEQUENCE

A. Question: The Staff inquired whether certain switches, if not properly positioned, could prevent automatic initiation of redundant safety equipment.

B. Response: Three separate forms of switch position indication exist to support the administrative controls which preclude operation of these switches until required under a postulated loss of coolant accident. These are:

1) The position of the switch handles themselves,
2) The single green light ("switch off") and at least three red lights (energized as successive switch functions are completed) associated with each switch, and
3) The "RECIRC. SWITCH OFF NORMAL" audible and visual annunciator alarm provided on panel SB1F.

However to further assure that redundant safeguard functions are not defeated in the unlikely event of a malpositioned switch, we will incorporate changes to these circuits similar to those provided at Indian Point Unit No. 3. In those cases where a single switch affects redundant components, contacts which open upon safety injection actuation will be added in series with the switch or interposing relay contacts. This will defeat the Recirc. Switch Function during the first phase of safety injection operation. Switches and associated functions to be interlocked in this manner are as follows:

Switch 3

"43/RS-3" trip to each RHR pump.

Switch 6

1) "43/RS-6" open signal to valves 888A & B.

2) "43/RS-6" close signal to valves 746 and 747.

Switch 7

"43/RS-7" trip to each SI pump.

These changes will be completed during the present refueling outage.

ITEM 4 - AUTOMATIC TRANSFER CIRCUITS

A. 480V Bus Ties

Question: The Staff questioned whether the 480V A.C. redundant buses might be automatically tied together.

Response: The automatic closing feature associated with 480V safeguard bus tie breakers 2AT5A, 2AT3A & 3AT6A was previously removed. The subject circuit breakers can be closed only by operator action. The existing design does not allow redundant 480 volt safeguard buses to be automatically tied together.

B. Onsite DC Power System

Question: The Staff questioned whether the failure of the DC auto transfer devices could result in cross-connecting the batteries.

Response: There are seven auto transfer circuits for Indian Point 2 safeguard equipment use. (Diesels 21, 22, 23, 480V buses 2A, 3A, 5A and 6A). Cables from redundant DC panels in separately routed cable trays supply the load via the auto transfer device. There is physical cable separation from the redundant DC power sources to the auto transfer devices. There are two circuit interrupting devices between the auto transfer device and the DC bus. Since no single failure in the transfer device could cause the loss of either DC bus, we consider the present design reliable and no circuitry changes are deemed necessary.

ITEM 4 (Continued)

C. 118V AC Instrument Buses

Question: The Staff raised the question that one of the instrument buses is not fed from a diesel-backed MCC. In addition the back up feed for the instrument buses is also from a non-safeguard power supply. The Staff is questioning the installation's capability to perform its safety function.

Response: All safety related components fed from the four 118V AC instrument buses (with the exception of the Containment Spray Pump initiation logic) fail in the safe (trip) direction on loss of power. Therefore, if an SI coincident with loss of off site power and a single failure is postulated the proper function of the safety system is not jeopardized.

Power supplies for the containment spray actuation logic are supplied by safeguards power sources such that minimum requirements for system redundancy as specified in Table 3.3 of the Indian Point Unit No. 2 Technical Specifications are satisifed.

ITEM 5 - DESCRIPTION OF SEPARATION AND REDUNDANCY FOR INSTRUMENT CHANNELS, POWER AND CONTROL CABLES

A. Question: The Staff requested more detail information on separation and redundancy.

B. Response: The Indian Point 2 reactor protection and engineered safety system cable circuits are routed in four instrument channels, three power channels and three control channels to provide and preserve the basic redundancy and independence of systems. In addition, cables are further separated in trays in accordance with voltage level, size and function. Cables assigned to their channels will remain in their respective channels throughout the run. The physical channeling is accomplished by either separate trays or trays with metal barriers and in some cases by separate conduit. In general, redundant circuits are separated horizontally rather than vertically. The separation distances vary from 1", when the separation is maintained by the use of 4" high 16 gauge sheet metal barriers within the tray, to three feet. Where physical conditions prevented horizontal separation, vertical separation was utilized. The vertical channel separation varies from 7-1/2 inches to 19 inches.

The minimum vertical separation of 7-1/2 inches between redundant power trays and between power and control trays is supplemented with a 1/4" transite barrier. There are fire stops and fire barriers of glass wool, ceramic fiber blankets, fiberglass and Flamastic 71A used throughout the plant to provide additional reliability.

For additional information refer to Indian Point FSAR Supplements3 & 12, Volume 5, Questions 7.6 & 7.7.

ITEM 6 - SAFETY INJECTION BLOCK SWITCH

A. Question: The Staff inquired whether the existing single switch may permit bypassing of both redundant safeguards initiation circuits for low pressurizer pressure/low pressurizer level initiation signal.

B. Response: Malpositioning of the Safety Injection Bypass Switch is prevented from defeating either train of Pressurizer Pressure/Level Logic at pressure by automatic bypass removal circuitry (PC455C, PC456C & PC457C) which is designed in accordance with the single failure criteria. However, to preclude effects on both logic trains of low pressurizer pressure/level due to any failure of the common Safety Injection Block Switch, a second independent switch will be provided. Circuitry will be modified so that each switch is only associated with one of the two redundant logic trains. This modification will be performed during the present refueling outage.

ITEM 7 - BYPASS OF REDUNDANT ENGINEERED SAFETY FEATURE LOGIC TRAINS

A. Question: The Regulatory Staff questioned whether the potential exists for bypassing both redundant ESF circuits during testing.

B. Response: Unit No. 2 does not have similar test circuitry to to that provided for Unit No. 3, so this problem is not completely applicable. (Actuation relay continuity at Unit No. 2 is verified by ohmeter rather than the test relay and test light combinations in use at Unit No. 3). Individual logic relay matrices on each train may be bypassed by operation of any of their associated logic relay test switches (function by function bypasses rather than complete train bypass). However, to further support administrative procedures, which preclude operation of logic relay test switches of opposite trains simultaneously, separate annunciation for each train ("safeguards train A in test" and "safeguards train B in test") will be provided during the present refueling outage.

ITEM 8 - LOW HEAD INJECTION LINE FLOW INSTRUMENTATION

A. Question: The Staff inquired whether the single failure of a battery would result in the loss of two of the four low head line flow transmitters (FT-946 A,B,C and D). Since the emergency procedure for a postulated LOCA requires verifying flow in three of the four flow meters during the switchover to recirculation, sufficient information would not be available for the operator to proceed.

B. Response: Indian Point Unit No. 2 Emergency Procedure E-2A presently requires verifying that 3 of the 4 transmitters indicate flows $\geq$ 300 gpm before switching to low head recirculation. The corresponding Indian Point Unit No. 3 emergency procedure was modified during licensing of that unit to allow the operator to proceed based on only 2 flow meters indicating flows $\geq$ 600 gpm through each one. The Staff has indicated that a similar approach for Indian Point Unit No. 2 would be acceptable and, therefore, IP 2 Emergency Procedure E-2A will be modified to reflect this change.

ITEM 9 - DIESEL FUEL OIL TRANSFER PUMPS

A. Question: The Staff inquired whether the fuel transfer pumps are powered from non-safeguard MCC's and may not be available when needed.

B. Response: The diesel fuel oil transfer pumps are fed from MCC 27 and 29. Although both MCC's are automatically disconnected on an SI, the operators have approximately 1 hour as a minimum (nearly 2 hours assuming a full Day Tank) after the SI to restore the power supply to the subject pumps from the CCR. Since there is ample time available for required operator action, no changes to the existing design are deemed necessary.

ITEM 10 - DIESEL FUEL OIL TRANSFER CIRCUITS

A. Question: The Staff questioned whether the failure of the manual sequencing switch could prevent fuel transfer to all three diesel Day Tanks.

B. Response: The operating sequence of the 2Hp fuel transfer pumps is determined by positioning a sequence selector switch. In our opinion, there are great advantages in having the capability to supply fuel from any of the three oil storage tanks to any of the diesel Day Tanks such as the present design provides.

It should also be noted that the Day Tanks have nearly 2 hour fuel supply capacity when full and a minimum of 1 hour supply before the low level alarm alerts the operators in the CCR that a Day Tank is 50% full and the fuel transfer pumps failed to start. Even if there was a selector switch failure, which we feel is extremely unlikely, contacts could be bypassed on an emergency basis in the allotted time.

We believe that the present system flexibility to supply fuel for the diesel Day Tanks is advantageous and reliable. Therefore, no changes to the system design are deemed necessary.

ITEM 11 - VALVES 743 AND 1870: MINIFLOW VALVES FOR RHR PUMPS

A. Question: A postulated single failure involving motor operated valve 743 or 1870 could potentially result in the spurious closure of one of these RHR Pump miniflow valves.

B. Response: To assure that a postulated single failure of valve 743 or 1870 would not cause interruption of RHR pump miniflow, it was determined that these two valves should be locked in the open position with their supplies physically disconnected. Proper safeguards positioning of the two valves would, thereby, be assured.

ENCLOSURE 4

Indian Point Unit No. 2

1. Modification Resulting From Submerged Electrical Study:

   (a) Relocation of valves 856 A,B & D and associated piping.

   (b) Relocation of solenoids for accumulator N_2 fill line isolation valves 891 B & D.

   (c) Relocation of Flow Transmitters FT-925, 926 and 946 B.

   (d) Installation of additional fuses and/or circuit breakers for four circuits powering electrical equipment that could potentially become submerged following a postulated LOCA. These improvements will provide redundant fault protection for the four lines and render them consistent with the other circuits.

2. Ventilation System Modifications:

   (a) PAB Exhaust - installation of carbon filters.

   (b) FSB Exhaust - installation of carbon filters.

   (c) Post Accident Ventilation System - installation of carbon filters.

   (d) Installation of flow instrument in plant vent.

3. Appendix J - 10 CFR 50:

   Performance of Type A,B and C Containment Leak Tests in accordance with Appendix J to 10 CFR 50. In addition, pressure gauges are being installed in both the personnel and equipment airlocks to assure repressurization of the hatch seals following each closure of the airlock doors.

4. Miscellaneous Modifications:

   (a) Installation of feedwater low flow bypass valves.

   (b) Modification to accumulator level transmitters as necessary to comply with new accumulator levels required by the Final Acceptance Criteria (FAC) for ECCS.

(c) Installation of Metal Impact and Loose Parts Monitoring System for the Reactor Coolant System.

(d) Modifications to improve design of Westinghouse BFD relays and W-2 switches.

(e) Installation of Blowdown Tank Vent Iodine Sampling System.

(f) Modifications to correct thermal overstressing of tubing in the sample line containment penetration.