TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

ADS01 GENERIC (A,B) 01011

CAUSE:FAILURE OF TIME DELAY (2E-<4, 2E-<11)

PLT STA:100% POWER/ADS INITIATION SIGNAL PRESENT

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED ADS CHANNEL TIMERS TO FAIL TO TIME OUT AND OPEN THE ADS RELIEF VALVES WHEN AN ADS AUTO INITIATION SIGNAL IS PRESENT. IF ONLY ONE ADS TIMER IS FAILED, NO EFFECTS WILL BE OBSERVED, THE OPERTIONAL CHANNELS ADS TIMER TIMES OUT AFTER 105 SECONDS AND OPENS ALL THE ADS RELIEF VALVES. IF BOTH CHANNELS ARE FAILED, ALL NORMAL ADS SYSTEM INITIATION INDICATIONS WILL BE OBSERVED UNTIL THE 105 SECONDS HAVE ELAPSED, AT WHICH TIME THE ADS RELIEF VALVES WILL NOT OPEN. THE RELIEF VALVES MAY BE OPENED USING THEIR HAND SWITCHES OR CAN OPEN ON HIGH REACTOR PRESSURE, BUT WILL NOT OPEN AUTOMATICALLY (FROM AN ADS SYSTEM AUTO SIGNAL) UNTIL THE MALFUNCTION IS REMOVED. IF THE MALFUNCTION IS INSERTED AFTER THE ADS TIMERS HAVE TIMED OUT, NO EFFECTS WILL BE OBSERVED.

IF A SMALL BREAK LOCA CONDITION EXISTS AND THE HPCI AND RCIC SYSTEMS DO NOT [illegible]TOMATICALLY START WHEN THE MALFUNCTION IS ACT[illegible] THE RATE AT WHICH THE REACTOR IS DEPRESSURIZED COULD BE SIGNIFICANTLY LONGER. THE LOW PRESSURE ECCS SYSTEMS WILL NOT PROVIDE WATER TO THE REACTOR VESSEL UNTIL IT IS DEPRESSURIZED SUFFICIENTLY. THE RATE OF REACTOR PRESSURE AND LEVEL DECREASE WILL BE CONSISTENT WITH MASS AND ENERGY BALANCES ON THE VESSEL.

NO ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE ADS TIMERS TO NORMAL AND OPENS THE ADS RELIEF VALVES AFTER 105 SECONDS IF THE INITIATION SIGNALS AND PERMISSIVES ARE STILL PRESENT.

REFERENCES: M-1-S-54 ADS SYSTEM ELEMENTARY DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
IPN02	THREE MILE ISLAND ACCIDENT (BWR EQUIVALENT)	C012

TYPE:DISCRETE

CAUSE:SIMULTANEOUS ACTIVATION OF MALFUNCTIONS MSS06A/B/C/D, ALL MSIV'S FAIL SHUT; MSS09C, THE C SRV STICKS OPEN; HPC01, HPCI FAILS TO AUTO START AND RCIC02, RCIC FAILS TO AUTO START.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SIMULTANEOUS ACTIVATION OF MALFUNCTIONS MSS06 A/B/C/D. ALL MSIV'S FAIL SHUT; MSS09C, THE C SRV STICKS OPEN; HPC01, HPCI FAILS TO AUTO START AND RCIC02, RCIC FAILS TO AUTO START. THE REACTOR SCRAMS, MAIN TURBINE TRIPS, AND RECIRC PUMPS TRIP AS THE AUX SWITCHGEAR BUSSES FAST TRANSFER TO THE STARTUP SOURCES. REACTOR PRESSURE INCREASES TO THE RELIEF VALVE'S SETPOINT DUE TO DECAY HEAT AND THE RELIEF VALVES OPERATE TO LOWER REACTOR PRESSURE. RELIEF VALVE AO-2-71C REMAINS OPEN AFTER PRESSURE HAS DECREASED TO LESS THAN 1105 PSIG, AND WILL REMAIN OPEN THROUGHOUT THE MALFUNCTION UNLESS PRESSURE DECREASES TO LESS THAN 50 PSIG. REACTOR PRESSURE SLOWLY DECREASES DUE TO FLOW THRU THE STUCK-OPEN RELIEF AND REACTOR WATER LEVEL DECREASES DUE TO THE MASS LOST TO THE SUPPRESSION POOL. WHEN WATER LEVEL DECREASES TO 0 INCHES A GROUP II AND III ISOLATION OCCURS, ISOLATING THE PRIMARY CONTAINMENT AND STARTING THE SBGT SYSTEM. WHEN WATER LEVEL REACHES -48. THE HPCI AND RCIC SYSTEMS RECEIVE AN AUTO START SIGNAL BUT BOTH SYSTEMS FAIL TO START. WHEN REACTOR PRESSURE DECREASES LESS THAN THE DISCHARGE PRESSURE OF THE CONDENSATE PUMPS THEY WILL FILL THE RPV SOLID AND WATER WILL FLOW THROUGH THE SRV TO THE SUPPRESSION POOL. IF REACTOR WATER LEVEL DECREASES TO LESS THAN -150 INCHES PRIOR TO PRESSURE LOWERING BELOW THE CONDENSATE PUMP DISCHARGE PRESSURE, A PCIS GROUP I ISOLATION OCCURS, THE CORE SPRAY AND LPCI SYSTEMS AUTO START, BUT DO NOT INJECT WATER INTO THE CORE UNLESS REACTOR PRESSURE DECREASES LESS THAN 450 PSIG. SEE MALFUNCTIONS HPC01 AND RCIC01 FOR DESCRIPTION/INDICATIONS OF THE FAILURE OF EACH TO AUTO START.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTIONS ARE:

SAFETY RELIEF VALVES OPEN - 205L
MAIN STEAM ISO VALVES NOT FULL OPEN TRIP - 205L

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EDU NO.

REMOVAL OF THE MALFUNCTION REMOVES MALFUNCTIONS HPC01, RCI02, AND MSS0 A/B/C/D.

REF: M-1-S-23 PCIS ELECTRICAL SCHEMATIC DIAGRAM, M-1-S-52 AUTOMATIC BLOWDOWN SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-1-S-54 RPS ELECTRICAL SCHEMATIC DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MS506	REACTOR PRESSURE RELIEF VALVE FAILURE	CD1(

TYPE:GENERIC (A-L) VARIABLE 0-100%

CAUSE:MECHANICAL FAILURE OF RELIEF VALVE PILOT. 100% SEVERITY IS EQUIVALENT TO THE VALVE BEING FULL OPEN.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RPV TO FAIL TO THE INSTRUCTORS SPECIFIED VALUE, 0-100% WHERE 100% IS FULL OPEN. THE RELIEFS ASSOCIATED WITH THIS MALFUNCTION ARE:

A:	AO-2-71A	E:	AO-2-71E	J:	AO-2-71J
B:	AO-2-71B	F:	AO-2-71F	K:	AO-2-71K
C:	AO-2-71C	G:	AO-2-71G	L:	AO-2-71L
D:	AO-2-71D	H:	AO-2-71H		

IF THE RELIEF IS FAILED CLOSED (0%) THEN IT WILL NOT OPEN REGARDLESS OF REACTOR PRESSURE OR IF AN ADS AUTO OPEN SIGNAL IS RECIEVED, OR USING IT'S HAND SWITCH.

IF THE RELIEF IS FAILED OPEN, REACTOR WATER LEVEL INCREASES DUE TO SWELL, THE DECREASES TO A SLIGHTLY LOWER LEVEL THAN NORMAL DUE TO THE FEEDWATER CONTROL SYSTEM SEEING A FEED FLOW/STEAM FLOW MISMATCH. STEAM FLOW IN THE MAIN STEAM LINE THAT THE RELIEF VALVE IS LOCATED ON INDICATES A LOWER STEAM FLOW. REACTOR POWER DECREASES, THEN INCREASES TO A LOWER VALUE THAN BEFORE THE MALFUNCTION WAS INSERTED. REACTOR PRESSURE DECREASES THEN INCREASES WHEN THE CONTROL VALVES CLOSE TO MAINTAIN PRESSURE. GENERATOR OUTPUT DECREASES ABOUT 70 MWE. TORUS TEMPERATURE AND LEVEL, AND RELIEF VALVE DOWNSTREAM TEMPERATURE INCREASES. THE RELIEF VALVE INDICATES OPEN ON THE PPC AND PANEL C03.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

SAFETY RELIEF VALVE OPEN - C205L
BLOWDOWN RELIEF VALVES HIGH TEMPERATURE - C203A4

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE EFFECTED RELIEF TO NORMAL. IF THE RELIEF CLOSES, REACTOR PRESSURE INCREASES AND THE CONTROL VALVES OPEN TO MAINTAIN REACTOR PRESSURE. GENERATOR OUTPUT INCREASES TO MWE.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REACTOR WATER LEVEL DECREASES, THEN INCREASES TO IT'S NORMAL LEVEL. REACTOR POWER INCREASES, THEN DECREASES TO 100%.

REF: M-351 NUCLEAR BOILER P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MSS09	REACTOR PRESSURE RELIEF VALVE STICKS OPEN	C010

TYPE:GENERIC (A-L)

CAUSE:SECONDARY PISTON JAMS AFTER RELIEF VALVE ACTUATION.

PLT STA:N/A

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RPV TO STICK OPEN AFTER ACTUATION AND REMAIN OPEN UNTIL THE MALFUNCTION IS REMOVED.

THE RELIEFS ASSOCIATED WITH THIS MALFUNCTION ARE:

A:	AO-2-71A	E:	AO-2-71E	J:	AO-2-71J
B:	AO-2-71B	F:	AO-2-71F	K:	AO-2-71K
C:	AO-2-71C	G:	AO-2-71G	L:	AO-2-71L
D:	AO-2-71D	H:	AO-2-71H		

THE RELIEF INDICATES OPEN AFTER THE OPEN SIGNAL IS REMOVED (EITHER REACTOR PRESSURE, ADS, OR WITH IT'S HAND SWITCH) ON PANEL C03 AND THE PPC. TORUS TEMPERATURE AND LEVEL CONTINUES TO INCREASES. RELIEF VALVE DOWNSTREAM TEMPERATURE INDICATES THAT THE RELIEF IS OPEN, AND THE PLANT SAFETY RELIEF VALVE OPEN ANNUNCIATOR WILL NOT CLEAR. REACTOR WATER LEVEL REACTS IN ACCORDANCE WITH MASS AND ENERGY BALANCES ON THE REACTOR.

SAFETY RELIEF VALVE OPEN - C205L
BLOWDOWN RELIEF VALVES HIGH TEMPERATURE - C203AA

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE EFFECTED RELIEF TO NORMAL.

REF: M-351 NUCLEAR BOILER P&ID, M-1-JJ-16 SAFETY/RELIEF VALVE MODEL 67F TECHNICAL MANUAL.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

ANN01 CONTROL ROOM ANNUNCIATOR MALFUNCTIONS

TYPE:GENERIC (A-L)

CAUSE:BLOWN FUSE ON POWER SUPPLY TO ANNUNCIATOR

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED GROUP OF ANNUNCIATORS TO DEENERGIZE. ALL ANNUNCIATOR WINDOWS ON THE EFFECTED PANELS WILL EXTINGUISH IF ON. IF THE AUDIBLE ALARM IS SOUNDING BECAUSE OF AN ANNUNCIATOR IN THE AFFECTED GROUP, THE HORN SILENCES.
THE ACK, TEST AND RESET PUSHBUTTONS ARE NOT AFFECTED BY THIS GROUP OF MALFUNCTIONS.
THE ANNUNCIATORS AFFECTED BY THIS MALFUNCTION ARE:

MALF	POWER SUPPLY	PANEL	GROUP AFFECTED
ANN01A	20C254A	2PPA	C225 A C203 A C203 AA C204 C
ANN01B	20C254B	2PPB	C226 B C203 B C203 BB C204 B
ANN01C	20C254C	2PPC	C226 C C236 L C203 C 2B4
ANN01D	20C254D	2PPD	C226 D C236 R C214 C203 D
ANN01E	20C255	2PPC	C206 L,R C207 L,R C208 L,R
ANN01F	20C256	2PPD	C205 LL,L,R,RR

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT			EQU NO.
			C204 L,M,R	
ANN013	2DC253	2PPA	C212 L,R C224 C210 C209 L,R	
ANN01H	2DC253		3DC209 L,R	
ANN01J	E-124-T-B	20859	C201 L,R	
ANN01K	125VDC	20D25 2AD75	C0048X 196 L,R	
ANN01L	1P54-W-C	00B29	CR10	

OF THE ANNUNCIATOR SYSTEM TO NORMAL AND REPLACES THE BLOWN FUSE.

REF: ALL UNIT 2 MAIN CONTROL ROOM ANNUNCIATOR SYSTEM ELECTRICAL SCHEMATIC DIAGRAMS, E-26, E-237.

REV. 4

SUPPLIMENTAL INFORMATION:

THIS PAGE DOCUMENTS WHICH PANELS SUPPLY POWER FOR THE ANNUNCIATOR PUSHBUTTONS AND ALARM HORNS.

BOX	ACK PNL	ACK P/S	TEST & RESET PNL	TEST & RESET P/S	ALARM HORN PNL	ALARM HORN P/S
206 L,R	C007A	2PPD	C007A	2PPC	C008	2PPD
207 L,R	C005A	2PPD				
208 L,R	C012	2PPD				
236 L,R	C007A	2PPD				
205 LL,L	C005A	2PPD	C005A	2PPD	C008	2PPD
205 R,RR	C012	2PPD				
204 L,M,R						
212 L,R	C007A	2PPD				
213	C005A	2PPD				

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

C012 2PPD C012 2PPC C005 2PPD

NOTE: IN ALL OF THE ABOVE GROUPS, ANY ONE OF THE THREE ACK PUSHBUTTONS WILL ACKNOWLEDGE THE ALARMS IN ANY GROUP. THE TEST AND RESET PUSHBUTTONS ONLY APPLY TO THEIR INDICATED GROUP.

	ACK, TEST P/S PNL	RESET P/S P/S	ALARM HORN PNL	ALARM HORN P/S
214 226 A,B,C,D	C026B	2PPA	C005	2PPD
209 L,R 224 309 L,R	C024	2PPA	C024	2PPA
203 A,B,C,D 203 AA,BB 204 B,C	C03	2PPA	C03	2PPA
284	C03	2PPC	C03	2PPA
201 L,R	C007A	E-124-T-B	C08B	2PPD
196 L,R	231	2A025	231	2PPA
C810	230	1PS4-N-C	230	N/A
48X	C0048X	ED:ACS	C0048X	NOTE

NOTE: ALARM P/S = 2PPA .AND. ACS BKR 23.

REV 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

ANN02 NOT IN MASTER FILE

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

ANN03 CRY WOLF ANNUNCIATOR ALARM OR DEFEAT

TYPE:GENERIC

CAUSE:INSTRUCTOR INICIATED

PLT STA:100% POWER

EFFECTS:THIS PSUEDO MALFUNCTION IS INITIATED BY THE INSTRUCTOR VIA THE INSTRUCTOR STATION'S CRT. THE INSTRUCTOR HAS THE ABILITY TO CAUSE ANY SINGLE OR MULTIPLE ANNUNCIATORS TO ALARM SPURIOUSLY. SIMILARLY, THE INSTRUCTOR CAN CAUSE ANY SINGLE OR MULTIPLE ANNUNCIATORS TO BE DEFEATED. THAT IS, WHEN THE CONDITIONS IN A SIMULATED SYSTEM WARRANTS AN ALARM TO BE ANNUNCIATED, THERE IS NO AUDIBLE NOR VISUAL ALARM IN THE CONTROL ROOM AS LONG AS THAT SPECIFIC ANNUNCIATOR IS DEFEATED.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	ERU NO.
CSS01	CORE SPRAY PUMP TRIP	07010

TYPE:GENERIC (A-D)

CAUSE:CORE SPRAY PUMP MOTOR FAULT CAUSES ACTUATION OF INSTANTANEOUS OVERCURRENT TRIP (1503).

PLT STA:CORE SPRAY SYSTEM IN OPERATION

EFFECTS:THIS MALFUNCTION CAUSES A SHORT TO DEVELOP IN THE INSTRUCTOR SPECIFIED CORE SPRAY PUMP. IF THE PUMP IS STARTED OR IS RUNNING, THIS SHORT CAUSES THE PUMP TO TRIP ON OVERCURRENT. CORE SPRAY PUMP AMPS SPIKE SHARPLY UPWARD, THE CORE SPRAY PUMP BREAKER TRIPS, AND AMPS GO TO 0. LOOP A/B FLOW DECREASES AND A/C OR B/D PUMP'S COMBINED DISCHARGE PRESSURE DECREASES. IF THE EFFECTED CORE SPRAY PUMP IS RESTARTED WHILE THE MALFUNCTION IS STILL ACTIVE, THE PUMP AMPS AGAIN SPIKE SHARPLY UPWARD AND THE PUMP TRIPS AS BEFORE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:
A-D CORE SPRAY PUMP TRIP C203A/B/C/D

REMOVAL OF THIS MALFUNCTION ALLOWS THE OPERATOR TO RESTART THE EFFECTED CORE SPRAY PUMP OPERATION TO NORMAL.

REFERENCED: E-183 CORE SPRAY PUMP 4.16 KV BREAKER ELECTRICAL SCHEMATIC DIAGRAM, M-362 CORE SPRAY SYSTEM P&ID, M-1-DD-7 CORE SPRAY SYSTEM PROCESS DIAGRAM, M-1-JJ-21 CORE SPRAY PUMP MOTOR GEK.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CSS02	CORE SPRAY INJECTION VALVE FAILS TO OPEN	C003

TYPE:GENERIC (A-B)

CAUSE:CORE SPRAY MOTOR OPERATED VALVE MO-12A/B STEM BINDS IN CLOSED POSITION.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED CORE SPRAY OUTBOARD INJECTION VALVES TO BIND SHUT. THE SELECTED VALVE WILL NOT OPEN ON AN AUTO OPEN SIGNAL OR BY OPERATING IT'S HAND SWITCH. THE LOOP A/B FLOW REMAINS AT 0 AND THE PUMP A/C OR B/D MINIMUM FLOW VALVES REMAIN OPEN. IF THE VALVE IS OPEN WHEN THE MALFUNCTION IS INSERTED, NO EFFECTS WILL BE OBSERVED. THE VALVE MUST BE FULLY SHUT BEFORE IT WILL BIND.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

SYSTEM I CORE SPRAY INJECTION VALVES OVERCURRENT	C203A
SYSTEM II CORE SPRAY INJECTION VALVES OVERCURRENT	C203D

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE EFFECTED CORE SPRAY INJECTION VALVE AND BREAKER TO NORMAL OPERATION.

REFERENCES: M-362 CORE SPRAY SYSTEM P&ID, M-1-S-40 CORE SPRAY SYSTEM ELEMENTARY DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RWC01	RWCU PUMP TRIP	01030

TYPE:GENERIC (A-C)

CAUSE:CONTACTS 3-3C OF PUMP MOTOR CONTROL SWITCH FAIL OPEN

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED RWCU PUMP TO TRIP. REGENERATIVE HEAT EXCHANGER INLET PRESSURE DECREASES, THE CLEANUP FILTER/DEMIN SYSTEM TROUBLE ANNUNCIATOR ACTUATES, FILTER DEMIN FLOW DECREASES, CLEANUP TEMPERATURES DECREASE, AND RBCCW TEMPERATURE DECREASES. CLEANUP INLET AND OUTLET CONDUCTIVITIES WILL EVENTUALLY INCREASE SLOWLY DUE TO THE NO FLOW CONDITION, AND REACTOR FEEDWATER CONDUCTIVITY SLOWLY INCREASES, THE RATE OF INCREASE DEPENDANT UPON THE AMOUNT OF TIME THE CLEANUP SYSTEM IS NOT IN OPERATION. IF THE RWCU PUMP IS RESTARTED, IT WILL TRIP AGAIN WHEN ITS HAND SWITCH IS TAKEN FROM START TO ITS MID POSITION.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:
CLEANUP FILTER/DEMIN SYSTEM TROUBLE 204R

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE CONTACTS IN THE RWCU PUMP MOTOR HAND SWITCH TO NORMAL AND ALLOW THE PUMP TO BE RESTARTED. A REMOTE FUNCTION FOR THE PUMP LOW FLOW ANNUNCIATOR MUST BE USED TO RESET THE ANNUNCIATOR.

REF: E-36B RWCU PUMP ELECTRICAL SCHEMATIC DIAGRAM, M-354 RWCU SYSTEM P&ID, M-355 RWCU FILTER DEMIN SYSTEM P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RWC02	RWCU NONREGENERATIVE HEAT EXCHANGER LEAK	01120

TYPE:GENERIC (A,B), VARIABLE 0-100%

CAUSE:TUBE LEAK IN RWCU NRHX. 100% SEVERITY IS EQUIVALENT TO A 100 GPM LEAK AT NORMAL OPERATING PRESSURE OF THE RWCU AND THE RBCCW SYSTEMS.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED RWCU NRHX TO LEAK INTO THE RBCCW SYSTEM AT 100 GPM AT NORMAL OPERATING PRESSURE OF THE RWCU AND RBCCW SYSTEMS AND 100% SEVERITY SELECTED. AT 100% SEVERITY THE RUNNING RWCU PUMP(S) HIGH/LOW FLOW ALARM ANNUNCIATES. RBCCW HEAD TANK LEVEL INCREASES AND OVERFLOWS TO THE REACTOR BUILDING FLOOR DRAIN PUMP. RBCCW TEMPERATURE AND PROCESS RADIATION MONITOR INDICATION INCREASES. RWCU TEMPERATURES INCREASE AS RBCCW TEMPERATURE INCREASES. THE STANDBY NRHX MAY BE PLACED IN SERVICE USING A REMOTE FUNCTION TO MITIGATE THE EFFECTS OF THE MALFUNCTION.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

REACT BLDG COOLING WATER HEADER TANK HI-LO LEVEL - C212
REACT BLDG COOLING WATER HI RADIATION - C210
CLEANUP RECIRC PUMP HIGH OR LOW FLOW - 204P

REMOVAL OF THIS MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-354 RWCU SYSTEM P&ID, M-316 REACTOR BLDG COOLING WATER SYSTEM P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RWC03 RWCU FILTER DEMIN CLOGGING 01067

TYPE:GENERIC (A-B)

CAUSE:FILTER RESIN CLOGGED

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED RWCU FILTER DEMIN D/P TO INCREASE TO 35 PSID IN 2 MINUTES. WHEN FILTER D/P REACHES 35 PSID, THE AFFECTED FILTER DEMIN'S OUTLET CONTROL VALVE (AO-12-4-16) SHUTS. REGENERATIVE HEAT EXCHANGER INLET PRESSURE INCREASES TO THE SHUTOFF HEAD OF THE RWCU PUMP AND FILTER DEMIN A/P FLOW DECREASES TO 0. 12 SECONDS LATER, THE RUNNING RWCU PUMPS TRIP DUE TO LOW SYSTEM FLOW. THE STANDBY FILTER DEMIN MAY BE PLACED IN SERVICE USING A REMOTE FUNCTION TO MITIGATE THE EFFECTS OF THE MALFUNCTION.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

CLEANUP FILTER DEMIN SYSTEM TROUBLE - C204
A CLEANUP RECIRC PUMP HI/LO FLOW - C204
B CLEANUP RECIRC PUMP HI/LO FLOW - C204
C CLEANUP RECIRC PUMP HI/LO FLOW - C204

REMOVAL OF THIS MALFUNCTION WILL ALLOW THE DEMIN TO BE REGENERATED USING A REMOTE FUNCTION.

REF: M-354 RWCU SYSTEM P&ID, M-355 CLEANUP FILTER AND DEMINERALIZER SYSTEM P&ID.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RWC04	RWCU RESIN DEPLETION	03050

TYPE:GENERIC (A-B), VARIABLE 0-100%

CAUSE:DEPLETION OF RWCU RESIN. 100% SEVERITY IS EQUIVALENT TO A COMPLETE LOSS OF ION EXCHANGE EFFICIENCY, OR EFFLUENT CONDUCTIVITY IS EQUAL TO INFL NT CONDUCTIVITY AT 100% SEVERITY.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED RWCU FILTER DEMIN RESIN TO BE EXHAUSTED. AT 100% SEVERITY, OUTLET CONDUCTIVITY INCREASES TO THE VALUE OF INLET CONDUCTIVITY, THEN BOTH INLET AND OUTLET CONDUCTIVITIES INCREASE AT A RATE CONSISTENT WITH FEED SYSTEM CONDUCTIVITY. AT .1 MICROMHO OUTLET CONDUCTIVITY, THE OUTLET HIGH CONDUCTIVITY ANNUNCIATOR ACTUATES. THE STANDBY FILTER DEMIN MAY BE PLACED IN SERVICE USING A REMOTE FUNCTION TO MITIGATE THE EFFECTS OF THE MALFUNCTION.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

CLEANUP FILTER/DEMIN INLET/OUTLET HI CONDUCTIVITY - C204

REMOVAL OF THIS MALFUNCTION WILL ALLOW THE DEMIN TO BE REGENERATED USING A REMOTE FUNCTION.

REF: M-354 RWCU SYSTEM P&ID, M-355 CLEANUP FILTER AND DEMINERALIZER SYSTEM P&ID.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RWC05	RWCU DRAIN FLOW CONTROL VALVE FAILURE	01090

TYPE:DISCRETE, VARIABLE 0-100%

CAUSE:E/P CONVERTER FAILURE IN MANUAL CONTROL CIRCUIT OF CV-55. 100% SEVERITY IS EQUIVALENT TO THE VALVE FAILING 100% OPEN.

PLT STA:PLANT STARTUP

EFFECTS:THIS MALFUNCTION CAUSES THE DRAIN FLOW CONTROL VALVE TO FAIL TO THE INSTRUCTORS SPECIFIED VALUE 0-100%, WHERE 100% IS FULL OPEN.

IF THE FLOW CONTROL VALVE IS FAILED OPEN, REACTOR WATER LEVEL AND RHX INLET PRESSURE DECREASES, DUMP FLOW, FILTER FLOW, AND RWCU TEMPERATURES INCREASE. IF NRHX OUTLET TEMPERATURE REACHES 200 DEGREES, THE RWCU SYSTEM ISOLATES. IF RWCU FLOW INCREASES TO GREATER THAN 210 GPM, THE RWCU PUMP TRIPS DUE TO HIGH FLOW. IF DRAIN HEADER PRESSURE REACHES 140 PSIG, THE FLOW CONTROL VALVE AUTO CLOSES, STOPPING DRAIN FLOW.

IF THE FLOW CONTROL VALVE IS FAILED CLOSED, REACTOR WATER LEVEL AND RHX INLET PRESSURE INCREASES, DUMP FLOW, FILTER FLOW, AND RWCU TEMPERATURES DECREASE. IF RWCU FLOW DECREASES TO LESS THAN 60 GPM, THE RWCU PUMP TRIPS DUE TO LOW FLOW. OPERATION OF THE C04 CONTROLLER FOR CV-55 WILL HAVE NO EFFECT.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

REACTOR HI/LO WATER LEVEL - C205
CLEANUP NRHX OUTLET HIGH TEMPERATURE - C204
A CLEANUP RECIRC PUMP HI/LO FLOW - C204
B CLEANUP RECIRC PUMP HI/LO FLOW - C204
C CLEANUP RECIRC PUMP HI/LO FLOW - C204
CLEANUP DRAIN HEADER HI-LO PRESSURE - C204

REMOVAL OF THIS MALFUNCTION WILL RESTORES THE OPERATION OF THE DRAIN FLOW CONTROLLER TO NORMAL.

REF: M-354 RWCU SYSTEM P&ID, M-355 CLEANUP FILTER AND DEMINERALIZER SYSTEM P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RWC06 RWCU INLET PIPING RUPTURE 01120

TYPE:DISCRETE, VARIABLE 0-100%

CAUSE:WELD UPSTREAM OF MO-18 BREAKS. 100% SEVERITY IS EQUIVALENT TO A COMPLETE GUILLOTINE RUPTURE OF THE 6" RWCU PIPING.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES THE RWCU SUCTION PIPING TO LEAK AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS A COMPLETE GUILLOTINE RUPTURE. RWCU ROOM TEMPERATURE INCREASES AND CAUSES THE PLANT ANNUNCIATOR TO ACTUATE WHEN TEMPERATURE REACHES 120 DEGREES. IF THE RWCU TOTAL SUCTION LINE FLOW RATE REACHES 300% OF ITS NORMAL VALUE, THE TWCU SYSTEM ISOLATES AND STOPS THE LEAK. RWCU SYSTEM PRESSURE REMAINS CONSTANT AFTER THE LEAK IS ISOLATED DUE TO MO-18 AUTO CLOSING. THE VENTILLATION RADIATION MONITOR AND THE REACTOR BLDG SUMP AREA RAD MONITOR LEVELS INCREASE. THE REACTOR BLDG FLOOR DRAIN SUMP FLOW INCREASES AS THE RWCU LEAKAGE CONDENSES AND DRAINS TO THE REACTOR BLDG FLOOR DRAIN SUMP.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

CLEANUP RECIRC PUMP SUCTION LINE BREAK - C204
GROUP II AND III OUTBOARD ISOL RELAYS NOT RESET - C204
HIGH AREA TEMP - C205

REMOVAL OF THIS MALFUNCTION WILL REQUIRE REINITIALIZATION OF THE TRAINER.

REF: M-354 RWCU SYSTEM P&ID, M-1-S23 PCIS SYSTEM ELEMENTARY DIAGRAM, M-334 VENTILLATION RADIATION MONITOR SYSTEM P&ID, FSAR VOL.5 SECTION 12.1 FIG. 12.1.4 GENERAL ARRANGEMENT PLAN.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
DGA01	DIESEL GENERATOR FAILS TO START	02060

TYPE:GENERIC (A-D)

CAUSE:DEAD BUS START RELAYS DB-1 AND DB-2 FAIL TO ENERGIZE IN THE SELECTED DIESEL GENERATOR START CIRCUIT.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE DEAD BUS START RELAYS DB-1 AND DB-2 TO FAIL IN THE DEENERGIZED POSITION. IF AN AUTOMATIC START SIGNAL IS RECEIVED WHILE THIS MALFUNCTION IS ACTIVE, THE SELECTED DIESEL GENERATOR DOES NOT START. IF THE DIESEL GENERATOR IS ALREADY RUNNING WHEN THIS MALFUNCTION IS ACTIVATED, NO EFFECTS WILL BE SEEN. THE DG MAY BE MANUALLY STARTED (EXCEPT QUICK START), AND WILL NOT NOT START ON A LOCA SIGNAL.

ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE AS FOLLOWS:

E1 DIESEL GEN TROUBLE - C226A
E2 DIESEL GEN TROUBLE - C226B
E3 DIESEL GEN TROUBLE - C226C
E4 DIESEL GEN TROUBLE - C226D

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF DB-1 AND DB-2 TO NORMAL, AND ALLOWS THE DEISEL TO START IF IT'S LOCKOUTS ARE RESET.

REF: E-6-7-33 SH.1 STANDBY DEISEL GENERATORS ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
DGA02	DIESEL GENERATOR BREAKER AUTO CLOSE FAILURE	02110

TYPE:GENERIC (A-D)

CAUSE:TIMER CONTACT (ERR RELAY CONTACT 62-63) IN BREAKER AUTO CLOSE CIRCUIT FAILS TO CLOSE.

PLT STA:LOSS OF POWER TO EMERGENCY BUSSES

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED DIESEL GENERATOR OUTPUT BREAKER TO FAIL TO AUTO CLOSE. ON A LOSS OF POWER TO AN EMERGENCY BUS (E12/E22/E23/E24) THE AFFECTED DIESEL WILL AUTO START BUT IT'S OUTPUT BREAKER WILL NOT AUTO CLOSE. THE BREAKER MAY BE CLOSED USING IT'S HAND SWITCH, RESTORING POWER TO IT'S BUS. IF THE OUTPUT BREAKER IS CLOSED WHEN THE MALFUNCTION IS INSERTED NO EFFECTS WILL BE OBSERVED.

ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE AS FOLLOWS:

E1/2/3/4 DIESEL RUNNING - 226A/B/C/D
E12 BUS UNDERVOLTAGE - 226A
E22 BUS UNDERVOLTAGE - 226B
E32 BUS UNDERVOLTAGE - 226C
E42 BUS UNDERVOLTAGE - 226D

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE TIMER CONTACT TO NORMAL AND ALLOWS THE AFFECTED DIESEL OUTPUT BREAKER TO AUTO CLOSE IF POWER IS STILL LOST TO IT'S BUS.

REF: E-5-7-33 SH.1 STANDBY DIESEL GENERATORS ELECTRICAL SCHEMATIC DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
DGA03	DIESEL GENERATOR TRIP	02100

TYPE:GENERIC (A-D)

CAUSE:SPURRIOUS TRIP OF LOCKOUT RELAY 86DG (A3/B3/C3)

PLT STA:DIESEL GENERATOR OPERATING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED DG LOCKOUT RELAY ON PANEL C29A (B/C/D) TO TRIP. IF THE DIESEL IS SUPPLYING LOADS, THE AFFECTED LOADS DEENERGIZE AND THE PLANT REACTS DYNAMICALLY TO THE LOSS OF POWER. DIESEL AMPS, VOLTS, WATTS, AND VARS DECREASE TO 0. THE BUSSES BEING SUPPLIED BY THE DIESEL DEENERGIZE WITH THEIR BUS VOLTAGES AND AMPS DECREASING TO 0, AND THEIR RESPECTIVE BUS LOW VOLTAGE ANNUNCIATORS ACTUATING. IF THE DIESEL IS STOPPED WHEN THE MALFUNCTION IS INSERTED, THE LOCKOUT ON PANEL C29A/B/C/D WILL TRIP AND THE DIESEL WILL NOT START.

ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE AS FOLLOWS:

E1 DIESEL GENERATOR DIFFERENTIAL AND GROUND - C226A
E2 DIESEL GENERATOR DIFFERENTIAL AND GROUND - C226B
E3 DIESEL GENERATOR DIFFERENTIAL AND GROUND - C226C
E4 DIESEL GENERATOR DIFFERENTIAL AND GROUND - C226D

REMOVAL OF THE MALFUNCTION ALLOWS THE OPERATOR TO RESET THE DG LOCKOUT ON PANEL C29A (B/C/D) AND RESTART THE DIESEL.

REF: E-5-7-33 SH.1 STANDBY DIESEL GENERATORS ELECTRICAL SCHEMATIC DIAGRAM, E-193 SH.1 DIESEL GENERATOR 4.16KV CKT. BKR. ELECTRICAL SCHEMATIC DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

DCD01 250 VDC DISTRIBUTION PANEL FAULT 07050

TYPE:GENERIC (A-E)

CAUSE:SHORT IN DISTRIBUTION PANEL CAUSES SUPPLY FUSES TO OPEN

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED 250 VDC DISTRIBUTION PANEL TO DEVELOP A DIRECT SHORT TO GROUND WHICH CAUSES THE SUPPLY FUSES TO OPEN. THE MALFUNCTIONS ARE DESIGNATED AS FOLLOWS:

DCD01A - 20D12
DCD01B - 20D11
DCD01C - 20D07
DCD01D - 20D08
DCD01E - 20D05

THE SYSTEMS WIT LOADS POWERED FROM THESE DC DISTRIBUTION PANELS WILL RESPOND DYNAMICALLY TO THE LOSS OF POWER.

ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

2DA RCIC 250 VDC BUS LO VOLTAGE - 205LL
2DC MISC 250 VDC BUS LO VOLTAGE - 205LL
2DD MISC 250 VDC BUS LO VOLTAGE - 20C20PR
2DE HPCI 250 VDC BUS LO VOLTAGE - 20C20QR
EMER BRG OIL PUMP DC POWER LOSS - C20BL

REMOVAL OF THE MALFUNCTION WILL CORRECT THE SHORT CIRCUIT AND REPLACE THE FUSES TO ENERGIZE THE EFFECTED DC DISTRIBUTION PANEL .

REF: E-2a 125/250 VDC SYSTEM UNIT 2.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

DCD02 125 VDC DISTRIBUTION PANEL FAULT 07030

TYPE:GENERIC (A-D)

CAUSE:SHORT IN DISTRIBUTION PANEL CAUSES SUPPLY FUSES TO OPEN

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED 125 VDC DISTRIBUTION PANEL TO DEVELOP A DIRECT SHORT TO GROUND WHICH IN TURN CAUSES THE SUPPLY FUSES TO OPEN. THIS DISTRIBUTION PANELS EFFECTED BY THIS MALFUNCTION ARE:

DCD02A - 2PPA
DCD02B - 2PPB
DCD02C - 2PPC
DCD02D - 2PPD

THE SYSTEMS EFFECTED BY THIS MALFUNCTION WILL REACT DYNAMICALLY TO THE LOSS OF POWER.

THE FOLLOWING ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION:

2B DC POWER PANEL LO VOLTAGE - 20C209B
2D DC POWER PANEL LO VOLTAGE - 20C209D
2A DC POWER PANEL LO VOLTAGE - 205LL
2C DC POWER PANEL LO VOLTAGE - 205LL

REMOVAL OF THIS MALFUNCTION WILL CORRECT THE SHORT CIRCUIT, REPLACE THE BLOWN FUSES AND REENERGIZES THE EFFECTED DC DISTRIBUTION PANEL.

REF: E-26 125/250 VDC SYSTEM UNIT 2.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
DCD03	24 VDC DISTRIBUTION PANEL FAULT	07070

TYPE:GENERIC (A/B)

CAUSE:SHORT IN DISTRIBUTION PANEL CAUSES SUPPLY FUSES TO OPEN

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED 24 VDC DISTRIBUTION PANEL TO DEVELOP A DIRECT SHORT TO GROUND AND BLOW THE SUPPLY FUSE. THE DISTRIBUTION PANELS EFFECTED BY THIS MALFUNCTION ARE:

DCD03A - BUS 2E
DCD03B - BUS 2F

THE SYSTEMS WITH LOADS POWERED BY BUSSES AFFFECTED BY THIS MALFUNCTION REACT DYNAMICALLY TO THE LOSS OF POWER.

ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE AS FOLLOWS:

24/48 VOLT BUS 2E-2G TROUBLE 2A-2C - C205L
24/48 VOLT BUS 2F-2H TROUBLE 2B-2D - C205L

REMOVAL OF THE MALFUNCTION WILL CORRECT THE SHORT CIRCUIT AND REPLACE THE FUSE TO REENERGIZE THE EFFECTED 24 VDC BUS.

REF: E-24 SINGLE LINE DIAGRAM 24 VDC POWER SYSTEM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

IPM01 LOSS OF ALL AC POWER 02010

TYPE:DISCRETE

CAUSE:SIMULTANEOUS ACTIVATION OF MALFUNCTION MAP02, DGA01 - ALL REDUNDANCIES.

PLT STA:N/A

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A COMPLETE LOSS OF AC POWER. THE REACTOR SCRAMS AND ALL AC POWERED LOADS DEENERGIZE. PCIS ISOLATIONS OCCUR CLOSING THE MSIV'S APPROPRIATE GROUP I, II, AND II VALVES. REACTOR PRESSURE INCREASES TO THE RELIEF VALVE'S SETPOINTS AND THE RELIEF VALVES OPERATE TO LOWER PRESSURE. REACTOR WATER LEVEL DECREASES TO -48 INCHES DUE TO MASS LOST TO THE SUPPRESSION POOL FROM RELIEF VALVE ACTUATION AND THE HPCI AND RCIC SYSTEMS OPERATE TO RAISE WATER LEVEL TO 45 INCHES. THE HPCI AND RCIC TURBINES TRIP WITH THE ABOVE CYCLE REPEATING ITSELF. THE ANNUNCIATOR SYSTEM AND ALL DC POWERED EQUIPMENT REMAIN OPERATIONAL AS WELL AS THE LOADS POWERED FROM THE UNINTERRUPTABLE AC POWER. THE RFPT, MAIN, AND RECIRC PUMP'S DC LUBE OIL PUMPS START AND SUPPLY LUBE OIL TO THEIR RESPECTIVE COMPONENTS. ALL PLANT SYSTEMS REACT DYNAMICALLY TO THE LOSS OF POWER.

THE APPROPRIATE PLANT ANNUNCIATORS ACTUATE.

REMOVAL OF THE MALFUNCTION REQUIRES RE-INITIALIZATION OF THE TRAINER.

REF: E-1 SINGLE LINE STATION DIAGRAM, E-2a 125/150 VDC SYSTEM UNIT 2, E-2a 24 VDC SYSTEM UNIT 2.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

MAP01 MAIN TRANSFORMER COOLING LOSS 03090

TYPE:DISCRETE

CAUSE:FAILURE OF RELAY #4 (MASTER CONTACTOR) IN TRANSFORMER OIL PUMP AND COOLING FAN CONTROL CIRCUIT

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE MAIN TRANSFORMER COOLING FANS AND OIL PUMP TO STOP. MAIN TRANSFORMER TEMPERATURES INCREASE AS INDICATED ON THE PPC POINTS GOU2, GOO3, GOO4, GOO5, GO14, GO15 AND TRANSFORMER EFFICIENCY DECREASE AS INDICATED, GENERATOR KVAR INCREASING, AND GENERATOR AMPS INCREASING. AFTER APPROXIMATELY 10 MINUTES AT FULL LOAD, THE MAIN TRANSFORMER DEVELOPS A SHORT TO GROUND CAUSING THE MAIN TRANSFORMER GROUND OVERCURRENT RELAY (551G ON PANEL C22B) TO TRIP AND INITIATES A MAIN GENERATOR LOCKOUT (386G). THE EXCITOR FIELD BREAKER TRIPS, UNIT AUX SWGR MAIN CKT BREAKER'S TRIP, AND A MAIN TURBINE MASTER TRIP RELAY LOCKOUT OCCURS CAUSING A MAIN TURBINE TRIP. THE AUX BUSSES FAST TRANSFER, THE RECIRC PUMPS TRIP, THE MAIN TURBINE TRIPS, AND THE REACTOR SCRAMS. THE AMOUNT OF TIME IT TAKES FOR THE TRANSFORMER TO DEVELOP A SHORT WILL BE A FUNCTION OF THE LOAD ON THE MAIN TRANSFORMER.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

2 GENERATOR TRANS BACKUP RELAYS - D09

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF RELAY #4 (MASTER CONTRACTOR) IN TRANSFORMER OIL PUMP AND COOLING FAN CONTROL CIRCUIT TO NORMAL.

REF: E-4 SINGLE LINE METER AND RELAYING DIAGRAM UNIT 2,
E-41 MAIN TRANSFORMER ELECTRICAL SCHEMATIC DIAGRAM,
E-92 TURBINE GENERATOR AND TRANSFORMER RELAYING ELECTRICAL SCHEMATIC DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

MAP02 LOSS OF OFF-SITE POWER SOURCES 02010

TYPE:GENERIC (A-E)

CAUSE:ELECTRICAL STORM DAMAGES SWTICHYARD AND CAUSES SELECTED BREAKER TO TRIP ON OVERCURRENT

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED BREAKER TO TRIP ON ACTUATION OF ITS OVERCURRENT TRIP DEVICE. THE FOLLOWING BREAKERS ARE ASSOCIATED WITH THIS MALFUNCTION: A:SU-25, B:SU-35, C:SU-215, D:SU-225, E:SU-3435. BUS FAST TRANSFERS MAY OCCUR, AND THE DIESEL GENERATORS MAY START, DEPENDING UPON THE ELECTRICAL DISTRIBUTION SYSTEM CONFIGURATION AT THE TIME THE MALFUNCTION IS INSERTED AND THE POWER SUPPLIES LOST. THE BUSSES/LOADS AFFECTED BY THIS MALFUNCTION WILL REACT DYNAMICALLY TO THE LOSS OF POWER. THE FOLLOWING ALARMS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION:

ALARM	PANEL
SU-25 BKR TROUBLE	C224
SOUTH 500 KV SUBSTATION GENERAL ALARM	C224
NORTH 220 KV SUBSTATION GENERAL ALARM	C224
SU-35 BKR TROUBLE	C224

REMOVAL OF THIS MALFUNCTION ALLOWS THE BREAKER LOCKOUT TO BE RESET AND THE BREAKER RESHUT AFTER THE RESPECTIVE BREAKER INTERLOCKS ARE MET.

REF: E-1 STATION ELECTRICAL SINGLE LINE DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MAP03	500 KV CONTROL AIR FAILURE	02110

TYPE:GENERIC (A-B)

CAUSE:AIR LINE TO 500 KV BREAKER RUPTURED

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A LOSS OF CONTROL AIR TO THE INSTRUCTOR SPECIFIED 500 KV BREAKER. THE BREAKERS ASSOCIATED WITH THIS MALFUNCTION ARE: A:225, B:215. THE LOSS OF AIR FAILS THE 500 KV BREAKERS OPEN. THE OPERATOR WILL NOT BE ABLE TO OPERATE THE BREAKERS UNTIL THE MALFUNCTION IS REMOVED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

SOUTH 500KV SUBSTATION GENERAL TROUBLE - 224
215 BREAKER TRIP - 209
225 BREAKER TRIP - 209

REMOVAL OF THIS MALFUNCTION RETURNS CONTROL AIR TO THE EFFECTED 500 KV BREAKER.

REF: E-1

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MAP04	13.2 KV BUS FAULT	02030

TYPE:GENERIC (A,B)

CAUSE:SHORT BETWEEN EFFECTED BUS AND GROUND CAUSES THE SUPPLY BREAKER TO TRIP

PLT STA:PLANT STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED 13.2 KV BUS TO DEVELOP A FAULT. THE EFFECTED BUSSES ARE A: 1 STARTUP FEED BUS (0DA06) AND B: 2 STARTUP FEED BUS (0DA05). THE BUS DIFFERENTIAL LOCKOUT DEVICE TRIPS (286-06 ON PANEL C31B FOR 1 STARTUP FEED BUS AND 286-05 ON PANEL C31A FOR THE 2 STARTUP FEED BUS). THE FOLLOWING BREAKERS TRIP IF CLOSED AND LOCKOUT IF THE MALFUNCTION IS INSERTED ON #1 SU FEED: A1, A11, 14, 3SU-1, 13, AND 12. IF THE MALFUNCTION IS INSERTED ON #2 SU FEED BUS, THE FOLLOWING BREAKERS TRIP (IF CLOSED) AND LOCKOUT: B2,22,21,3SU2,23,AND,24. THE LOADS SUPPLIED FROM THE AFFECTED STARTUP FEED BUS DEENERGIZES. THE BUSSES/LOADS LOST WILL REACT DYNAMICALLY TO THE LOSS OF POWER. #1/2/3/4 AUX BUS AMPS FROM THE EFFECTED STARTUP FEEDER AND BUS AMPS, VOLTS, AND WATTS INDICATIONS DECREASE TO 0 IF THE AUX BUS IS BEING SUPPLIED FROM THE EFFECTED FEEDER.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

#1 STARTUP FEED BUS DIFFERENTIAL RELAYS - 224
#1 STARTUP FEED BUS LO VOLTAGE - 224
11 OR 21 BREAKER TRIP - 20C209L
14 OR 24 BREAKER TRIP - 30C209L
A1 BKR TRIP - 224
3SU-2 BKR TRIP
#2 STARTUP FEED BUS DIFFERENTIAL RELAYS - 224
#2 STARTUP FEED BUS LO VOLTAGE - 224
12 OR 22 BREAKER TRIP - 20C209L
13 OR 23 BREAKER TRIP - 30C209L

REMOVAL OF THE MALFUNCTION REMOVES THE SHORT FROM THE BUS AND ALLOWS THE OPERATOR TO RESET THE LOCKOUT AND REENERGIZE THE BUS.

REF: E-45 STARTUP AND EMERGENCY POWER SYSTEM 13.8KV SWITCHGEAR ELECTRICAL SCHEMATIC DIAGRAM, E-7 13.8KV

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
	AUX POWER UNIT 2 SINGLE LINE METER AND RELAYING DIAGRAM, E-83 STARTUP FEED BUS DIFFERENTIAL RELAYING ELECTRICAL SCHEMATIC DIAGRAM.	
	REV. 2	

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MAP05	STARTUP SOURCES BUS FAULT	02030

TYPE:GENERIC (A-D)

CAUSE:SHORT ON EFFECTED BUS CAUSES SUPPLY BREAKER TO TRIP

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED STARTUP BUS TO DEVELOP A SHORT TO GROUND. THE BUSSES EFFECTED BY THIS MALFUNCTION ARE: A: 2SU, B: 3SU, C: 2SU-A, D: 2SU-B

IF THE 2SU BUS IS FAILED, THE 251N RELAY ENERGIZES ON PANEL C31B CAUSING BREAKER 5U-25 TO TRIP AND THE STARTUP EMERGENCY TRANSFORMER LOCKOUT RELAY (486-1 ON PANEL C31B) TO TRIP. THE 2SU-A, 2SU-B, AND 2SU-E BREAKERS TRIP IF CLOSED. THE BUSSES/LOADS LOST WILL REACT DYNAMICALY TO THE LOSS OF POWER.

IF THE 3SU BUS IS FAILED, THE 250-2 RELAY ENERGIZES ON PANEL C31A CAUSING BREAKER 3435 BKR TO TRIP AND THE 3 STARTUP EMERGENCY TRANSFORMER LOCKOUT RELAY (286-X05 ON PANEL C31A) TO TRIP. THE 3SU-2, 3SU-1, AND 3SU-E BREAKERS TRIP IF CLOSED. THE BUSSES/LOADS LOST WILL REACT DYNAMICALY TO THE LOSS OF POWER.

IF THE 2SU-A BUS IS FAILED, A LOCAL LOCKOUT RELAY IS TRIPPED CAUSING THE 2SU-A BREAKER, A8-4 TRANSFORMER BREAKER, A1 BREAKER, COOLING TOWER PUMPS OAPBB AND OAPBD BREAKERS. AND COOLING TOWER OAE-177 BREAKER TO TRIP.

IF THE 2SU-B BUS IS FAILED, A LOCAL LOCKOUT RELAY IS TRIPPED CAUSING THE 2SU-B BREAKER, B5-4 TRANSFORMER BREAKER, B2 BREAKER, COOLING TOWER PUMPS OCPBB AND COOLING TOWER OBE-177 BREAKER TO TRIP.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

SU-25 TRANS OVERCURRENT - 224
3SU CABLE FAILURE - 224
OAE-177 COOLING TOWER BREAKER TRIP D - 224
2SU-A BREAKER TRIP - 224
2SU-A BUS LO VOLTAGE - 224
A1 BREAKER TRIP - 224

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

2SU-A BUS DIFF RELAYS 220-08 LINE TRANSFER TRIP - 224
2SU-B BUS DIFF RELAYS 220-08 LINE TRANSFER TRIP - 224
08E-177 COOLING TOWER BREAKER TRIP C - 224
BS-4 TRANS BREAKER TRIP - 224
2SU-B BREAKER TRIP - 224
2SU-B BUS LO VOLTAGE - 224
B2 BREAKER TRIP - 224

REMOVAL OF THE MALFUNCTION REMOVES THE SHOR. ON THE EFFECTED BUS AND RESETS THE LOCAL LOCKOUTS FOR BUSSES 2SU-A AND 2SU-B.

REF: E-252 STARTUP AND COOLING TOWERS ANNUNCIATOR ELECTRICAL SCHEMATIC DIAGRAM, E-80 STARTUP BUS 2SU AND 3SU RELAYING ELECTRICAL SCHEMATIC DIAGRAM, E-76 UNIT 2 STARTUP TRANSFORMER SWITCHGEAR 13.8 KV BREAKER CONTROL AND RELAYS, E-69 ELECTRICAL DC SCHEMATIC DIAGRAM UNIT 2 STARTUP AND EMERGENCY AUX TRANSFORMER RELAYING, E-45 STARTUPP AND EMERGENCY POWER SYSTEM 13.8 KV SWITCHGEAR ELECTRICAL SCHEMATIC DIAGRAM, E-10 STARTUP AND EMERGENCY POWER SYSTEM SINGLE LINE METER AND RELAYING DIAGRAM, E-79 ELECTRICAL DC SCHEMATIC DIAGRAM AND RELAY CIRCUIT FOR #3 STARTUP 13.8 KV CABLE FEED FROM REGULATING TRANSFORMER 500 KV NORTH SUBSTATION, E-82 REGULATING TRANSFORMER SWITCHGEAR STARTUP BUS 13.8 KV CIRCUIT BREAKER ELECTRICAL SCHEMATIC DIAGRAM, E-84 REGULATING TRANSFORMER SWITCHGEAR EMERGENCY SYSTEM 13.8 KV CIRCUIT BREAKER ELECTRICAL SCHEMATIC DIAGRAM, E-43 STARTUP AND EMERGENCY POWER SYSTEM 13.8 KV SWITCHGEAR ELECTRICAL SCHEMATIC DIAGRAM, E-10 STARTUP AND EMERGENCY POWER SYSTEM SINGLE LINE METER AND RELAYING DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

MAP06 13.2 KV BREAKER TRIP 02071

TYPE:GENERIC (A-N)

CAUSE:CONTACT 2-2C FAILS CLOSED IN THE EFFECTED BREAKER CONTROL SWITCH

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED 13.2 KV BREAKER TO TRIP. THE BREAKERS EFFECTED BY THIS MALFUNCTION ARE:

A:252-0113	#21 BREAKER	H:252-0103	1R4 TRANS BREAKER
B:252-0105	#11 BREAKER	I:252-0110	1T4 TRANS BREAKER
C:252-0101	#1 BREAKER	J:252-0102	1S4 TRANS BREAKER
D:252-0214	#2 BREAKER	K:252-0213	2S4 TRANS BREAKER
E:252-0210	#12 BREAKER	L:252-0204	2T4 TRANS BREAKER
F:252-0202	#22 BREAKER	M:252-0212	2R4 TRANS BREAKER
G:252-0109	1PS4 TRANS BREAKER	N:252-0201	2PS4 TRANS BREAKER

THE SELECTED BREAKER TRIPS AND THE LOADS SUPPLIED FROM THE AFFECTED BUS(ES) LOSE POWER. THE PLANT SYSTEMS WILL REACT DYNAMICALLY TO THE LOSS OF POWER.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

1 BKR TRIP - 20C109L
2 BKR TRIP - 20C209L
1 AUX BUS LO VOLTAGE - 20C309L
2 AUX BUS LO VOLTAGE - 20C209L
11 OR 21 BKR TRIP - 20C209L
12 OR 22 BKR TRIP - 20C209L

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF CONTACT 2-2C TO NORMAL AND ALLOWS THE OPERATOR TO CLOSE THE EFFECTED BREAKER.

REF: E-1 STATION SINGLE LINE DIAGRAM, E-62 UNIT AUX SWITCHGEAR 1 & 2 STARTUP FEED AND 13.2 K BREAKER ELECTRICAL SCHEMATIC DIAGRAM, E-64 UNIT AUX SWITCHGEAR LOAD CENTER TRANSFORMER 13.8 KV CIRCUIT BREAKER ELECTRICAL SCHEMATIC DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

MAP07 4.16 KV EMERGENCY BUS FAULT 05010

TYPE:GENERIC (A-H)

CAUSE:SHORT ON BUS CAUSES SUPPLY BREAKER TO OPEN

FLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED 4.16 KV EMERGENCY BUS TO DEVELOP A DIRECT SHORT TO GROUND. THE BUSSES EFFECTED BY THIS MALFUNCTION ARE:

A: E12 (20A15) C: E32 (20A17) E: E-13 G: E-33
B: E22 (20A16) D: E42 (20A18) F: E-23 H: E-43

THE EFFECTED BUSSES CURRENT INDICATION INCREASES FULL SCALE, THE SUPPLY BREAKER TRIPS, AND THE BUS AMPS DECREASE TO 0. THE BUS OVERCURRENT LOCKOUT RELAY TRIPS (LOCATED ON A LOCAL PANEL), CAUSING THE NORMAL POWER SUPPLY BREAKER E212 (322/232/342/313/223/333/243) TO TRIP AND LOCKOUT THE ALTERNATE SUPPLY BREAKER E312 (222/332/242/213/323/233/343). THEASSOCIATED DIESEL GENERATOR AUTO STARTS. HOWEVER, IT'S OUTPUT BREAKER DOES NOT CLOSE AND IS LOCKED OUT UNTIL THE MALFUNCION IS REMOVED. THE EMERGENCY AUX SWITCHGEAR LOAD CENTER TRANSFORMER 4.16 KV BREAKER TRIPS (E124/224/324/424/134/234/334/434), AND THE LOADS SUPPLIED FROM THE AFFECTED LOAD CENTER BUS DEENERGIZE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

E12 BUS DIFFERENTIAL OR OVERCURRENT RELAYS - 26A
E22 BUS DIFFERENTIAL OR OVERCURRENT RELAYS - 26B
E32 BUS DIFFERENTIAL OR OVERCURRENT RELAYS - 26C
E42 BUS DIFFERENTIAL OR OVERCURRENT RELAYS - 26D
E12 BUS UNDERVOLTAGE - 26A
E22 BUS UNDERVOLTAGE - 26B
E32 BUS UNDERVOLTAGE - 26C
E42 BUS UNDERVOLTAGE - 26D
E124 TRANS BKR TRIP - 26A
E224 TRANS BKR TRIP - 26B
E324 TRANS BKR TRIP - 26C
E424 TRANS BKR TRIP - 26D
E1 DIESEL RUNNING - 26A
E2 DIESEL RUNNING - 26B

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

E3 DIESEL RUNNING - 26C
E4 DIESEL RUNNING - 26D

E13 BUS UNDERVOLTAGE - 26A
E23 BUS UNDERVOLTAGE - 26B
E33 BUS UNDERVOLTAGE - 26C
E43 BUS UNDERVOLTAGE - 26D
E13 BUS DIFFERENTIAL OR OVERCURRENT RELAYS
E23 BUS DIFFERENTIAL OR OVERCURRENT RELAYS
E33 BUS DIFFERENTIAL OR OVERCURRENT RELAYS
E43 BUS DIFFERENTIAL OR OVERCURRENT RELAYS
E134 TRANS BKR TRIP - 26A
E234 TRANS BKR TRIP - 26B
E334 TRANS BKR TRIP - 26C
E434 TRANS BKR TRIP - 26D

REMOVAL OF THE MALFUNCTION REMOVES THE GROUND ON THE EFFECTED BUS . THE DIESEL GENERATOR OUTPUT BREAKER CLOSES AND SUPPLIES POWER TO THE BUS E12,E22,E32 & E42. THE DIESEL WILL NOT CLOSE IN ON BUSES E13,E23,E33 & E43 AND THEY REMAINS DEENERGIZED. THREE SECONDS LATER, THE EMERGENCY AUX SWITCHGEAR LOAD CENTER TRANSFORMER 4.16 KV BREAKER (E124/224/324/424) AUTO CLOSES, REENERGIZING THE AFFECTED EMERGENCY LOAD CENTER. THE OPERATOR MAY THEN REENERGIZE THE LOADS LOST FROM THE BUS IF DESIRED.

REF: E-186 SH. 2 EMERGENCY AUX SWITCHGEAR BUS DIFFERENTIAL AND OVERCURRENT RELAYS ELECTRICAL SCHEMATIC DIAGRAM, E-47 4160 V. EMERGENCY AUX POWER SYSTEM SCHEMATIC RELAY AND METERING DIAGRAM, E-71 EMERGENCY AUX SWITCHGEAR REGULATING TRANSFORMER SOURCE 4.16 KV CKT BREAKER ELECTRICAL SCHEMATIC DIAGRAM, E-1 STATION SINGLE LINE DIAGRAM, E-198 EMERGENCY AUX SWITCHGEAR DIESEL GENERATOR 4160V CIRCUIT BREAKER SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MAP03	4.16 KV BUS AUTO TRANSFER FAILURE	05010

TYPE:GENERIC (A-H)

CAUSE:THE M1-T1 CONTACT OF THE TIMER RELAY 153-1503 FAILS OPEN IN EFFECTED BREAKER CLOSING CIRCUIT.

PLT STA:LOSS OF POWER TO EMERGENCY BUS

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SPECIFIED 4.16 KV BUS TO FAIL TO AUTOMATICALLY TRANSFER POWER SOURCES ON A LOSS OF NORMAL POWER TO THE BUS. THE BUSSES EFFECTED BY THIS MALFUNCTION ARE:

A: E12 (20A15) C: E32 (20A17) E: E-13 G: E-33
B: E22 (20A16) D: E42 (20A18) F: E-23 H: E-43

ON A LOSS OF POWER WITH THE MALFUNCTION INSERTED, THE ALTERNATE SUPPLY BREAKER TO THE 4160 EMERGENCY BUS DOES NOT CLOSE. THE EMERGENCY AUX SWITCHGEAR LOAD CENTER TRANSFORMER 4.16 KV BREAKER TRIPS (E124/224/324/424/134/234/334/434, AND THE LOADS SUPPLIED FROM THE EFFECTED BUS DEENERGIZE. THE PLANT SYSTEMS WILL REACT DYNAMICALLY TO THE LOSS OF POWER. THE DIESEL GENERATOR STARTS AND WITHIN 10 SECONDS THE DIESEL GENERATOR OUTPUT BREAKER CLOSES, REENERGIZING THE BUS (IF THE BUS IS E12, E22, E32, OR E42). THREE SECONDS LATER, THE EMERGENCY AUX SWITCHGEAR LOAD CENTER TRANSFORMER 4.16 KV BREAKER (E124/224/324/424) AUTO CLOSES, REENERGIZING THE EFFECTED EMERGENCY LOAD CENTER.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

E12 BREAKER AUTO CLOSE - 26A
E22 BREAKER AUTO CLOSE - 26B
E32 BREAKER AUTO CLOSE - 26C
E42 BREAKER AUTO CLOSE - 26D
E12 BUS UNDERVOLTAGE - 26A
E22 BUS UNDERVOLTAGE - 26B
E32 BUS UNDERVOLTAGE - 26C
E42 BUS UNDERVOLTAGE - 26D
E13 BUS UNDERVOLTAGE - 26A
E23 BUS UNDERVOLTAGE - 26B
E33 BUS UNDERVOLTAGE - 26C

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

E43 BUS UNDERVOLTAGE - 26D
E124 TRANS BKR TRIP - 26A
E224 TRANS BKR TRIP - 26B
E324 TRANS BKR TRIP - 26C
E424 TRANS BKR TRIP - 26D
E134 TRANS BKR TRIP - 26A
E234 TRANS BKR TRIP - 26B
E334 TRANS BKR TRIP - 26C
E434 TRANS BKR TRIP - 26D
E1 DIESEL RUNNING - 26A
E2 DIESEL RUNNING - 26B
E3 DIESEL RUNNING - 26C
E4 DIESEL RUNNING - 26D

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE M1-T1 CONTACT OF THE TIMER RELAY 183-1508 IN THE EFFECTED BREAKER CLOSING CIRCUIT TO NORMAL AND ALLOWS THE BREAKER TO AUTO TRANSFER ON A LOSS OF POWER TO THE BUS.

REF: E-71 EMERGENCY AUX SWITCHGEAR REGULATING TRANSFORMER SOURCE 4.16 KV CKT BREAKER ELECTRICAL SCHEMATIC DIAGRAM, E-86 EMERGENCY AUX SWITCHGEAR LOAD CENTER TRANSFORMER 4.16 KV CIRCUIT BREAKER ELECTRICAL SCHEMATIC DIAGRAM, E-1 STATION SINGLE LINE DIAGRAM, E-193 EMERGENCY AUX SWITCHGEAR DIESEL GENERATOR 4160V CKT BKR ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MAP09	13.2 KV BUS AUTO TRANSFER FAILURE	02070

TYPE:GENERIC (A,B)

CAUSE:FAILURE OF CONTACT 1-2 (8-10) OF TIMER 302-06(302-05) IN AUTO CLOSE CIRCUIT.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE FAILURE OF THE INSTRUCTOR SPECIFIED AUX SWGR BUS TO FAST TRANSFER ON A GENERATOR LOCKOUT. THE BUSSES ASSOCIATED WITH THIS MALFUNCTION ARE:

A: 1 UNIT AUX SWGR (20A01)
B: 2 UNIT AUX SWGR (20A02)

IF A GENERATOR LOCKOUT OCCURS, THE 1 (2) BREAKER TRIPS. HOWEVER, THE STARTUP SOURCE SUPLY BREAKER LINED UP FOR FAST TRANSFER DOES NOT CLOSE (IF FAILED). THE LOADS SUPPLIED FROM THE AFFECTED AUX BUS DEENERGIZE. THE PLANT REACTS DYNAMICALLY TO THE LOSS OF POWER. THE OPERATOR MAY CLOSE THE AFFECTED BREAKER USING IT'S HAND SWITCH TO REENERGIZE THE AUX BUS.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

1 AUX BUS LO VOLTAGE - 20C209L
2 AUX BUS LO VOLTAGE - 20C209L

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF CONTACT 1-2 (8-10) OF TIMER 302-06 (302-05) IN AUTO CLOSE CIRCUIT TO NORMAL AND ALLOWS THE FAST TRANSFER TO TAKE PLACE.

REF: E-62 UNIT AUX SWITCHGEAR 1 AND 2 STARTUP FEED BUS 13.8 KV BREAKERS ELECTRICAL SCHEMATIC DIAGRAM, E-1 STATION SINGLE LINE DIAGRAM, E-60 UNIT AUX SWITCHGEAR MAIN 13.8 KV BREAKERS ELECTRICAL SCHEMATIC DIAGRAM, E-92 TURBINE GENERATOR AND TRANSFORMER RELAYING ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
VAC01	480 VAC BUS FAULT	0A130

TYPE:GENERIC (A-R)

CAUSE:DIRECT SHORT BETWEEN THE EFFECTED 480V BUS AND GROUND CAUSES THE SUPPLY BREAKER TO TRIP.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED 480 VAC BUS TO DEVELOP A DIRECT SHORT TO GROUND. THE 480V BUSSES ASSOCIATED WITH THIS MALFUNCTION ARE:

A: A3S4	E: A2S4	I: 1R4	M: 1T4	Q: 2PS4
B: B3S4	F: B2S4	J: 2R4	N: 2T4	R: 4PS4
C: A1S4	G: A3S4	K: 1G4	O: 1PS4	
D: B1S4	H: B3S4	L: 2G4	P: 3PS4	

THE DIRECT SHORT TO GROUND ON THE SELECTED 480 VAC BUS CAUSES THE LOAD CENTER BUS AMPS TO INCREASE SHARPLY, THE LOAD CENTER TRANSFORMER SUPPLY BREAKER TO TRIP (FOR EXAMPLE, 1PS4 TRANSFORMER BREAKER 252-0109 FOR BUS 1PS4, 1R4 TRANSFORMER BREAKER 252-0103 FOR BUS 1R4, ETC.). 480 VOLT BUS AMPS DECREASE TO 0, THE LOAD CENTER TRANSFORMER SUPPLY AMPS INDICATION DECREASES TO 0, AND THE TRANSFORMER SUPPLY BREAKER TRIP AND 480 VOLT BUS TROUBLE ANNUNCIATORS ACTUATE. THE LOADS SUPPLIED BY THE AFFECTED BUS DEENERGIZE AND THE PLANT REACTS DYNAMICALLY TO THE LOSS OF POWER. IF THE OPERATOR ATTEMPTS TO REENERGIZE THE BUS, THE TRANSFORMER SUPPLY BREAKER AGAIN TRIPS DUE TO OVERCURRENT AS ABOVE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

1PS4 PLANT SERVICES LOAD CENTER TROUBLE - 209L
3PS4 PLANT SERVICES LOAD CENTER TROUBLE - 209L
2PS4 PLANT SERVICES LOAD CENTER TROUBLE - 209L
4PS4 PLANT SERVICES LOAD CENTER TROUBLE - 209L
BS4 SCREEN STRUCT. LOAD CENTER TROUBLE - 209L
AS4 SCREEN STRUCT. LOAD CENTER TROUBLE - 209L
1G4 GEN. AREA LOAD CENTER TROUBLE - 209L
2G4 GEN. AREA LOAD CENTER TROUBLE - 209L
1R4 REACTOR AREA LOAD CENTER TROUBLE - 209L
2R4 REACTOR AREA LOAD CENTER TROUBLE - 209L
1T4 TURBINE AREA LOAD CENTER TROUBLE - 209L
2T4 TURBINE AREA LOAD CENTER TROUBLE - 209L
AS4 TRANS BKR TRIP - 224
BS4 TRANS BKR TRIP - 224

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REMOVAL OF THE MALFUNCTION RESTORES THE AFFECTED BUS GROUNDS TO NORMAL AND ALLOWS THE OPERATOR TO REENERGIZE THE BUS.

REF: 3-87 STARTUP TRANSFORMER SWITCHGEAR COOLING TOWER LOAD CENTER 13.8 KV BREAKER ELECTRICAL SCHEMATIC DIAGRAM, E-66 LOAD CENTER SWITCHGEAR BUS TIE 480 VAC BREAKER ELECTRICAL SCHEMATIC DIAGRAM, E-65 LOAD CENTER SWITCHGEAR MAIN 480 VAC BREAKER ELECTRICAL SCHEMATIC DIAGRAM, E-64 UNIT AUX SWITCHGEAR LOAD CENTER TRANS 13.8KV FOR BREAKER ELECTRICAL SCHEMATIC DIAGRAM, E-1 STATION SINGLE LINE DIAGRAM, E-5 13.8 KV AUX POWER SYSTEM SINGLE LINE METER AND RELAYING DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
VAC02	480 VAC EMERGENCY BUS FAULT	05050

TYPE:GENERIC (A-G)

CAUSE:DIRECT SHORT BETWEEN THE EFFECTED 480 V BUS AND GROUND CAUSES THE SUPPLY BREAKER TO TRIP.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED 480 VAC EMERGENCY BUS TO DEVELOP A DIRECT SHORT TO GROUND. THE 480V BUSES ASSOCIATED WITH THIS MALFUNCTION ARE:

A: E124 C: E124 E: E17A4 G: E43A4
B: E224 D: E424 F: E23A4

THE DIRECT SHORT TO GROUND ON THE SELECTED 480VAC EMERGENCY BUS CAUSES THE EMERGENCY LOAD CENTER BUS FEEDER AMPS TO INCREASE SHARPLY, AND THE MCC BUS FEEDER BREAKER TO TRIP (FOR EXAMPLE, E124 FEEDER BREAKER 52-1012). 480 VOLT EMERGENCY BUS FEEDER AMPS DECREASE TO 0 AND THE MCC FEEDER BREAKER TRIP ANNUNCIATORS ACTUATE. THE LOADS SUPPLIED BY THE AFFECTED BUS DEENERGIZE AND THE PLANT REACTS DYNAMICALLY TO THE LOSS OF POWER.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

E124 BUS FEED BREAKER TRIP - 226A
E224 BUS FEED BREAKER TRIP - 226B
E324 BUS FEED BREAKER TRIP - 226C
E424 BUS FEED BREAKER TRIP - 226C

REMOVAL OF THE MALFUNCTION RESTORES THE AFFECTED BUS GROUNDS TO NORMAL AND ALLOWS THE OPERATTOR TO REENERGIZE THE BUS.

REF: E-1 STATION SINGLE LINE DIAGRAM, E-3b EMERGENCY AUX SWITCHGEAR LOAD CENTER TRANSFORMER 13.8 KV BREAKER ELECTRICAL SCHEMATIC DIAGRAM.
REV.3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

VAC03 480 VAC MCC FAULT 06160

TYPE:GENERIC (A-Z, AA-ZZ, A1-K1)

CAUSE:A DIRECT SHORT BETWEEN THE EFFECTED MCC AND GROUND CAUSES THE SUPPLY BREAKER TO TRIP.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED 480VAC MCC TO DEVELOP A DIRECT SHORT TO GROUND, CAUSING THE MCC SUPPLY BREAKER TO TRIP. THE MCC'S ASSOCIATED WITH THIS MALFUNCTION ARE:

A: AS-4-A1	G: E234-D-A	GG: 1G4-T-D	WW: 1PS4-W-C
B: AS4-S-A2	H: E224-P-A	HH: 1G4-P-A	XX: 1PS4-C-B
C: AS4-S-A	S: E324-R-B	II: 1G4-G-B	YY: 1PS4-M-A
D: BS4-S-A1	T: E324-R-D	JJ: 1G4-T-A	ZZ: 3PS4-G-B
E: BS4-S-A2	U: E324-G-A	KK: 1G4-B-D	A1: 3PS4-W-C
F: BS4-C-A	V: E324-T-B	LL: 2G4-T-A	B1: 3PS4-P-B
G: B24-C-A	W: E324-D-A	MM: 2G4-G-B	C1: 3PS4-M-A
H: B34-C-A	X: E424-W-A	NN: 2G4-P-A	D1: 3PS4-V-B
I: A34-Y-A	Y: E424-R-D	OO: 1T4-T-C	E1: 4PS4-W-B
J: E124-R-C	Z: E434-D-A	PP: 1T4-T-B	F1: 4PS4-U-C
K: E124-T-	AA: E424-T-B	QQ: 2T4-T-C	G1: 4PS4-P-B
L: E124-D-A	BB: E424-D-A	RR: 2T4-T-B	H1: E13A4-EC-A
M: E134-P-A	CC: 1R4-R-D	SS: 2PS4-P-B	I1: E23A4-EC-A
N: E124-G-A	DD: 1R4-T-A	TT: 2PS4-U-C	J1: E43A4-EC-A
O: E224-R-B	EE: 2R4-R-D	UU: 2PS4-W-B	
P. E224-T-B	FF: 2R4-T-A	VV: 1PS4-V-A	

THE LOADS SUPPLIED FROM THE SELECTED MCC DEENERGIZE. THE PLANT REACTS DYNAMICALLY TO THE LOSS OF POWER. FOR A DETAILED LIST OF THE LOADS LOST, REFER TO DWG. 6280-E-2.

REMOVAL OF THE MALFUNCTION RESETS AND CLOSES THE TRIPPED BREAKER.

REF: E-2 13.2KV, 4.16KV, AND 480VAC SYSTEM STATION ELECTRICAL SINGLE LINE COMPOSITE DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
VAC04	120 VAC INSTRUMENT PANEL FAULT	07010

TYPE:GENERIC (A-F)

CAUSE:SHORT IN INSTRUMENT PANEL CAUSES THE SUPPLY BREAKER TO TRIP ON OVERCURRENT.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A SHORT IN THE SELECTED INSTRUMENT PANEL WHICH TRIPS THE INSTRUMENT PANELS SUPPLY BREAKER. THE INSTRUMENT PANELS ASSOCIATED WITH THIS MALFUNCTION ARE:

A: 20Y-50 D: 20Y-35
B: 20Y-33 E: 20Y-37
C: 20Y-34 F: 00Y-03

THE LOADS POWERED FROM THE SELECTED PANEL DEENERGIZE. THE SYSTEMS EFFECTED BY THIS MALFUNCTION REACT DYNAMICALLY TO THE LOSS OF POWER.

REMOVAL OF THE MALFUNCTION RESETS AND CLOSES THE TRIPPED BREAKER.

REF: E-2 13.2KV, 4.16KV, AND 480VAC SYSTEMS STATION ELECTRICAL SINGLE LINE COMPOSITE DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MGA01	MAIN GENERATOR TRIP	04010

TYPE:DISCRETE

CAUSE:FAILURE OF OVERCURRENT CONTACT 51 CAUSES LOCKOUT RELAY TO ENERGIZE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A MAIN GENERATOR TRIP. GENERATOR LOCKOUT 386F AND 386B TRIP ON PANEL 22R. THE GENERATOR EXCITER FIELD BREAKER TRIPS, THE #1 AND #2 BREAKERS TRIP, THE MAIN TURBINE TRIPS, THE REACTOR SCRAMS, THE RECIRC PUMPS TRIP, THE AUX BUSSES FAST TRANSFER TO THE STARTUP SOURCES WITH THE 11 (21) AND THE 12 (22) BREAKERS CLOSING, AND GENERATOR WATTS, VOLTS, AMPS, AND VARS DECREASE TO 0. THE BYPASS VALVES AND SRVS OPERATE TO MAINTAIN REACTOR PRESSURE, AND THE FEED SYSTEM OPERATES TO MAINTAIN REACTOR WATER LEVEL.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

2 GEN TRANS BACK UP RELAYS - 20C20PR
2 EXCITOR FIELD BREAKER TRIP - 20C20PR

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF OVERCURRENT CONTACT 51 TO NORMAL AND ALLOWS THE OPERATOR TO RESET THE 386F AND 386B LOCKOUT RELAYS.

REF: E-1 STATION SINGLE LINE DIAGRAM, E-62 UNIT AUX SWITCHGEAR 1&2 STARTUP FEED BUS 13.2 KV BREAKER ELECTRICAL SCHEMATIC DIAGRAM, E-60 UNIT AUX SWITCHGEAR MAIN 13.8 KV BREAKERS ELECTRICAL SCHEMATIC DIAGRAM, E-92 TURBINE GENERATOR AND TRANSFORMER RELAYING ELECTRICAL SCHEMATIC DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MGA02	VOLTAGE REGULATOR FAILS HIGH	01010

TYPE:DISCRETE

CAUSE:SHORT IN AUTO VOLTAGE REGULATOR VOLTAGE ADJUST RHEOSTAT (90P) CAUSES OUTPUT TO FAIL HIGH.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE OUTPUT OF THE AC VOLTAGE REGULATOR TO FAIL HIGH. GENERATOR FIELD VOLTAGE INCREASES, FIELD AMPS INCREASES, GENERATOR OUTPUT VOLTAGE INCREASES SLIGHTLY, A/B/C PHASE AMPS INCREASES (MAY DECREASE AND THEN INCREASE DEPENDING UPON THE REACTIVE LOAD PRESENT), WATTS REMAINS RELATIVELY CONSTANT, AND VARS INCREASE IN THE IN DIRECTION. THE VOLTAGE REGULATOR OUTPUT IS LIMITED TO 107.5% OF NORMAL OUTPUT. THE TRANSFER VOLTAGE ERROR INDICATION INCREASED AND CAUSES AN ALARM AFTER A TIME DELAY. GENERATOR WINDING TEMPERATURES INCREASE DUE TO THE CURRENT INCREASING. THE 13.2 KV AUX BUS'S VOLTAGES INCREASE. THE OPERATOR MAY PLACE THE VOLTAGE REGULATOR IN MANUAL AND CONTROL GENERATOR CURRENT AND VARS IF DESIRED. OPERATION OF THE AUTO VOLTAGE ADJUST RHEOSTAT WHILE THIS MALFUNCTION IS ACTIVE WILL HAVE NO EFFECT ON GENERATOR VOLTAGE. IF THE EXCITOR FIELD CURRENT INCREASES TO THE MAXIMUM EXCITATION LIMIT, THE VOLTAGE REGULATOR AUTO TRANSFERS TO MANUAL AFTER A 10 SECOND TIME DELAY.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

2 GEN VOLT REG AUTO TO MAN UNBALANCED - 2002D9R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE AUTO VOLTAGE ADJUST RHEOSTAT (90P) TO NORMAL.

REF: M-2-563-10 STEAM TURBINE GENERATOR GEK, (GEK-14870).

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MGA03	VOLTAGE REGULATOR FAILS LOW	01010

TYPE:DISCRETE

CAUSE:HIGH RESISTANCE CONNECTION DEVELOPS IN THE TAP OF SWITCH A2 IN THE AC AUTO REGULATOR CAUSING A LOW OUTPUT TO EXCITER FIELD.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE OUTPUT OF THE AC VOLTAGE REGULATOR TO FAIL LOW. GENERATOR FIELD VOLTAGE DECREASES, FIELD AMPS DECREASES, GENERATOR OUTPUT VOLTAGE DECREASES SLIGHTLY, A/B/C PHASE AMPS DECREASE AS VARS DECREASE TO 0, THEN INCREASE AS VARS INCREASE IN THE OUT DIRECTION, AND WATTS REMAINS RELATIVELY CONSTANT. THE VOLTAGE REGULATOR OUTPUT IS LIMITED TO 92.5% OF NORMAL OUTPUT. THE TRANSFER VOLTAGE ERROR INDICATION INCREASES AND ALARMS AFTER A TIME DELAY. THE 13.2 KV AUX BUS'S VOLTAGE DECREASE SLIGHTLY. THE OPERATOR MAY PLACE THE VOLTAGE REGULATOR IN MANUAL AND CONTPOL GENERATOR CURRENT AND VARS IF DESIRED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

2 GEN VOLT REG AUTO TO MAN UNBALANCED - 2CC209R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF SWITCH A2 IN THE AC AUTO REGULATOR TO NORMAL.

REF: M-2-363-10 STEAM TURBINE GENERATOR GEK, (GEK-14970), M-2-355C ALTERREX EXCITATION SYSTEM WITH SCR REGULATOR ELECTRICAL SCHEMATIC DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MGA04	VOLTAGE REGULATOR TRANSFERS TO MANUAL.	04050

TYPE:DISCRETE

CAUSE:FAILURE OF CONTACT 42T (VOLTS/HERTZ MANUAL TRANSFER CONTACT).

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE VOLTAGE REGULATOR TO TRANSFER TO MANUAL. GENERATOR VOLTAGE INCREASES/DECREASES OR REMAINS CONSTANT, DEPENDING UPON THE VOLTAGE DIFFERENCE BETWEEN THE AUTO AND MANUAL VOLTAGE REGULATORS. NORMALLY, THE TWO VOLTAGE REGULATORS ARE KEPT NULLED, SO THAT NO CHANGE IN VOLTAGE AND GENERATOR PARAMETERS SHOULD OCCUR. THE VOLTAGE REGULATOR MODE INDICATING LIGHTS ON PANEL C09 INDICATE THAT THE VOLTAGE REGULATOR IS IN MANUAL. THE OPERATOR MAY CONTROL GENERATOR VOLTAGE AND VAR LOADING USING THE MANUAL VOLTAGE REGULATOR.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

2 GEN VOLT REG AUTO TO MAN TRIP - 2C02D1R

REF: M-2-363-10 STEAM TURBINE GENERATOR GEK, (GEK-14870), M-2-355C ALTERREX EXCITATION SYSTEM WITH SCR REGULATOR ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MGA05	GENERATOR FIELD BREAKER FAILS OPEN	C001

TYPE:DISCRETE

CAUSE:FAILURE OF 41/CS TRIP CONTACT IN FIELD BREAKER CONTROL CIRCUIT.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE MAIN GENERATOR FIELD BREAKER TO TRIP. THE FIELD BREAKER INDICATES OPEN, MAIN GENERATOR LOCKOUT RELAYS 3P6B AND 3B6F TRIP CAUSING THE MAIN TURBINE TO TRIP, THE REACTOR SCRAMS, THE RECIRC PUMPS TRIP, THE AUX BUSSES FAST TRANSFER TO THE STARTUP SOURCES, AND THE GENERATOR VOLTAGE REGULATOR TRANSFERS TO MANUAL. THE BYPASS AND SRV VALVES OPERATE TO MAINTAIN REACTOR PRESSURE AND THE FEED SYSTEM OPERATES TO MAINTAIN REACTOR WATER LEVEL. IF REACTOR POWER IS LESS THAN APPROXIMATELY 30% AS SENSED BY TURBINE FIRST STAGE PRESSURE, THE REACTOR DOES NOT SCRAM, THE RECIRC PUMPS TRIP IF THEY ARE BEING POWERED FROM THE MAIN GENERATOR, AND THE BYPASS VALVES OPERATE TO MAINTAIN REACTOR PRESSURE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

2 EXCITER FIELD BREAKER TRIP - 2OC20DR
2 GEN RELAYS - 2OC20GR

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE 41/CS TRIP CONTACT IN THE FIELD BREAKER CONTROL CIRCUIT TO NORMAL.

REF: M-2-363-10 STEAM TURBINE GENERATOR GEK, (GEK-14870), M-2-355C ALTERREX EXCITATION SYSTEM WITH SCR REGULATOR ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MGA06	GENERATOR FIELD BREAKER FAILS TO CLOSE	C001

TYPE:DISCRETE

CAUSE:FAILURE OF CLOSING COIL IN GENERATOR FIELD BREAKER

PLT STA:GENERATOR STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION PREVENTS THE MAIN GENERATOR FIELD BREAKER FROM CLOSING. WHEN THE HAND SWITCH FOR THE FIELD BREAKER IS TAKEN TO CLOSE, THE BREAKER DOES NOT CLOSE AND THE BREAKER INDICATION INDICATES THAT THE BREAKER IS STILL OPEN. IF THE BREAKER IS CLOSED WHEN THE MALFUNCTION IS INSERTED, NO EFFECTS WILL BE OBSERVED.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF HE GENERATOR FIELD BREAKER CLOSING COIL TO NORMAL.

REF: M-2-3[illegible]-10 STEAM TURBINE GENERATOR [illegible], (IEK-14970), M-2-355C ALTERREX EXCITATION SYSTEM WITH SCR REGULATOR ELECTRICAL SCHEMATIC DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MGA07	MAIN GENERATOR HYDROGEN LEAK	05120

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:RUPTURE OF THE GENERATOR GAS INLET PIPING. 100% IS EQUIVALENT TO A 10 PSI/MIN GAS PRESSURE DECREASE AT 70 PSIG GAS PRESSURE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A RUPTURE OF THE GAS INLET PIPING. AT 100% SEVERITY, GAS PRESSURE DECREASES 10 PSI/MIN AT AN INITIAL GENERATOR CASING PRESSURE OF 70 PSIG. GENERATOR HYDROGEN PRESSURE DECREASES, BEARING #9 AND #10 HYDROGEN SEAL OIL PRESSURE DECREASES DUE TO THE AUTOMATIC OPERATION OF PRESSURE CONTROL VALVE H-19 IN THE HSO SYSTEM, HOT GAS TEMPERATURE INCREASES (TR-2411), AND GENERATOR WINDING AND HYDROGEN TEMPERATURES INCREASE. THE RATE AND MAGNITUDE OF THE TEMPERATURE INCREASE WILL BE A FUNCTION OF HYDROGEN PRESSURE IN THE GENERATOR, AND GENERATOR LOAD. STATOR WATER COOLING TEMPERATURES INCREASE AS GENERATOR HYDROGEN TEMPERATURES INCREASE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

GENERATOR STATOR SLOTS HI TEMP - 208R
HOT HYDROGEN TO COOLER HI TEMP - 208R
GENERATOR ROTOR HI TEMP - 208R

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M2-148L STATOR WINDING COOLING SYSTEM PRID, M2-145K GAS CONTROL PIPING DIAGRAM, M2-147 ARRANGEMENT OF SHAFT SEALING SYSTEM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
SWC01	LOSS OF STATOR WATER COOLING FLOW	05010

TYPE:DISCRETE

CAUSE:FILTER YFI-1 CLOGS

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A LOSS OF STATOR WATER COOLING FLOW. THE STANDBY SCW PUMP DOES NOT START BECAUSE THE PRESSURE UPSTREAM OF THE FILTER REMAINS GREATER THAN 20 PSIG. MAIN GENERATOR LOAD DECREASES TO 25% DUE TO THE LOAD SETPOINT DECREASING TO 25%. 1 SECOND AFTER THE LOSS OF STATOR WATER COOLING OCCURS, A RECIRC PUMP TRIPS. 10 SECONDS AFTER THE LOSS OF STATOR WATER COOLING OCCURS, B RECIRC PUMP TRIPS. REACTOR WATER LEVEL INCREASES DUE TO VOID FORMATION IN THE CORE AND THE FEED PUMP'S SPEED DECREASES TO MAINTAIN LEVEL. REACTOR POWER DECREASES TO ABOUT 50-55% AND THE BYPASS VALVES OPEN TO MAINTAIN PRESSURE. IF THE AMOUNT OF STEAM PRODUCED EXCEEDS THE COMBINED FLOW RATE THROUGH THE BYPASS VALVES AND THE CONTROL VALVES, STEAM PRESSURE INCREASES CAUSING REACTOR POWER TO INCREASE AND AN APRM FLOW BIASED SCRAM WILL OCCUR IF .65W + 54 IS EXCEEDED. MACHINE GAS TEMPERATURE, AND PRESSURE WINDING TEMPERATURES, AND GENERATOR SLOT TEMPERATURES INCREASE. IF GENERATOR AMPS ARE NOT LESS THAN 22,530 IN 2 MINUTES OR LESS THAN 7720 AMPS IN 3 1/5 MINUTES THE MAIN TURBINE TRIPS. IF TOTAL FEED FLOW IS LESS THAN 45% AND GENERATOR LOAD IS LESS THAN 15% WHEN A LOSS OF STATOR WINDING COOLING FLOW OCCURS, A RECIRC PUMP TRIP WILL NOT OCCUR.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

STATOR COOLANT LOSS AND RUNBACK FAILURE TRIP - 2108

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE YFI-1 FILTER TO NORMAL AND RESTORES STATOR COOLING WATER FLOW TO NORMAL IF THE A SCW PUMP'S REMOTE FUNCTION IS IN RUN OR AUTO AND RESETS THE SCW LOW FLOW RUNBACK.

REF: M2-148 STATOR WINDING COOLER WATER SYSTEM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
HS001	HYDROGEN SEAL OIL PRESSURE DECREASE	05190

TYPE:DISCRETE, VARIABLE 0-100%

CAUSE:FAILURE OF PRESSURE CONTROL VALVE. 100% SEVERITY IS EQUIVALENT TO A COMPLETE LOSS OF HYDROGEN SEAL OIL PRESSURE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A MECHANICAL FAILURE OF THE PRESSURE CONTROL VALVE DIAPHRAGM, CAUSING HYDROGEN SEAL OIL PRESSURE TO DECREASE. HYDROGEN LEAKS OUT OF THE GENERATOR AS INDICATED BY HYDROGEN PRESSURE DECREASING AND GENERATOR WINDING AND HYDROGEN TEMPERATURES INCREASE. THE RATE AND MAGNITUDE OF THE HYDROGEN PRESSURE DECREASE WILL BE A FUNCTION OF SEVERITY SELECTED, INITIAL HYDROGEN PRESSURE IN THE GENERATOR, AND GENERATOR LOAD. STATOR WATER COOLING TEMPERATURES INCREASE AS GENERATOR HYDROGEN TEMPERATURES INCREASE. IF STATOR WATER TEMPERATURE REACHES TRIP POINT, A STATOR COOLING RUNBACK WILL OCCUR.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

GENERATOR ROTOR HI TEMP - 208R
HOT HYDROGEN TO COOLER HI TEMP - 208R
COLD HYDROGEN FROM COLLER HI TEMP - 208R

REMOVAL OF THIS MALFUNCTION RESTORES THE OPERATION OF THE PRESSURE CONTROL VALVE TO NORMAL AND ALLOWS THE GENERATOR TO BE PRESSURIZED WITH HYDROGEN.

REF: M2-148L STATOR WINDING COOLING SYSTEM P&ID, M2-145K GAS CONTROL PIPING DIAGRAM, M2-147 ARRANGEMENT OF SHAFT SEALING SYSTEM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
FPS01	CARDOX INJECTION TO THE DIESEL GENERATOR ROOM	01130

TYPE:GENERIC (A-D)

CAUSE:SPONTANEOUS COMBUSTION RAG FIRE CAUES CARDOX INJECTION INTO THE SELECTED DIESEL ROOM. NO OTHER PLANT EQUIPTMENT IS DESTROYED BY THE FIRE OTHER THAN THE RAGS.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A RAG FIRE IN THE SELECTED DIESEL GENERATOR ROOM. THE SELECTED DIESEL GENERATOR BUILDING'S CARDOX INJECTION SYSTEM WILL ACTIVATE AS INDICATED BY THE E1 (E2/3/4) DIESEL BLDG CO2 DISCHARGED ANNUNCIATOR ACTUATING, AND THE CODED FIRE ALARM SOUNDING. IF THE DIESEL IN THE AFFECTED ROOM IS NOT RUNNING, OR IS RUNNING WITHOUT A LOCA SIGNAL PRESENT (MCA RELAY ENERGIZED), THE DIESEL TRIPS. IF THE DIESEL IS RUNNING SUPPLYING LOADS, THE AFFECTED LOADS DEENERGIZE AND THE PLANT REACTS DYNAMICALLY TO THE LOSS OF POWER. DIESEL AMPS, VOLTS, WATTS, AND VARS DECREASE TO 0. THE BUSSES BEING SUPPLIED BY THE DIESEL DEENERGIZE WITH THEIR BUS VOLTAGES AND AMPS DECREASING TO 0, AND THEIR RESPECTIVE BUS LOW VOLTAGE ANNUNCIATORS ACTUATING. IF A LOCA SIGNAL IS PRESENT PRIOR TO MALFUNCTION INSERTION, THE E1(E2/3/4) DIESEL BLDG CO2 DISCHARGED ANNUNCIATOR ACTUATES, THE CODED FIRE ALARM SOUNDS, HOWEVER THE DIESEL GENERATOR WILL NOT TRIP AND CARDOX WILL NOT BE INJECTED INTO THE DIESEL ROOM UNTIL THE LOCA SIGNAL IS REMOVED (MCA RELAY ENERGIZED).

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

E1 DIESEL GENERATOR BLDG CO2 DISCHARGED - 007
E2 DIESEL GENERATOR BLDG CO2 DISCHARGED - 007
E3 DIESEL GENERATOR BLDG CO2 DISCHARGED - 007
E4 DIESEL GENERATOR BLDG CO2 DISCHARGED - 007

REMOVAL OF THE MALFUNCTION RESETS THE CARDOX INJECTION SYSTEM AUTOMATIC DETECTION RELAY, RECHARGES THE EFFECTED DG ROOM CARDOX STORAGE TANK, AND RESETS THE AFFECTED DIESEL'S CARDOX LOCKOUT DEVICE 89Y-PF4-A. 60 SECONDS AFTER THE MALFUNCTION IS REMOVED THE AFFECTED DIESEL GOVERNOR SHUTDOWN SOLONOID DEENERGIZES, THE DIESEL GENERATOR NOT IN AUTO ANNUNCIATOR CLEARS, AND THE DIESEL GENERATOR AUTO STARTS IF AN AUTO START SIGNAL IS PRESENT.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REF: 6280-ES-7 SH. 1-3 STANDBY DIESEL GENERATOR ELECTRICAL SCHEMATICS, M-46-24-3 DG CARDOX ELECTRICAL SCHEMATIC, M-1-540 CORE SPRAY SYSTEM ELECTRICAL SCHEMATIC DIAGR., S.13.2.2.A INITIAL STARTUP AND NORMAL OPERATION OF DIESEL GENERATOR CARDOX SYSTEM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
IPM04	FIRE IN THE REMOTE SHUTDOWN PANEL	01120

TYPE:DISCRETE

CAUSE:ELECTRICAL FIRE IN THE REMOTE SHUTDOWN PANEL

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A FIRE IN THE REMOTE SHUTDOWN PANEL. WITH THE INSTRUMENT TRANSFER SWITCHES ON THE RSP IN EMERGENCY, THE INSTRUMENTS ON THE RSP WILL DEVELOP A SHORT TO GROUND DUE TO THE FIRE AND INCREASE UPSCALE THEN DECREASE TO THE BOTTOM PEG OF THE INSTRUMENT, IN A RANDOM MANNER.
WITH THE INSTRUMENT TRANSFER SWITCHES ON THE REMOTE SHUTDOWN PANEL IN NORMAL, THE REDUNDANT INSTRUMENTS ON THE CONTROL ROOM PANEL WILL INCREASE UPSCALE THEN DECREASE TO THEIR BOTTOM PEG IN A RANDOM MANNER. THE HAND SWITCHES ON THE RSP AND THE REDUNDANT HAND SWITCHES ON THE CONTROL ROOM PANEL BECOME INOPERATIVE BECAUSE OF THE FIRE AS INDICATED BY THEIR INDICATING LAMPS GOING OUT, AND THEIR SWITCHES NOT OPERATING.

THE FOLLOWING COMPONENTS ARE AFFECTED BY THIS MALFUNCTION:

PI-90AX REACTOR PRESSURE WIDE RANGE (C43)
PI-90A REACTOR PRESSURE WIDE RANGE (C05)
PI-90BX REACTOR PRESSURE WIDE RANGE (C43)
PI-90B REACTOR PRESSURE WIDE RANGE (C05)
PI-93X RCIC PUMP DISCH PRESSURE (C43)
PI-93 RCIC PUMP DISCH PRESSURE (C04C)
PI-94X RCIC PUMP TURB STEAM PRESSURE (C43)
PI-94 RCIC PUMP TURB STEAM PRESSURE (C04C)
PI-95X RCIC PUMP TURB EXH PRESSURE (C43)
PI-95 RCIC PUMP TURB EXH PRESSURE (C04C)
PI-96X RCIC PUMP SUCT PRESSURE (C43)
PI-96 RCIC PUMP SUCT PRESSURE (C04C)
PI-2508 DRYWELL PRESSURE (C43)
PI-236A ESW PUMP A DISCH PRESSURE (C25)
PI-236AX ESW PUMP A DISCH PRESSURE (C43)
PI-236B ESW PUMP B DISCH PRESSURE (C25)
PI-236BX ESW PUMP B DISCH PRESSURE (C43)
TI-2442A TORUS WATER TEMPERATURE (C43)
TI-2442B TORUS WATER TEMPERATURE (C43)
LI-3123A TORUS WATER LEVEL (C4)

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
	LI-8123AX TORUS WATER LEVEL (C43)	
	LI-2217 CST LEVEL (C04)	
	LI-2217X CST LEVEL (C43)	
	SPI-149 RCIC TURB SPEED (C43)	
	FI-91 RCIC FLOW (C04)	
	FI-91X RCIC FLOW (C43)	
	LI-85A REACTOR VESSEL WATER LEVEL (C05)	
	LI-85AX REACTOR VESSEL WATER LEVEL (C43)	
	LI-85B REACTOR VESSEL WATER LEVEL (C05)	
	LI-85BX REACTOR VESSEL WATER LEVEL (C43)	
	E-222 BREAKER	
	E-322 BREAKER	
	E-224 BREAKER	
	E-242 BREAKER	
	E-342 BREAKER	
	E-212 BREAKER	
	E-312 BREAKER	
	E-232 BREAKER	
	E-332 BREAKER	
	ESW PUMP A	
	ESW PUMP B	
	CRD PUMP A	
	CRD PUMP B	
	MO-18 RHR S/D COOLING ISO VALVE	
	MO-17 RHR S/D COOLING ISO VALVE	
	RV-71E B MAIN STEAM LINE RELIEF	
	RV-71H C MAIN STEAM LINE RELIEF	
	RV-71L D MAIN STEAM LINE RELIEF	
	FC-91X RCIC FLOW CONTROLLER	
	MO-13-21 RCIC DISCHARGE VALVE	
	MO-13-131 RCIC STEAM SUPPLY VALVE	
	MO-13-16 RCIC STEAM LINE ISOLATION VALVE	
	MO-4244 RCIC TURBINE EXHAUST VACUUM BREAKER	
	MO-13-30 RCIC TEST TO CST	
	MO-13-20 RCIC PUMP DISCHARGE VALVE	
	MO-13-15 CST SUCTION VALVE	
	RCIC STOP VALVE TRIP	
	MO-13-27 RCIC MIN FLOW VALVE	
	MO-13-39 SUPPRESSION POOL SUCTION VALVE	
	MO-13-41 SUPPRESSION POOL SUCTION VALVE	
	MO-13-138 RCIC TURB EXH DRAIN VALVE	
	MO-13-137 RCIC TURB EXH DRAIN ISO VALVE	
	RCIC COND VACUUM PUMP	
	AO-13-13 RCIC COND PUMP DISCH DRAIN VALVE	
	RCIC COND PUMP	

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

MO-13-132 RCIC LUBE OIL COOLER ISO VALVE
AO-13-32 RCIC STEAM LINE DRAIN CONTROL VALVE
RCIC TURB STOP VALVE CONTROL
AO-13-34/35 RCIC STEAM LINE DRAIN VALVES

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.
REF: M-359 RCIC SYSTEM P&ID, M-340 RCIC PUMP TURBINE DETAILS P&ID, M-1-S-42 RCIC SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-1-S-52 ADS SYSTEM ELECTRICAL SCHEMATIC DEAGRAM, E-26 SINGLE LINE DIAGRAM 125/250 VDC SYSTEM, M-1-S-29 CRD SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, E-136 CRD PUMP 4.16 KV BKR ELECTRICAL SCHEMATIC DIAGRAM, M-1-S-23 RHR SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, E-137 ESW PUMP 4.16 KV BKR ELECTRICAL SCHEMATIC DEAGRAM, E-2 SINGLE LINE DIAGRAM 1392KV/411bKV AND 480VAC SYSTEMS, E-8 4160V EMERGENCY AUX POWER SYSTEM UNIT 2, E-56 EMERGENCY AUX SWGR LOAD CENTER TRANSFORMER BREAKER ELECTRICAL SCHEMATIC DIAGRAM, M-1-EE-329 ELECTRICAL CONNECTION DIAGRAM PANEL C43, MM-1-EE-293 ELECTRICAL CONNECTION DIAGRAM PANEL 9-3, E-393 ELECTRICAL SECONDARY AND CONTROL CONNECTION DIAGRAM PANEL C43.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

ESD02 FW HEATER LEVEL CONTROL VALVE FAILS OPEN 13020

TYPE:GENERIC (A-L)

CAUSE:THE EFFECTED FW HEATER LEVEL CONTROLLER FAILS SUCH THAT IT'S ASSOCIATED LEVEL CONTROL VALVE GOES FULL OPEN. THE FOLLOWING LEVEL CONTROLLERS:

ESD02A - LC-2039A
ESD02B - LC-2039B
ESD02C - LC-2039C
ESD02D - LC-2041A
ESD02E - LC-2041B
ESD02F - LC-2041C
ESD02G - LC-2043A
ESD02H - LC-2043B
ESD02I - LC-2043C
ESD02J - LC-2045A
ESD02K - LC-2045B
ESD02L - LC-2045C

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION WILL CAUSE THE INSTRUCTOR SPECIFIED FW HEATER (A2 THRU C5) LEVEL CONTROL VALVE TO FAIL OPEN. THIS MALFUNCTION WILL ONLY EFFECT THE NORMAL LEVEL CONTROL VALVE AND NOT THE BACKUP DUMP TO THE CONDENSER. THE EFFECTS OF THIS MALFUNCTION WILL BE AN INCREASE IN SHELL TEMPERATURE INDICATOR TI-2100 (PANEL C06A) READING FOR THE NEXT FW HEATER IN THE FW HEATER TRAIN DUE TO LOWERING IN THE AMOUNT OF HEAT TRANSFERRED TO THE FW IN THE TUBES OF THE EFFECTED HEATER AND A DECREASE IN THE FEEDWATER TEMPERATURE. THE EFFECTS OF THE CHANGE IN TEMPERATURE WILL BE PROPAGATED THROUGHOUT THE FW SYSTEM OVERALL PLANT EFFICIENCY WILL DECREASES SLIGHTLY. REACTOR POWER WILL INCREASE DUE TO THE COLDER WATER ENTERING THE REACTOR. THE LOWER PRESSURE HEATERS WILL PRODUCE A PLANT RESPONSE THAT WILL BE LESS PRONOUNCED THAN IF THE HIGHER PRESSURE HEATERS ARE AFFECTED. THE ASSOCIATED HEATER'S NORMAL DRAIN VALVE WILL INDICATE OPEN ON PANEL C06A WHILE THE MALFUNCTON IS ACTIVE.

REMOVAL OF THIS MALFUNCTION WILL RETURN THE EFFECTED LEVEL CONTROLLER TO NORMAL OPERATION.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REF: M-304 TURBINE AND EXTRACTION STEAM P&ID, M-305 VENTS & DRAINS HEATERS 3, 4, & 5, M-307 CONDENSATE SYSTEM P&ID, M-308 FEED SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

ESD03 FW HEATER LEVEL CONTROL VALVE FAILS CLOSED 13020

TYPE:GENERIC (A-L)

CAUSE:THE INDIVIDUAL FW HEATER LEVEL CONTROLLER FAILS SUCH THAT IT'S ASSOCIATED LEVEL CONTROL VALVE FAILS CLOSED. THE FOLLOWING MALFUNCTIONS ARE ALIGNED WITH THE FOLLOWING LEVEL CONTROLLERS:

ESD03A - LC-2039A
ESD03B - LC-2039B
ESD03C - LC-2039C
ESD03D - LC-2041A
ESD03E - LC-2041B
ESD03F - LC-2041C
ESD03G - LC-2043A
ESD03H - LC-2043B
ESD03I - LC-2043C
ESD03J - LC-2045A
ESD03K - LC-2045B
ESD03L - LC-2045C

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED FW HEATER LEVEL CONTROL VALVE TO FAIL CLOSED. THE AFFECTED FW HEATER'S LEVEL INCREASES AND CAUSES THE ASSOCIATED HIGH LEVEL DUMP VALVE TO OPEN AS INDICATED ON PANEL C08A DUMPING WATER TO THE MAIN CONDENSER. THE EFFECTS OF THE LOSS OF DRAIN FLOW TO THE NEXT STAGE OF FEEDWATER HEATING WILL PROPAGATE THROUGHOUT THE FEEDWATER SYSTEM WITH FEEDWATER AND HEATER DRAIN TEMPERATURES AND FLOWS DOWNSTREAM OF THE AFFECTED HEATER DECREASING, REACTOR POWER INCREASING AND PLANT EFFECIENCY DECREASING. CONDENSER PRESSURE MAY INCREASE DUE TO THE FLOW FROM THE HEATER TO THE CONDENSER. THE AMOUNT OF INCREASE IN PRESSURE WILL BE DEPENDANT UPON THE FEEDWATER HEATER SELECTED AND THE FLOW RATE THROUGH THE DUMP LINE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

2A HEATER HI LEVEL - 206L
2B HEATER HI LEVEL - 206L
2C HEATER HI LEVEL - 206L
3A HEATER HI LEVEL - 206L

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
	3B HEATER HI LEVEL - 20%L	
	3C HEATER HI LEVEL - 20%L	
	4A HEATER HI LEVEL - 20%L	
	4B HEATER HI LEVEL - 20%L	
	4C HEATER HI LEVEL - 20%L	
	5A HEATER HI LEVEL - 20%L	
	5C HEATER HI LEVEL - 20%L	

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE NORMAL LEVEL CONTROL VALVE TO NORMAL.

REF: M-304 TURBINE AND EXTRACTION STEAM P&ID, M-305 VENTS & DRAIN HEATERS 5, 4, 3 & 2, M-307 CONDENSATE SYSTEM P&ID, M-308 FEED SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

FWC01 RFP M/A CONTROLLER FAILURE COM

TYPE:GENERIC (A-C), VARIABLE (0-100%)

CAUSE:AUTO FAILURE IN M/A STATION. 100% SEVERITY IS EQUIVALENT TO 100% OF CONTROLLER OUTPUT. THIS MALFUNCTION DOES NOT EFFECT THE MANUAL CONTROL FEATURE OF THE CONTROLLER.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES THE AUTO OUTPUT OF THE INDIVIDUAL RFP M/A CONTROLLER TO FAIL TO THE INSTRUCTORS SPECIFIED VALUE. FEED PUMP SPEED WILL INCREASE OR DECREASE DEPENDING UPON THE INITIAL SPEED AND THE FAILED VALUE. IF THE SIGNAL IS FAILED LOW, RFP SPEED, DISCHARGE PRESSURE, AND PUMP FLOW DECREASES. TOTAL FEED FLOW DECREASES AND REACTOR WATER LEVEL DECREASES. A RECIRC PUMP RUNBACK MAY OCCUR DUE TO THE DECREASED FEED FLOW. THE OTHER RUNNING RFP'S SPEED INCREASE TO MAINTAIN REACTOR WATER LEVEL. IF THE SIGNAL IS FAILED HIGH (IN RELATION TO THE INITIAL SIGNAL) RFP SPEED, DISCHARGE PRESSURE, AND FLOW INCREASES. TOTAL FEED FLOW AND REACTOR WATER LEVEL INCREASES. THE OTHER RFP'S SPEED DECREASE TO MAINTAIN REACTOR WATER LEVEL. THE OPERATOR MAY PLACE THE EFFECTED RFP M/A CONTROLLER IN MANUAL AND CONTROL RFP SPEED TO MITIGATE THE EFFECTS OF THE MALFUNCTION.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RFP LO FLOW - C205L
B RFP LO FLOW - C205L
C RFP LO FLOW - C205L

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE OPERATION OF THE EFFECTED M/A STATION TO NORMAL.

REF: M-308 FEEDWATER & FEED PUMPS P&ID, M-1-T-8 FEEDWATER CONTROL SYSTEM T.E.D., M-1-JJ-104 FEEDWATER CONTROL SYSTEM SEK.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	FQU NO.

FWC02 RFP MASTER CONTROLLER FAILURE C001

TYPE:DISCRETE, VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE OF MASTER CONTROLLER CAUSES OUTPUT OF THE AUTOMATIC FUNCTION OF THE CONTROLLER TO FAIL TO THE INSTRUCTOR SPECIFIED VALUE. 100% IS EQUIVALENT TO 20MA OUTPUT. THIS MALFUNCTION DOES NOT AFFECT THE MANUAL OPERATION OF THE CONTROLLER.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES THE AUTO OUTPUT OF THE RFP MASTER CONTROLLER TO FAIL TO THE INSTRUCTORS SPECIFIED VALUE. FEED PUMP SPEED WILL INCREASE OR DECREASE DEPENDING UPON THE INITIAL RFP SPEED AND THE FAILED VALUE. IF THE SIGNAL IS FAILED LOW, RFP SPEEDS, DISCHARGE PRESSURES, AND PUMP FLOWS DECREASE. TOTAL FEED FLOW DECREASES AND REACTOR WATER LEVEL DECREASES. A RECIRC PUMP RUNBACK MAY OCCUR DUE TO THE DECREASED FEED FLOW. IF THE SIGNAL IS FAILED HIGH (IN RELATION TO THE INITIAL SIGNAL) RFP SPEEDS, DISCHARGE PRESSURES, AND FLOWS INCREASE. TOTAL FEED FLOW AND REACTOR WATER LEVEL INCREASES. THE REACTOR HI/LO WATER LEVEL ANNUNCIATOR AND REACTOR/TURBINE TRIPS MAY OCCUR DEPENDING UPON THE CHANGE IN SPEED AND THE TIME THE FEED PUMPS ARE OPERATED AT THE FAILED VALUE. THE OPERATOR MAY PLACE THE MASTER CONTROLLER IN MANUAL AND CONTROL RFP SPEED TO MITIGATE THE EFFECTS OF THE MALFUNCTION, OR PLACE THE INDIVIDUAL RFP M/A STATIONS IN MANUAL TO CONTROL INDIVIDUAL FEED PUMP SPEED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RFP LO FLOW - C205L
B RFP LO FLOW - C205L
C RFP LO FLOW - C205L
REACTOR HI/LO WATER LEVEL - C205L

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE OPERATION OF THE MASTER CONTROLLER TO NORMAL.

REF: M-30B FEEDWATER FEED PUMPS P&ID, M-1-T-8 FEEDWATER CONTROL SYSTEM I.E.D., M-1-JJ-104 FEEDWATER CONTROL SYSTEM TEK.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
FWC03	RFP MASTER CONTROLLER OSCILLATION	C001

TYPE:DISCRETE, VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE OF MASTER CONTROLLER AUTOMATIC FUNCTION CAUSES THE AUTO OUTPUT TO OSCILLATE WITH A 30 SECOND PERIOD. 100% IS EQUIVALENT TO 20% PEAK TO PEAK OSCILLATION. THIS MALFUNCTION DOES NOT AFFECT THE MANUAL OPERATION OF THE CONTROLLER.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES THE AUTO OUTPUT OF THE RFP MASTER CONTROLLER TO OSCILLATE AT A PERIOD OF 30 SECONDS. RFP SPEEDS, DISCHARGE PRESSURES, AND PUMP FLOWS OSCILLATE. TOTAL FEED FLOW AND REACTOR WATER LEVEL OSCILLATES. A RECIRC PUMP RUNBACK MAY OCCUR DUE TO THE DECREASED FEED FLOW. THE OPERATOR MAY PLACE THE MASTER CONTROLLER IN MANUAL AND CONTROL RFP SPEED TO MITIGATE THE EFFECTS OF THE MALFUNCTION.

THE INDIVIDUAL RFP M/A STATIONS CAN ALSO BE PLACED IN MANUAL TO CONTROL INDIVIDUAL FEED PUMP SPEED.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE OPERATION OF THE MASTER CONTROLLER TO NORMAL.

REF: M-308 FEEDWATER & FEED PUMPS P&ID, M-1-T-9 FEEDWATER CONTROL SYSTEM I.E.D., M-1-JJ-104 FEEDWATER CONTROL SYSTEM SEK.

REV. 2

TABLE I.C-3
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
FWC04	FW FLOW TRANSMITTER FT-5D FAILURE	1-013

TYPE:GENERIC (A,B,C) VARIABLE, 0-100%

CAUSE:ELECTRONIC FAILURE OF FT-5DA/B/C CAUSES OUTPUT TO FAIL TO THE INSTRUCTOR SPECIFIED VALUE. 100% IS EQUIVALENT TO 50MA OUTPUT OR 100% OF SCALE OR RANGE. CONVERSELY, 0% SEVERITY IS EQUIVALENT TO 10MA OUTPUT OR 1% OF SCALE OR RANGE.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES FLOW TRANSMITTER FT-5D TO FAIL TO THE INSTRUCTORS SPECIFIED VALUE 0-100%, WHERE 0% IS 10MA AND 100% IS 50MA. INDIVIDUAL FEED FLOW INDICATION ON FR-2565 (PANEL C05A) GOES TO THE FAILED VALUE. THE CHANGE IN TRANSMITTER OUTPUT IS SUMMED WITH THE OTHER TWO INDIVIDUAL FEED FLOWS AND A FEED FLOW/STEAM FLOW ERROR SIGNAL IS GENERATED. THE FEEDWATER CONTROL SYSTEM RESPONDS BY INCREASING/DECREASING FEED PUMP SPEED TO RAISE OR LOWER REACTOR WATER LEVEL. REACTOR WATER LEVEL THEN STABILIZES AT A SLIGHTLY HIGHER/LOWER LEVEL. THE RECIRC PUMP RUNBACK CIRCUIT WILL ALSO SENSE THE FAILED FEED FLOW SIGNAL AND MAY CAUSE A RECIRC PUMP RUNBACK OR INHIBIT A RECIRC PUMP RUNBACK FROM OCCURING.
INSERTION OF THIS MALFUNCTION WILL HAVE NO EFFECT IF THE FWLC SYSTEM IS IN SINGLE ELEMENT CONTROL.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE OPERATION OF THE EFFECTED FLOW TRANSMITTER TO NORMAL.

REF: M-306 FEEDWATER & FEED PUMPS P&ID, M-1-T-3 FEEDWATER CONTROL SYSTEM I.E.D., M-1-JJ-104 FEEDWATER CONTROL SYSTEM SEK.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
FWC05	FW TEMP TRANSMITTER TT-80 FAILURE	14020

TYPE:GENERIC (A-C) VARIABLE, 0-100%

CAUSE:ELECTRONIC FAILURE OF TT-80A/B/C CAUSES OUTPUT TO FAIL TO THE INSTRUCTOR SPECIFIED VALUE. 100% IS EQUIVALENT TO 50MA OUTPUT OR 100% OF SCALE OR RANGE. CONVERSELY, 0% SEVERITY IS EQUIVALENT TO 10MA OUTPUT OR 0% OF SCALE OR RANGE.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES TEMPERATURE TRANSMITTER TT-80 TO FAIL TO THE INSTRUCTORS SPECIFIED VALUE 0-100%, WHERE 100% IS 50MA OR FULL SCALE AND 0% IS 10MA. TT-80 PROVIDES THE DENSITY COMPENSATION FOR THE FEEDWATER FLOW TRANSMITTERS. IF THE TEMPERATURE TRANSMITTER IS FAILED HIGHER THAN ITS ACTUAL VALUE, INDIVIDUAL FEED FLOW INDICATION ON FR-2565 (PANEL C05A) DECREASES. THE CHANGE IN INDIVIDUAL FEED FLOW IS SUMMED WITH THE OTHER TWO INDIVIDUAL FEED FLOWS AND A FEED FLOW/STEAM FLOW ERROR SIGNAL IS GENERATED. THE FEEDWATER CONTROL SYSTEM RESPONDS BY INCREASING FEED PUMP SPEED AND RAISING REACTOR WATER LEVEL. REACTOR WATER LEVEL THEN STABILIZES AT A SLIGHTLY HIGHER LEVEL. IF THE TEMPERATURE TRANSMITTER IS FAILED IN THE OPPOSITE DIRECTION, SIMILAR BUT OPPOSITE EFFECTS WILL BE OBSERVED.

INSERTION OF THIS MALFUNCTION WILL HAVE NO EFFECTS IF THE FWLC SYSTEM IS IN SINGLE ELEMENT CONTROL.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RFP LO FLOW - C205L
B RFP LO FLOW - C205L
C RFP LO FLOW - C205L
REACTOR HI-LO WATER LEVEL - C205L

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE OPERATION OF THE EFFECTED TEMPERATURE TRANSMITTER TO NORMAL.

REF: 1-3DS FEEDWATER & FEED PUMPS P&ID, M-1-FW-2 FEEDWATER CONTROL SYSTEM I.E.D., M-1-JJ-104 FEEDWATER CONTROL SYSTEM SEK.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

FWC06 FW TEMP TRANSMITTER TT-1b8 FAILURE 0b110

TYPE:GENERIC (A-D) VARIABLE, 0-100%

CAUSE:ELECTRONIC FAILURE OF TT-1b8A/B/C/D CAUSES OUTPUT TO FAIL TO THE INSTRUCTOR SPECIFIED VALUE. 100% IS EQUIVALENT TO 50MA OUTPUT OR 100% OF SCALE OR RANGE. CONVERSELY, 1% SEVERITY IS EQUIVALENT TO .5MA OUTPUT OR 1% OF SCALE OR RANGE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE FEEDWATER TEMPERATURE TRANSMITTER TT-1b8A (B/C/D) TO FAIL TO THE INSTRUCTORS SPECIFIED VALUE 0-100%, WHERE 100% IS EQUIVALENT TO 50MA OUTPUT OR 100% OF SCALE OR RANGE. REACTOR FEEDWATER INLET TEMPERATURE INDICATION ON PPC POINTS R029, R030, R031, AND R032 INDICATE THE FAILED VALUE. THIS WOULD CAUSE CHANGES IN THE CORE THERMAL POWER CALCULATIONS (CTPSUR) IN THE PPC OF THE REFERENCE PLANT, HOWEVER, DUE TO THE SIMPLIFICATIONS USED IN THE OD MATH MODEL AND THE PPC MODELS (SEE SIMPLIFICATION PCS21 OF THE PROCESS COMPUTER PDS), THE FAILURE OF THE TEMPERATURE TRANSMITTERS WILL NOT AFFECT THE SIMULATED OD PROGRAMS OR CORE THERMAL POWER CALCULATION.

NO ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE TEMPERATURE TRANSMITTER TO NORMAL.

REF: PLANT PROCESS COMPUTER OPERATING AND MAINTENANCE INSTRUCTIONS VOL. 1

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
FWC07	FWC FUNCTION GENERATOR FAILS LOW	14230

TYPE:GENERIC (A-C)

CAUSE:ELECTRONIC FAILURE CAUSES THE OUTPUT OF THE FUNCTION GENERATOR TO FAIL LOW.

PLT STA:100% POWER

EFFECTS:INITIATION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED FEEDWATER CONTROLLER FUNCTION GENERATOR TO FAIL LOW. THE FAILED CONTROL SIGNAL IS REMOVED BY THE CONTROL SIGNAL FAILURE ALARM UNIT CAUSING FEED PUMP SPEED TO REMAIN CONSTANT. THE CONTROL SIGNAL LOCKOUT TRIPS ON PANEL C05A WITH THE WHITE INDICATOR ILLUMINATING ABOVE THE LOCKOUT AND THE AMBER INDICATOR GOING OUT. THE MOTOR GOVERNOR UNIT CONTROL WILL THEN BE INHIBITED UNTIL THE MALFUNCTION IS REMOVED AND THE CONTROL SIGNAL LOCKOUT IS RESET. THE OPERATOR MAY LOWER FEED PUMP SPEED BELOW IT'S FAILED VALUE USING THE MOTOR SPEED CHANGER. IF THE MOTOR SPEED CHANGER IS NOT ON IT'S HIGH SPEED STOP, AND THE HYDRAULIC JACK IS ENERGIZED, THE MOTOR SPEED CHANGER CAN BE USED TO CONTROL RFP SPEED THROUGHOUT IT'S ENTIRE RANGE OF SPEED.

THE ANNUNCIATOR DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

FEEDWATER PUMP TURBINE CONTROL SIGNAL FAILURE & MA - B05L
A/B/C RFPT FAILURE - B06L

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE FUNCTION GENERATOR TO NORMAL AND ALLOWS THE OPERATOR TO PLACE THE MGU IN SERVICE BY RESETTING THE CONTROL SIGNAL LOCKOUT AND DEENERGIZING THE HYDRAULIC JACK.

REF: M-1-S-25 FEEDWATER CONTROL SYSTEM ELECTRICAL DIAGRAM, E-119 SH.1 REACTOR FEED PUMP CONTROL SCHEME ELECTRICAL SCHEMATIC DIAGRAM, FEEDWATER CONTROL SYSTEM GEK.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
FWC08	FEEDWATER PUMP MGU 120 VAC POWER LOSS	14250

TYPE:DISCRETE (A-C)

CAUSE:OPEN IN POWER SUPPLY TO MOTOR GEAR UNIT

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED FEEDWATER CONTROLLER MOTOR GEAR UNIT TO LOSE 120V AC POWER. FEEDWATER SPEED REMAINS CONSTANT, REGARDLESS OF MGU AUTO OR MANUAL OUTPUT SIGNAL, AND THE RFPT FAILURE ANNUNCIATOR ACTUATES FOR THE AFFECTED FEED PUMP. IF THE MOTOR SPEED CHANGER IS NOT ON IT'S HIGH SPEED STOP, THE OPERATOR MAY ENERGIZE THE HYDRAULIC JACK AND CONTROL THE SPEED (BOTH INCREASE AND DECREASE) USING THE MOTOR SPEED CHANGER.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RFPT FAILURE - 206L
B RFPT FAILURE - 206L
C RFPT FAILURE - 206L

REMOVAL OF THE MALFUNCTION RESTORES 120V AC TO THE MOTOR CONTROL UNIT CAUSING THE MGU TO RESPOND TO MANUAL AND AUTOMATIC SIGNALS IF THE HYDRAULIC JACK IS DEENERGIZED.

REF: 4-1-3-25 FEEDWATER CONTROL SYSTEM ELECTRICAL DIAGRAM, E-129 SH. 1 REACTOR FEED PUMP CONTROL SCHEME ELECTRICAL SCHEMATIC DIAGRAM, FEEDWATER CONTROL SYSTEM GEK.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
FWC09	STARTUP FW REG VALVE CONTROLLER FAILURE	C093

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:ELECTRONIC FAILURE OF CONTROLLER CAUSES THE AUTOMATIC OUTPUT TO FAIL TO THE INSTRUCTOR SPECIFIED VALUE. 100% SEVERITY IS EQUIVALENT TO 100% OF THE CONTROLLER OUTPUT. THIS MALFUNCTION DOES NOT AFFECT THE MANUAL OPERATION OF THE CONTROLLER.

STA:REACTOR STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION WILL CAUSE THE STARTUP FW REG VALVE CONTROLLER (LC-8091) AUTO OUTPUT TO FAIL TO THE INSTRUCTOR SPECIFIED VALUE 0-100%, WHERE 0%=10 MA AND 100%=50 MA. THE EFFECT OF THIS MALFUNCTION WILL BE TO INCREASE OR DECREASE THE FLO RATE THRU AO-8091. FR-2565 (PANEL C05) WILL INDICATE THE CHANGE IN FLOW FROM C RFP. REACTOR WATER LEVEL WILL INCREASE OR DECREASE, DEPENDING UPON THE FAILED POSITION OF THE CONTROLLER. ALARMS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A/B/C RFP LO FLOW - 205L
REACTOR HI-LO WATER LEVEL - 205L

THE OPERATOR MAY TAKE THE LEVEL CONTROLLER TO MANUAL AND ADJUST AO-8091 POSITION IF DESIRED.

REMOVAL OF THIS MALFUNCTION WILL RETURN LC-8091 TO TO NORMAL OPERATION.

REF: M-1-T-8 FEEDWATER CONTROL SYSTEM I.E.D, M-30B FEEDWATER AND FEED PUMPS P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
FWC10	STARTUP FW REG VALVE CONTROLLER OSCILLATION	C093

TYPE:DISCRETE, VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE OF LC-3091 CAUSES THE CONTROLLER AUTOMATIC OUTPUT TO OSCILLATE WITH A 30 SECOND PERIOD. 100% SEVERITY IS EQUIVALENT TO AN OSCILLATION OF 10% OR A 20% PEAK TO PEAK DIFFERENCE. THIS MALFUNCTION DOES NOT AFFECT THE MANUAL OPERATION OF THE CONTROLLER.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE AUTO OUTPUT OF LC-3091 TO OSCILLATE AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS A 10% INCREASE AND 10% DECREASE FROM IT'S CURRENT VALUE. AO-3091 POSITION OSCILLATES CAUSING FLOW THRU C RFP TO OSCILLATE. SMALL CHANGES IN REACTOR WATER LEVEL MAY OCCUR, DEPENDING UPON INITIAL PLANT CONDITIONS AND SEVERITY SELECTED. THE OPERATOR MAY PLACE LC-3091 IN MANUAL AND CONTROL VALVE POSITION WHICH WILL CAUSE THE OSCILLATIONS TO CEASE.

NO ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF LC-3091 TO NORMAL.

REF: M-308 FEEDWATER AND FEED PUMPS P&ID, M-1-T-8 FEEDWATER CONTROL SYSTEM I.E.D, M-1-3-[illegible] FEEDWATER CONTROL SYSTEM ELECTRICAL DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MCS05	CONDENSATE PUMP TRIP	03250

TYPE:GENERIC, (A,B,C)

CAUSE:AN INTERNAL SHORT DEVELOPS IN THE MOTOR WHICH CAUSES THE MOTOR TO TRIP ON OVERCURRENT.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR * SPECIFIED MAIN CONDENSATE PUMP TO DEVELOP AN INTERNAL SHORT. MAIN CONDENSATE PUMP AMPS INCREASE UPSCALE, THE PUMP'S SUPPLY BREAKER TRIPS, AMPS DECREASE TO 0, AND A LOCAL LOCKOUT RELAY TRIPS. THE RECIRC PUMP'S RUNBACK TO 80% SPEED, THE FEED PUMPS ARE LIMITED TO 90% SPEED, REACTOR PRESSURE DECREASES AND THE CONTROL VALVES CLOSE TO MAINTAIN REACTOR PRESSURE. GENERATOR OUTPUT AND REACTOR POWER DECREASE. MAIN FEED PUMP SUCTION PRESSURES AND MAIN CONDENSATE PUMP DISCHARGE HEADER PRESSURE DECREASES SLIGHTLY.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A/B/C CONDENSATE PUMP OVERLOAD - 207L
A/B/C CONDENSATE PUMP BREAKER TRIP - 207L
A/B RECIRC FLOW LIMIT - 204M

REMOVAL OF THE MALFUNCTION RESTORES THE MAIN CONDENSATE PUMP MOTOR TO NORMAL .

REF: E-131 UNIT AUX SWGR COND PUMPS 13.8 KV BREAKER ELECTRICAL SCHEMATIC DIAGRAM, 1-107 CONDENSATE SYSTEM P&ID, M-1-S-4-20 VARIABLE SPEED RECIRC PUMP, M-1-T-3 FEEDWATER CONTROL SYSTEM TED.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

MCS06 CONDENSATE DEMIN RESIN DEPLETION 06080

TYPE:GENERIC (A-H,J,K), VARIABLE 0-100%

CAUSE:THE RESIN IN THE SELECTED DEMINERALIZER EXHAUSTS.
100% SEVERITY IS EQUIVALENT TO THE EFFLUENT CONDUCTIVITY
BEING 100% OF THE INFLUENT CONDUCTIVITY.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES EXHAUSTION OF A SELECTED CONDENSATE DEMINERALIZER AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO THE EFFLUENT CONDUCTIVITY BEING 100% OF THE INFLUENT CONDUCTIVITY. THE CONDUCTIVITY INCREASE WILL BE LINEAR WITH RESPECT TO THE SEVERITY SELECTED. AT 100% SEVERITY, THE DEMIN EFFLUENT CONDUCTIVITY INCREASES TO THE VALUE OF INFLUENT CONDUCTIVITY CAUSING A TURBINE BLDG SAMPLING STATION #1 ANNUNCIATOR TO ACTUATE. RWCU INLET CONDUCTIVITY INCREASES AS THE CONDENSATE DEMINERALIZER OUTLET CONDUCTIVITY INCREASES. IF THE OPERATOR ATTEMPTS TO REGENERATE THE FAILED DEMINERALIZER, NO EFFECTS OF THE REGENERATION WILL BE OBSERVED UNTIL THE MALFUNCTION IS REMOVED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

TURBINE BLDG SAMPLING STATION 1 TROUBLE - 207R

REMOVAL OF THE MALFUNCTION ALLOWS THE OPERATOR TO REGENERATE THE RESIN IN THE AFFECTED DEMINERALIZER AND RETURN IT TO SERVICE USING REMOTE FUNCTIONS.

REF: M-311 CONDENSATE FILTER/DEMIN SYSTEM P&ID, M-307 CONDENSATE SYSTEM P&ID, M-326 PROCESS SAMPLING SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MCS07	CONDENSATE FILTER/DEMIN RESIN INJECTION	06080

TYPE:GENERIC (A-H,J,K),, VARIABLE (0-100%)

CAUSE:FAILURE OF FILTER/DEMINERALIZER RETENTION ELEMENT. 100% SEVERITY IS EQUIVALENT TO ALL THE RESIN IN ONE FULL DEMINERALIZER BEING RELEASED.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A FILTER DEMIN UNIT TO INJECT RESIN INTO THE CONDENSATE EFFLUENT HEADER AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS EQUIVALENT TO ALL THE RESIN CONTAINED IN 1 FILTER DEMIN. F/D EFFLUENT CONDUCTIVITY INCREASES CAUSING A TURBINE BLDG. SAMPLING STATION 1 TROUBLE ANNUNCIATOR TO ACTUATE. THE RESIN IS INJECTED INTO THE CORE BY THE FEED SYSTEM WHERE THE RESIN BEADS MELT AND DISPERSE THROUGHOUT THE CORE COOLANT. RWCU INLET CONDUCTIVITY INCREASES AND COOLANT ACTIVITIES INCREASE CAUSING A RESULTANT INCREASE IN THE RADIATION MONITOR INDICATIONS THROUGHOUT THE PLANT.

THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

TURBINE BLDG SAMPLING STATION 1 TROUBLE - C207R
CLEANUP FILTER DEMIN IN/OUT HI CONDUCTIVITY - C204R
MAIN STAEM LINE HI RAD - C210

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-311 CONDENSATE FILTER/DEMIN SYSTEMS P&ID, M-307 CONDENSATE SYSTEM P&ID, M-26 PROCESS SAMPLING SYSTEM P&ID, M-354 RWCU SYSTEM P&ID, M-355 RWCU FILTER AND DEMIN SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MCS0B	EXHAUST HOOD SPRAY VALVE FAILS CLOSED	18110

TYPE:DISCRETE

CAUSE:PRESSURE SELECTING RELAY PY-2514 FAILS CAUSING CV-2514 TO FAIL CLOSED.

PLT STA:TURBINE SYNCHRONIZATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE MAIN TURBINE EXHAUST HOOD SPRAY VALVE TO FAIL CLOSED. IF THE SPRAY VALVE IS OPEN WHEN THE MALFUNCTION IS INSERTED, EXHAUST HOOD SPRAY PRESSURE DECREASES AS INDICATED ON PANEL C08A. EXHAUST HOOD TEMPERATURES INCREASE AS INDICATED ON TR-2458 ON PANEL C08B AND THE PPC. WHEN ANY EXHAUST HOOD TEMPERATURE INDICATION ON TR-2458 REACHES 175 DEGREES, THE EXHAUST HOOD HIGH TEMPERATURE ANNUNCIATOR ACTUATES. WHEN TEMPERATURE REACHES 225 DEGREES, THE MAIN TURBINE TRIPS. THE BYPASS VALVES OPERATE TO MAINTAIN REACTOR PRESSURE. THE OPERATOR MAY MITIGATE THE EFFECTS OF THE MALFUNCTION BY OPENING THE EXHAUST HOOD SPRAY BYPASS VALVE MO-2543 ON PANEL C08A.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A/B/C EXHAUST HOOD HI TEMP - 208R
EXHAUST HOOD HI TEMP TRIP - 208R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF PY-2544 TO NORMAL.

REF: M-307 CONDENSATE SYSTEM P&ID, M-303 MAIN STEAM BYPASS & CROSSAROUND SYSTEM P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

MFS01 REACTOR FEEDWATER PUMP TRIP 15120

TYPE:GENERIC (A-C)

CAUSE:PRESSURE SWITCH PS-2137A/B/C FAILS LOW CAUSING LOW SUCTION PRESSURE TRIP OF RFP.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED REACTOR FEED PUMP TO TRIP. THE SELECTED FEED PUMP'S DISCHARGE PRESSURE, TURBINE SPEED, DISCHARGE FLOW, AND STOP VALVE POSITION DECREASES TO 0. REACTOR WATER LEVEL DECREASES CAUSING THE REMAINING FEED PUMPS SPEED TO INCREASE TO ATTEMPT TO MAINTAIN LEVEL. WHEN LEVEL DECREASES TO 17 INCHES, A RECIRC PUMP RUNBACK OCCURS, LOWERING THE RECIRC PUMP'S SPEED TO 60%. REACTOR PRESSURE DECREASES AND THE CONTROL VALVES CLOSE TO MAINTAIN REACTOR PRESSURE. GENERATOR OUTPUT AND REACTOR POWER DECREASE. THE RUNNING FEED PUMPS OPERATE TO RECOVER REACTOR WATER LEVEL AND THE PLANT STABILIZES AT A LOWER POWER LEVEL. THE AFFECTED RFPT WILL NOT RESET UNTIL MALFUNCTION REMOVAL.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A/B/C RFPT TRIP - 206L
A/B/C RFP LO FLOW - 205L
REACTOR HI/LO LEVEL - 205L
A/B RECIRC FLOW LIMIT - 204M

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE EFFECTED PRESSURE SWITCH TO NORMAL AND ALLOWS THE OPERATOR TO RESET THE RFPT TURBINE.

REF: M-1-3-4-20 VARIABLE SPEED RECIRC PUMP, M-1-T-8 FEEDWATER CONTROL SYSTEM IED, M-3[illegible]5 FEEDWATER AND FEEDPUMPS P&ID.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

MFS02 REACTOR FEEDWATER PUMP HIGH VIBRATION 12100

TYPE:GENERIC (A-C) VARIABLE 0-100%

CAUSE:MISALIGNMENT OF TURBINE/PUMP FLEXIBLE COUPLING. 100% SEVERITY IS EQUIVALENT TO 5 TIMES THE NORMAL VIBRATION INDICATION.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTORS SPECIFIED REACTOR FEED PUMP VIBRATION TO INCREASE 0-100%, WHERE 100% IS 5 TIMES THE NORMAL VIBRATION INDICATION. VIBRATION INDICATION ON THE RECORDER ON PANEL C08B INCREASES AND CAUSES THE RFPT HIGH VIBRATION ANNUNCIATOR TO ACTUATE IF VIBRATION REACHES 4 MILS. IF VIBRATION REACHES 5 MILS, THE RFPT TRIPS.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A/B/C RFPT HI VIBRATION - 208R
A/B/C RFPT TRIP - 206L

REMOVAL OF THE MALFUNCTION RESTORES THE RFPT TURBINE/PUMP FLEXIBLE COUPLING ALIGNMENT TO NORMAL.

REF: M-108 FEEDWATER AND FEEDPUMPS P&ID, M4-43 STEAM TURBINE BOILER FEED PUMP DRIVE GEK.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MFS03	REACTOR FEEDWATER PUMP LOSS OF LUBE OIL	12020

TYPE:GENERIC (A-C)

CAUSE:DUAL OIL FILTER CLOGGED

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED RFP'S DUAL OIL FILTER TO CLOG. THE RFPT LO OIL PRESSURE ANNUNCIATOR ACTUATES AND THE REACTOR FEED PUMP TRIPS. THE SELECTED FEED PUMP'S DISCHARGE PRESSURE, TURBINE SPEED, DISCHARGE FLOW AND STOP VALVE POSITION DECREASES TO 0. REACTOR WATER LEVEL DECREASES CAUSING THE REMAINING FEED PUMPS SPEED TO INCREASE IN AN ATTEMPT TO MAINTAIN LEVEL. WHEN LEVEL DECREASES TO 17 INCHES, A RECIRC PUMP RUNBACK OCCURS, LOWERING THE RECIRC PUMP'S SPEED TO 50%. REACTOR PRESSURE DECREASES AND THE CONTROL VALVES CLOSE TO MAINTAIN REACTOR PRESSURE. GENERATOR OUTPUT AND REACTOR POWER DECREASE. THE RUNNING FEED PUMPS OPERATE TO RECOVER REACTOR WATER LEVEL AND THE PLANT STABILIZES AT A LOWER POWER LEVEL. THE AFFECTED RFPT WILL NOT RESET UNTIL MALFUNCTION REMOVAL.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A/B/C RFPT LO OIL PRESS - 206P
A/B/C RFPT TRIP - 206L
A/B/C RFP LO FLOW - 206L
REACTOR HI/LO LEVEL - 205L
A/B RE TRC FLOW LIMIT - 204M

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE EFFECTED DUAL OIL FILTER TO NORMAL.

REF: M-1-3-4-10 VARIABLE SPEED RECIRC PUMP, M-1-T-8 FEEDWATER CONTROL SYSTEM IED, M-303 FEEDWATER AND FEEDPUMPS P&ID, M4-43 STEAM TURBINE BOILER FEED PUMP DRIVE SEK.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

MFS04 REACTOR FEEDWATER PUMP MINIMUM FLOW VALVE FAILS OPEN 1010

TYPE:GENERIC (A-C)

CAUSE:FLOW ELEMENT LOW FLOW SWITCH (213PA,213PB,213PC)
FAILS LOW

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED RFP MIN FLOW VALVE TO FAIL OPEN. THE ASSOCIATED PUMP'S LOW FLOW ANNUNCIATOR ACTUATES DUE TO THE FLOW SWITCH FAILURE. SENSED DISCHARGE FLOW FROM THE ASSOCIATED FEED PUMP DECREASES AS THE MIN FLOW VALVE DIVERTS FEEDWATER FLOW TO THE MAIN CONDENSER. THE FEEDWATER CONTROL SYSTEM WILL INCREASE THE SPEED OF ALL THREE RFP'S TO COMPENSATE FOR THE DECREASE IN SENSED FLOW. REACTOR WATER LEVEL MAY DECREASE SLIGHTLY, THEN RETURN TO NORMAL. IF THE ASSOCIATED FEED PUMP'S SUCTION VALVE IS CLOSED WHEN THE MALFUNCTION IS INSERTED, THE MIN FLOW VALVE WILL NOT OPEN.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A/B/C RFP FLOW - 205L

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE EFFECTED FLOW SWITCH TO NORMAL AND CLOSES THE MIN FLOW VALVE IF THE INDIVIDUAL FEED FLOW IS GREATER THAN ABOUT 2000 GPM.

REF: M-1-T-3 FEEDWATER CONTROL SYSTEM IED, M-303 FEED WATER AND FEEDPUMPS P&ID, E-150 RFPT VALVES-SELONOID OPERATORS ELECTRICAL SCHEMATIC DIAGRAM

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MFS05	REACTOR FEEDWATER PUMP MINIMUM FLOW VALVE FAILS CLOSED	10100

TYPE:GENERIC (A-C)

CAUSE:FLOW ELEMENT LOW FLOW SWITCH (213PA,213PB,213PC) FAILS HIGH

PLT STA:FEED PUMP STARTUP.

EFFECTS:WHEN THIS MALFUNCTION IS INSERTED ON A MAIN FEED PUMP'S MIN. FLOW VALVE AND FLOW THRU THE PUMP IS LESS THAN 2000 GPM, THE MIN FLOW CLOSES. THE ASSOCIATED INDIVIDUAL FEED FLOW AS INDICATED ON FR-2555 INCREASES. THE FEED PUMP'S DISCHARGE PRESSURE INCREASES AND THE FEED OUTLET TEMPERATURE INCREASES AS INDICATED ON THE PPC DUE TO LESS ACTUAL FLOW THRU THE PUMP. REACTOR WATER LEVEL MAY INCREASE DEPENDING UPON THE MODE BEING USED TO CONTROL LEVEL. AT VERY LOW FEED PUMP FLOWS AND DISCHARGE PRESSURES, FEED FLOW MAY BE OBSERVED TO BE OSCILLATING INDICATING THAT THE FEED PUMP DISCHARGE CHECK VALVE IS OPENING AND CLOSING. THE ASSOCIATED FEED PUMP'S LOW FLOW ANNUNCIATOR WILL NOT ACTUATE WHILE THE MALFUNCTION IS ACTIVE DUE TO THE FAILURE OF THE FLOW SWITCH. THE OPERATOR MAY OPEN THE MIN FLOW VALVE BY TAKING IT'S HAND SWITCH TO OPEN, HOWEVER WHEN THE HAND SWITCH IS RELEASED, THE VALVE WILL CLOSE.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE FLOW SWITCH TO NORMAL.

REF: 1-1-T-3 FEEDWATER CONTROL SYSTEM IED, 1-308 FEEDWATER AND FEEDPUMPS P&ID, E-159 RFPT VALVES-SOLENOID OPERATORS ELECTRICAL SCHEMATIC DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MFS06	FEEDWATER HEATER TUBE LEAK	17000

TYPE:GENERIC (L-O)

CAUSE:FEEDWATER HEATER TUBE RUPTURE. 100% SEVERITY IS EQUIVALENT TO 200 GPM AT NORMAL OPERATING PRESSURE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A FEED WATER HEATER TUBE LEAK AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO 200 GPM AT NORMAL OPERATING PRESSURE. CONDENSATE FLOWS TO THE SHELL SIDE OF THE FEEDWATER HEATER THRU THE RUPTURE. THE LEVEL IN THE AFFECTED HEATER WILL INCREASE AND DRAIN FLOW FOR THE AFFECTED HEATER WILL INCREASE IF THIS MALFUNCTION IS INSERTED ON THE 5TH, 4TH, OR 3RD STAGE HEATERS IN ANY STRING, THE INCREASED DRAIN FLOW WILL BE INDICATED ON FR-2042 AND FR-2050. IF THE MALFUNCTION IS INSERTED ON THE 2ND OR 1ST STAGE HEATERS IN ANY STRING, THE INCREASED DRAIN FLOW WILL BE INDICATED ON FR-2050 ONLY. DRAIN TEMPERATURES DECREASE FOR THE AFFECTED HEATER AND THE SUBSEQUENT HEATERS IN THE HEATER STRING. FEEDWATER TEMPERATURES DECREASE FOR THE AFFECTED HEATER AND THE SUBSEQUENT HEATERS IN THE HEATER STRING. THE FEEDWATER HEATERS HIGH LEVEL DUMP VALVE MAY OPEN TO DRAIN WATER FROM THE FEEDWATER HEATER TO THE MAIN CONDENSER IF THE FLOW FROM THE TUBE SIDE TO THE SHELL SIDE OF THE FEEDWATER HEATER IS GREATER THAN THE MAXIMUM NORMAL DRAIN FLOW. REACTOR POWER MAY INCREASE DUE TO THE COLDER FEEDWATER, AND PLANT EFFICIENCY DECREASES.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A1/2/3/4/5 HEATER HI LEVEL - 206L
B1/2/3/4/5 HEATER HI LEVEL - 206L
C1/2/3/4/5 HEATER HI LEVEL - 206L

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-306 VENTS AND DRAINS FOR DRAIN COOLERS AND HEATERS A1 THRU C2 P&ID, M-306 VENTS AND DRAINS HEATERS 3,4, AND 5 P&ID, M-308 FEEDWATER AND FEEDPUMPS P&ID, M-307 CONDENSATE SYSTEM P&ID.

TABLE 2.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MFS07	LOSS OF AIR TO RFP C DISCHARGE BYPASS VALVE	13120

TYPE:DISCRETE

CAUSE:I/P 8091 FAILURE CAUSES AO-8091 TO FAIL CLOSED.

PLT STA:REACTOR STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE C RFP BYPASS VALVE AO-8091 TO FAIL CLOSED. THE POSITION INDICATOR ON PANEL C05A INDICATES CLOSED, C RFP FLOW DECREASES TO 0, CONDENSATE PUMP DISCHARGE PRESSURE INCREASES, PUMP AMPS DECREASE, AND THE CONDENSATE RECIRC VALVE AUTO OPENS IF THE TOTAL FLOW AS INDICATED ON FI-2709 DECREASES LESS THAN THE SETPOINT OF FC-2110. IF THE CONDENSATE RECIRC VALVE OPENS, CONDENSATE PUMP DISCHARGE PRESSURE DECREASES AND PUMP AMPS INCREASE. REACTOR WATER LEVEL WILL REFLECT THE LOSS OF FLOW FROM AO-8091 IF WATER IS BEING ADDED TO THE REACTOR. AO-8091 WILL NOT RESPOND TO CHANGES IN LIC-8091 OUTPUT.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF I/P 8091 TO NORMAL.

REF: M-305 FEEDWATER AND FEEDPUMPS P&ID, M-307 CONDENSATE SYSTEM P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MFS08	LOSS OF AIR TO RFP BYPASS VALVE CV-2558	18130

TYPE:DISCRETE

CAUSE:E/P RELAY FAILURE CAUSES CV-2558 TO FAIL CLOSED.

PLT STA:REACTOR STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES CV-2558 TO FAIL CLOSED. THE POSITION INDICATION ON PANEL C05A INDICATES CLOSED. FLOW INDICATION ON FI-2709 DECREASES AND CAUSES THE CONDENSATE RECIRC VALVE TO OPEN TO RECIRCULATE THE DISCHARGE OF THE CONDENSATE PUMPS TO THE MAIN CONDENSER. REACTOR WATER LEVEL WILL REFLECT THE LOSS OF FLOW FROM CV-2558. CV-2558 WILL NOT RESPOND TO CHANGES IN LIC-2558 OUTPUT.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE E/P RELAY TO NORMAL.

REF: M-308 FEEDWATER AND FEEDPUMPS P&ID, M-307 CONDENSATE SYSTEM P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
PCS01	COOLANT LEAKAGE INSIDE THE PRIMARY CONTAINMENT	17000

TYPE:DISCRETE, VARIABLE 0-100%

CAUSE:FEED PIPING RUPTURE ON UPSTREAM WELD OF CHECK VALVE 29A.
100% SEVERITY IS EQUIVALENT TO 5000 GPM LEAK.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A FEED PIPING LEAK IN THE DRYWELL AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO 5000 GPM LEAK AT NORMAL OPERATING PRESSURES OF THE FEED SYSTEM AND THE REACTOR. FEEDWATER FLOWS FROM THE LEAK AND FLASHES TO STEAM IN THE DRYWELL. DRYWELL PRESSURE AND TEMPERATURES INCREASE. REACTOR WATER LEVEL DECREASES AND THE FEEDWATER CONTROL SYSTEM INCREASES THE SPEED OF THE FEED PUMPS TO MAINTAIN WATER LEVEL. THE REACTOR SCRAMS WHEN DRYWELL PRESSURE REACHES 2 PSIG, WITH A PCIS GROUP II AND III ISOLATION OCCURRING, AND THE TURBINE TRIPS DUE TO A GENERATOR LOCKOUT ON REVERSE POWER. THE APPROPRIATE ECCS SYSTEMS AUTO START, VENTILLATION SYSTEMS ISOLATE, THE STANDBY GAS TREATMENT SYSTEM INITIATES, THE RECIRC PUMP'S TRIP, AND THE AUX BUSSES FAST TRANSFER TO THEIR STARTUP SOURCES. REACTOR PRESSURE IS CONTROLLED BY THE BYPASS VALVES FOLLOWING THE SCRAM. THE LEAKAGE CONTINUES FROM THE FEED SYSTEM PIPING CAUSING DRYWELL PRESSURE AND TEMPERATURE TO INCREASE FURTHER. CONTAINMENT RADIATION LEVELS INCREASE, AND DRYWELL FLOOR DRAIN SUMP LEVEL INCREASES. THE OPERATOR MAY STOP THE LEAKAGE BY STOPPING THE FEED AND CONDENSATE PUMPS OR ISOLATE THE LEAK BY CLOSING EACH FEED PUMP'S DISCHARGE VALVE. CLOSING THE FEED ISOLATIONS TO THE REACTOR MO-29A AND MO-29B WILL NOT STOP THE LEAK.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

DRYWELL HI-LO PRESS .25-.75 - 203B
DRYWELL HIGH PRESS TRIP 2.0 PSIG - C205L
GROUP II/III OUTBOARD ISOL RELAYS NOT RESET - 204M
GROUP II/III INBOARD ISOL RELAYS NOT RESET - 204M
CHANNEL A GROUP I ISOL RELAYS NOT RESET - 205R
CHANNEL B GROUP I ISOL RELAYS NOT RESET - 205R
A CHANNEL REACTOR AUTO SCRAM - C205K
B CHANNEL REACTOR AUTO SCRAM - C205R
DRYWELL FLOOR DRAIN SUMP HI-HI LEVEL - 204R

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-1-3-23 PRIMARY CONTAINMENT ISOLATION P&ID, M-1-3-14 RPS P&ID, M-308 FEED SYSTEM AND FEED PUMPS P&ID, M-351-21 NUCLEAR BOILER P&ID.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
PCS02	COOLANT LEAKAGE OUTSIDE THE PRIMARY CONTAINMENT	17000

TYPE:DISCRETE, VARIABLE 0-100%

CAUSE:FEED PIPING LEAK UPSTREAM OF CHECK VALVE 3-A.
100% SEVERITY IS EQUIVALENT TO 500 GPM LEAK.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A FEED SYSTEM PIPING LEAK OUTSIDE THE PRIMARY CONTAINMENT AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS EQUIVALENT TO 500 GPM AT NORMAL OPERATING PRESSURE. REACTOR WATER LEVEL DECREASES AND THE FEEDWATER CONTROL SYSTEM INCREASES THE SPEED OF THE FEED PUMPS. REACTOR WATER LEVEL STABILIZES AT A LOWER LEVEL THAN INITIALLY DUE TO A STEAM FLOW/FEED FLOW ERROR. HOTWELL LEVEL DECREASES CAUSING THE HOTWELL LEVEL CONTROLLER TO OPERATE THE COARSE/FINE MAKEUP VALVES TO INCREASE WATER LEVEL IN THE CONDENSER.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THE MALFUNCTION ARE:

COMMON TURBINE BUILDING PIPE TUNNEL FLOOR DRAIN SUMP LEVEL.HI-HI 212L
UNIT 2 TURBINE BLDG EQUIPMENT DRAIN SUMP LEVEL HI-HI 212L

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-351 REACTOR P&ID

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

HWC01 HYDROGEN LEAK IN HYDROGEN WATER CHEMISTRY SYSTEM

TYPE:DISCRETE, VARIABLE 0-100% WHERE 100% = 50 SCFM AT NORMAL HWC SYSTEM PRESSURE AT 100% POWER

CAUSE:FLANGE LEAKS DOWNSTREAM OF EXCESS FLOW CHECK VALVE (DOWNSTREAM OF VALVE AO-3625)

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A HYDROGEN LEAK IN THE HWC SYSTEM. AT LOW SEVERITIES, H2 FLOW TO THE FW SYSTEM DECREASES (FR-3529) AND THE H2 FLOW CONTROLLER OPERATES TO MAINTAIN H2 FLOW TO THE FW SYSTEM CONSTANT. H2 CONTINUES TO LEAK CAUSING A SHORT WHILE AFTER MALFUNCTION INSERTION THE AREA HYDROGEN LEVELS IN THE VICINITY OF THE LEAK TO INCREASE WITH THE AREA HYDROGEN LEAK ANNUNCIATOR ACTUATING AND A HWC SYSTEM TRIP OCCURRING. THE HYDROGEN SYSTEM ISOLATION TO UNIT 2 CLOSES (AO-3625) ISOLATING THE LEAK. H2 ISOLATIONS TO THE FEEDWATER SYSTEM (AO-3633A/B/C) ALSO CLOSE. THE HIGH AREA HYDROGEN ANNUNCIATOR WILL CLEAR SOON AFTER THE LEAK HAS STOPPED. THE O2 INJECTION SYSTEM WILL REMAIN OPERATING FOR 30 MINUTES AFTER THE H2 SYSTEM HAS TRIPPED.
IF THE MALFUNCTION IS ENTERED AT 100%, THE EXCESS FLOW CHECK VALVE IN THE H2 SUPPLY LINE WILL SEAT CAUSING THE H2 LEAK TO STOP AND THE HWC SYSTEM TO TRIP DUE TO LOW HWC SYSTEM FLOW. THE HIGH AREA H2 LEVEL ALARM MAY ACTUATE DUE TO THE MASS OF H2 LOST FROM THE LEAK.

THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

H2 WATER CHEMISTRY SYSTEM TROUBLE	C206L
HYDROGEN WATER CHEMISTRY SYSTEM TRIP	C205L
HYDROGEN FLOW RATE HIGH/LOW	C210
HYDROGEN PRESSURE LOW	C210
HYDROGEN ADDITION SYSTEM TRIP	C210
AREA HYDROGEN LEAK	C210

REMOVAL OF THE MALFUNCTION REPAIRS THE LEAK.

REV.0

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

HWC02 H2 WATER CHEMISTRY SYSTEM OXYGEN PRESSURE LOW

CAUSE:OXYGEN PRESSURE SWITCH PSL-3705 FAILS LOW

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE O2 PRESSURE SWITCH PSL-3705 IN THE HYDROGEN WATER CHEMISTRY SYSTEM TO FAIL LOW. THE OXYGEN PRESSURE LOW ANNUNCIATOR ACTUATES AND THE HWC SYSTEM TRIPS WITH THE HYDROGEN ISOLATION TO UNIT 2 (AO-3625) AUTO CLOSING AND THE FEED PUMP HYDROGEN ISOLATION VALVES (AO-3633A/B/C) AUTO CLOSING. H2 AND O2 FLOWS DECREASE TO 0.

THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

H2 WATER CHEMISTRY SYSTEM TROUBLE	C206L
HYDROGEN WATER CHEMISTRY SYSTEM TRIP	C206L
HYDROGEN FLOW RATE HIGH/LOW	C810
HYDROGEN PRESSURE LOW	C810
HYDROGEN ADDITION SYSTEM TRIP	C810
OXYGEN PRESSURE LOW	C810

REMOVAL OF THE MALFUNCTION RESTORES OPERATION OF PSL-3705 TO NORMAL.

REV.0

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
HPC01	FAILURE OF HPCI TO AUTO START	01080

TYPE:DISCRETE

CAUSE:FAILURE OF CONTACT 3-4 OF RELAY 23A-K24 IN HPCI AUX OIL PUMP AUTO START CIRCUIT.

PLT STA:HPCI INITIATION SIGNAL PRESENT

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE HPCI AUX OIL PUMP TO FAIL TO AUTO START WHEN AN INITIATION SIGNAL IS RECIEVED. ALL NORMAL HPCI SYSTEM INITIATION INDICATIONS WILL OCCUR, EXCEPT THE HPCI AUX OIL PUMP WILL NOT START AND THE TURBINE STOP AND CONTROL VALVES WILL REMAIN CLOSED. THE LOW LUBE OIL PRESSURE ANNUNCIATOR ACTUATES AFTER 25 SECONDS DUE TO MO-14 BEING OPEN AND LUBE OIL PRESSURE BEING LOW. THE HPCI LOW FLOW ANNUNCIATOR ACTUATES AFTER 25 SECONDS DUE TO MO-23-14 BEING OPEN AND FLOW LESS THAN 600 GPM. HPCI FLOW, TURBINE SPEED, DISCHARGE PRESSURE, AND EXHAUST PRESSURE INDICATIONS INDICATE THAT THE TURBINE IS NOT OPERATING. THE HPCI AUX OIL PUMP MAY BE STARTED USING IT'S HAND SWITCH WHICH CAUSES THE STOP AND CONTROL VALVES TO OPEN, STARTING THE HPCI TURBINE.

IF THE HPCI TURBINE IS OPERATING WHEN THIS MALFUNCTION IS INSERTED AND THE AUX OIL PUMP HAND SWITCH IS IN AUTO, NO EFFECTS WILL BE SEEN UNTIL CONTROL OIL PRESSURE DECREASES (DUE TO THE GEAR DRIVEN OIL PUMP DISCHARGE PRESSURE DECREASING AS RPM DECREASES) AT WHICH TIME THE AUX OIL PUMP WILL NOT AUTO START AND THE STOP AND CONTROL VALVES WILL CLOSE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

HPCI TURB BRG OIL PRESS 6 PSIG - 204B
HPCI LOW FLO 600 GPM - 204B

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF CONTACTS 3-4 OF RELAY 23A-K24 TO NORMAL AND STARTS THE HPCI AUX OIL PUMP IF THE INITIATION SIGNAL HAS NOT BEEN RESET.

REF: M-1-3-35 HIGH PRESSURE COOLANT INJECTION SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-36L HIGH PRESSURE COOLANT INJECTION SYSTEM P&ID, M-36M HPCI PUMP TURBINE DETAILS.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
HPC02	HPCI SPURIOUS AUTO START	04050

TYPE:DISCRETE

CAUSE:CONTACTS M1-T1 OF RELAYS 10A-K15OF AND 10A-K15OH SHORT ENERGIZING 23AK41 AND 23AK42.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE HPCI SYSTEM TO AUTO START. THE AUX OIL PUMP AUTO STARTS OPENING THE STOP AND CONTROL VALVES. MO-23-14 TURBINE STEAM SUPPLY VALVE AUTO OPENS, THE GLAND SEAL CONDENSER BLOWER STARTS, AND DRAIN POT VALVES AO-23-42 AND AO-23-43 CLOSE. HPCI PUMP DISCHARGE VALVE MO-23-2-19 AUTO OPENS SUPPLYING WATER TO THE REACTOR. HPCI FLOW, RPM, EXHAUST PRESSURE AND DISCHARGE PRESSURE INCREASES. REACTOR POWER INCREASES, STEAM FLOW DECREASES INITIALLY DUE TO HPCI STEAM FLOW THEN INCREASES AS CORE THERMAL POWER INCREASES. REACTOR WATER LEVEL INCREASES CAUSING THE FEEDWATER PUMPS SPEED TO LOWER TO MAINTAIN THE REACTOR WATER LEVEL SETPOINT SLIGHTLY HIGHER THAN BEFORE THE MALFUNCTION WAS INSERTED (THIS IS DUE TO THE FEED FLOW/STEAM FLOW MISMATCH). THE REACTOR LOW WATER LEVEL ANNUNCIATOR ON PANEL C204 ACTUATES DUE TO THE CONTACT FAILURE THE OPERATOR WILL NOT BE ABLE TO RESET THE AUTO START SIGNAL UNTIL THE MALFUNCTION IS REMOVED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

HPCI AUX RELAYS NOT RESET - 20398
HPCI AUX OIL PUMP RUNNING - 204C
REACTOR LOW WATER LEVEL - 43 INCHES - 2043

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF CONTACTS M1-T1 OF RELAYS 10A-K15OF AND 10A-K15OH TO NORMAL AND ALLOWS THE OPERATOR TO RESET THE HPCI INITIATION SIGNAL.

REF: M-1-3-36 HPCI SYSTEM ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
HPC03	HPCI TURBINE TRIP	04110

TYPE:DISCRETE

CAUSE:A SHORT IN THE TURBINE TRIP SOLONOID, SV-1, CAUSES THE TURBINE TO TRIP.

PLT STA:HPCI IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE HPCI TURBINE TO TRIP. THE STOP VALVE CLOSES CAUSING HPCI FLOW, DISCHARGE PRESSURE, RPM, AND EXHAUST PRESSURE TO DECREASE TO 0. THE HPCI MIN FLOW VALVE AUTO OPENS, AO-2-23-138 HPCI TURBINE EXHAUST COND DRAIN VALVE AUTO CLOSES.

THE FOLLOWING ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION:

HPCI PUMP DISCHARGE LO FLOW - 2048
HPCI TURBINE TRIPPED - 2048

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE TURBINE TRIP SOLONOID, SV-1, TO NORMAL. THE TURBINE AUTOMATICALLY RESETS AND RETURNS TO NORMAL RPM AND FLOW IF THE SYSTEM LINEUP HAS NOT BEEN CHANGED.

REF: M-1-S-36 HIGH PRESSURE COOLANT INJECTION SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-363 HIGH PRESSURE COOLANT INJECTION SYSTEM P&ID, M-366 HPCI PUMP TURBINE DETAILS.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
HPC04	HPCI FLOW CONTROLLER FAILS LOW	01200

TYPE:DISCRETE

CAUSE:ELECTRONIC FAILURE OF HPCI FLOW CONTROLLER FAILS AUTO OUTPUT TO MINIMUM.

PLT STA:HPCI IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE HPCI TURBINE FLOW CONTROLLER AUTO OUTPUT TO FAIL TO 10 MA. HPCI TURBINE SPEED DECREASES TO ABOUT 1000 RPM. HPCI FLOW, DISCHARGE PRESSURE, AND EXHAUST PRESSURE DECREASES. AT 500 GPM FLOW, THE MIN FLOW BYPASS VALVE AUTO OPENS AND THE LOW FLOW ANNUNCIATOR ACTUATES. THE OPERATOR MAY PLACE THE CONTROLLER IN MANUAL AND INCREASE FLOW TO MITIGATE THE EFFECTS OF THE MALFUNCTION.

THE FOLLOWING ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION:

HPCI PUMP DISCHARGE LO FLO - C2047

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE HPCI FLOW CONTROLLER AUTO OUTPUT TO NORMAL AND BRINGS THE SPEED OF THE HPCI TURBINE UP TO THE AUTO SETPOINT IF THE CONTROLLER IS IN AUTOMATIC.

REF: M-1-S-36 HIGH PRESSURE COOLANT INJECTION SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-355 HIGH PRESSURE COOLANT INJECTION SYSTEM P&ID, M-306 HPCI PUMP TURBINE DETAILS.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
HPC05	HPCI FLOW CONTROLLER FAILS HIGH	01200

TYPE:DISCRETE

CAUSE:ELECTRONIC FAILURE OF HPCI FLOW CONTROLLER FAILS AUTO OUTPUT TO MAXIMUM.

PLT STA:HPCI IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE HPCI TURBINE FLOW CONTROLLER AUTO OUTPUT TO FAIL TO 50 MA. HPCI TURBINE RPM, AND FLOW INCREASES TO MAXIMUM (50 MA SIGNAL EQUIVALENT). THE OPERATOR MAY PLACE THE FLOW CONTROLLER IN MANUAL TO MITIGATE THE EFFECTS OF THE MALFUNCTION.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION:

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE HPCI FLOW CONTROLLER AUTO OUTPUT TO NORMAL AND BRINGS THE SPEED OF THE HPCI TURBINE TO THE AUTO SETPOINT IF THE CONTROLLER IS IN AUTOMATIC.

REF: M-1-S-36 HIGH PRESSURE COOLANT INJECTION SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-365 HIGH PRESSURE COOLANT INJECTION SYSTEM P&ID, M-366 HPCI PUMP TURBINE DETAILS.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
HPC06	HPCI FLOW CONTROLLER OSCILLATION	01200

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:ELECTRONIC FAILURE OF HPCI FLOW CONTROLLER UNIT CAUSES AN OSCILLATING OUTPUT WITH A 30 SECOND PERIOD. 100% SEVERITY IS EQUIVALENT TO AN OSCILLATION OF 10% OR A 20% PEAK TO PEAK DIFFERENCE.

PLT STA:HPCI IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE HPCI TURBINE FLOW CONTROLLER AUTO OUTPUT TO OSCILLATE AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS EQUIVALENT TO AN OSCILLATION OF 10% OR A 20% PEAK TO PEAK DIFFERENCE. HPCI SYSTEM FLOW, DISCHARGE PRESSURE, EXHAUST PRESSURE, AND RPM OSCILLATE. THE OPERATOR MAY MITIGATE THE EFFECTS OF THE MALFUNCTION BY PLACING THE CONTROLLER IN MANUAL, HOWEVER IF THE CONTROLLER IS PLACED BACK IN AUTO BEFORE THE MALFUNCTION IS REMOVED, THE OSCILLATIONS WILL OCCUR AGAIN.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE HPCI FLOW CONTROLLER AUTO OUTPUT TO NORMAL.

REF: M-1-S-36 HIGH PRESSURE COOLANT INJECTION SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-365 HIGH PRESSURE COOLANT INJECTION SYSTEM P&ID, M-364 HPCI PUMP TURBINE DEAILS.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
HPC07	HPCI STEAM SUPPLY LINE BREAK	02090

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:PIPING RUPTURE JUST UPSTREAM OF MO-14. 100% SEVERITY IS EQUIVALENT TO A LEAK OF 300,000 LBM/HR AT A REACTOR PRESSURE OF 1030.

PLT STA:HPCI IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A HPCI STEAM LINE BREAK AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS 300,000 LBM/HR. MAIN STEAM LINE B STEAM FLOW, REACTOR POWER, REACTOR PRESSURE, AND FEED PUMP SPEED DECREASES INITIALLY. REACTOR WATER LEVEL INCREASES INITIALLY DUE TO SWELL. HPCI STEAM PRESSURE DECREASES. THE HPCI SYSTEM ISOLATES WITH THE STEAM SUPPLY ISOLATION VALVES, EXHAUST VALVE, STEAM LINE HEATUP VALVE, AND HPCI SUCTIONS FROM THE SUPPRESSION POOL AUTO CLOSING. THE HPCI TURBINE TRIPS WITH TURBINE SPEED, DISCHARGE PRESSURE, EXHAUST PRESSURE, AND FLOW DECREASING. MAIN STEAM LINE B STEAM FLOW, REACTOR POWER, REACTOR PRESSURE, AND FEED PUMP SPEED INCREASES TO NORMAL WHEN THE HPCI SYSTEM ISOLATES. REACTOR WATER LEVEL DECREASES TO NORMAL. HPCI SUPPLY STEAM PRESSURE INDICATION CONTINUES TO DECREASE TO ATMOSPHERIC PRESSURE. HPCI ROOM TEMPERATTURE INCREASES AND STABILIZES AT A HIGHER TEMPERATURE. HPCI ROOM RAD LEVELS INCREASE, THEN STABILIZE. THE VENTILATION SYSTEM LOWERS HPCI ROOM TEMPERATURE AFTER THE LEAK IS ISOLATED AND THE SYSTEM IS DEPRESSURIZED. THE OPERATOR MAY ISOLATE THE BREAK BY CLOSING MO-15 OR MO-16.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

HPCI STEAM LINE HIGH FLOW 300% - 204B
HPCI RELAYS NOT RESET - 204B
HPCI TURBINE TRIPPED - 204B
HIGH AREA TEMPERATURE - 205L

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-1-S-36 HIGH PRESSURE COOLANT INJECTION SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-363 HIGH PRESSURE COOLANT INJECTION SYSTEM P&ID, M-366 HPCI PUMP

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
	TURBINE DETAILS.	
	REV. 2	

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

HPC08 HPCI PUMP DISCH LINE BREAK D1090

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:PIPING RUPTURE BETWEEN MO-19 AND MO-20. 100% SEVERITY IS EQUIVALENT TO A LEAK OF 5,000 GPM. AT A HPCI PUMP DISCHARGE PRESSURE OF 1040 PSIG.

PLT STA:HPCI IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A HPCI PUMP DISCHARGE LINE LEAK AT THE INSTRUCTOR SPECIFIED SEVERITY 0-100%, WHERE 100% IS 5,000 GPM AT 1040 PSIG DISCHARGE PRESSURE. HPCI FLOW INITIALLY INCREASES WHEN THE BREAK OCCURS, THEN DECREASES TO THE FLOW CONTROLLER SETPOINT. THE SYSTEM RECIEVING WATER FROM THE HPCI SYSTEM PRIOR TO THE BREAK WILL REFLECT THE LOSS OF WATER SUPPLIED TO IT BY THE HPCI SYSTEM. AFTER ABOUT 60 SECONDS, THE HPCI PUMP ROOM FLOOD 6 INCHES ANNUNCIATOR ACTUATES.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

HPCI PUMP ROOM FLOOD 6 INCHES - 2043

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-365 HIGH PRESSURE COOLANT INJECTION SYSTEM P&TD.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

HPC09 HPCI LUBE OIL SYSTEM FAILURE 02060

TYPE:DISCRETE

CAUSE:DISCHARGE STRAINER CLOGS

PLT STA:HPCI IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE HPCI OIL SYSTEM STRAINER TO CLOG. THE TURBINE STOP VALVE CLOSES, THE HPCI TURBINE TRIPPED ANNUNCIATOR ACTUATES, AND TURBINE SPEED DECREASES. THE HPCI AUX OIL PUMP AUTO STARTS, BUT HAS NO EFFECT ON TURBINE OPERATION. HPCI FLOW, RPM, DISCHARGE PRESSURE AND EXHAUST PRESSURE DECREASE TO 0. TURBINE VIBRATION INDICATION INDICATES SLIGHTLY HIGHER VALUES DURING TURBINE COAST DOWN AS INDICATED ON VRI-4506 AND VRR-4506. WHEN FLOW IS LESS THAN 600 GPM, THE MIN FLOW VALVE MO-23-25 AUTO OPENS AND THE "HPCI PUMP DISCHARGE LOW FLOW" ANNUNCIATOR ACTUATES.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

HPCI OIL FILTER HI D/P 12 PSID - 2048
HPCI TURB BRG OIL LOW PRESS 4 PSIG - 2043
HPCI TURBINE TRIPPED - 2048
HPCI PUMP DISCHARGE LOW FLOW - 2048

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE OIL STRAINER TO NORMAL AND OPENS THE TURBINE STOP VALVE IF THE AUX OIL PUMP IS OPERATING.

REF: M-1-S-36 HIGH PRESSURE COOLANT INJECTION SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-355 HIGH PRESSURE COOLANT INJECTION SYSTEM P&ID, M-766 HPCI PUMP TURBINE DETAILS.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CAS01	LOSS OF INSTRUMENT AIR	02010

TYPE:GENERIC, (A,B), VARIABLE (0-100%)

CAUSE:AIR PIPING RUPTURES DOWNSTREAM OF FLOW ELEMENT FE-2652 A/B. 100% SEVERITY IS EQUIVALENT TO A COMPLETE GULLOTINE SEVERENCE.

PLT STA:100% POWER

EFFECTS:WHEN ACTIVE, THIS MALFUNCTION CAUSES A LEAK IN THE SPECIFIED AIR HEADER AT THE INSTRUCTOR SPECIFIED SEVERITY. THE LEAK IS DOWNSTREAM OF THE FLOW ELEMENT FE-2652 FOR BOTH THE "A" AND "B" HEADERS. BECAUSE THE AIR USAGE IS ABOVE THE CAPABILITY OF THE "A" INSTRUMENT AIR COMPRESSOR, BREAKING THE 'A' HEADER CAUSES RAPID DEPRESSURIZATION AND THE RECEIVER TO DISCHARGE TO THE LEAK AND FULLY DEPRESSURIZE. THE 'A' INST AIR COMPRESSOR WILL START BUT PRESSURE IN THE 'A' HEADER CANNOT BE RESTORED. WHEN THE PRESSURE IN THE 'A' HEADER FALLS BELOW THE 'B' SUPPLY, THE CHECK VALVES ON THE 'A' SUPPLY SEATS ISOLATING THE 'B' SUPPLY FROM THE LEAK. IF THE 'A' AND THE 'B' HEADERS ARE CROSSCONNECTED, BOTH AIR HEADERS WILL DEPRESSURIZE WITH THE 'B' COMPRESSOR AND THE SERVICE AIR COMPRESSORS DISCHARGING THROUGH THE LEAK. IF THE FOURTH COMPRESSOR IS STARTED AND PLACED IN SERVICE, INST AIR PRESSURE CAN BE RECOVERED WITH A 100% SEVERITY LEAK ON ONE OF THE INST AIR HEADERS.

IF THE 'B' HEADER IS BROKEN, THE 'B' INST AIR SUPPLY RAPIDLY DEPRESSURIZES AND THE 'B' COMPRESSOR STARTS. WHEN THE 'B' HEADER FALLS BELOW THE 'A' HEADER, THE 'B' HEADER SUPPLY CHECK VALVES WILL BACKSEAT. HOWEVER, THE AIR USAGE IS BEYOND THE CAPABILITY OF THE 'B' COMPRESSOR AND THE SERVICE AIR COMPRESSOR AND THE B INST AIR HEADER WILL BE LOST. SERVICE AIR WILL ALSO BE LOST SLOWLY DUE TO NORMAL USAGE/LEAKAGE WHEN PCV-2428 CLOSES DIVERTING ALL OF THE SERVICE AIR COMPRESSOR DISCH TO THE 'B' INST AIR HEADER. HOWEVER, THE LOSS OF INST AIR WILL NOT BE AS RAPID AS IF THE 'B' HEADER IS BROKEN AS IT WAS WHEN THE 'A' HEADER WAS BROKEN. AS BEFORE, IF THE 'A' AND 'B' HEADERS ARE CROSSCONNECTED AND THE FORTH COMPRESSOR IS STARTED AND PLACED IN SERVICE, INST AIR PRESSUE CAN BE RECOVERED WITH A 100% SEVERITY LEAK (ONLY IF THE OTHER THREE COMPRESSORS ARE RUNNING). A LOSS OF AIR PRESSURE IN BOTH HEADERS

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

CAUSES THE LOADS SUPPLIED BY THE INST AIR SYSTEM TO FAIL IN THEIR FAILED POSITION. THE CONTROL RODS WILL SCRAM IN A RANDOM MANNER DUE TO THE LOSS OF AIR HEADER PRESSURE.

ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE AS FOLLOWS:

AIR COMPRESSOR TROUBLE - C212
INSTRUMENT AIR HEADER PRESSURE LOW - C212

REMOVAL OF THIS MALFUNCTION REQUIRES REINITIALIZING THE SIMULATOR.

REFERENCES: P & ID, COMPRESSED AIR SYSTEM M-320 SHEETS 1 &2, ELECTRICAL SCHEMATIC DIAGRAM, AIR COMPRESSORS, E-230 SHEETS 1 & 2, PLANT SYSTEM OPERATING PROCEDURE, PLACING THE INSTRUMENT AND SERVICE AIR SYSTEM IN NORMAL OPERATION, S.11.1.A.

REV. 0

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CAS02	INSTRUMENT NITROGEN RECEIVER LEAK	02240

TYPE:GENERIC (A/B) VARIABLE 0-100%

CAUSE:RUPTURE OF RECEIVER CASING. 100% SEVERITY IS EQUIVALENT TO 150% OF THE CAPACITY OF BOTH NITROGEN COMPRESSORS.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SPECIFIED INSTRUMENT NITROGEN RECEIVER TO DEVELOP A LEAK AT THE INSTRUCTOR SPECIFIED SEVERITY. WHEN THE MALFUNCTION IS ACTIVATED, THE LEAD COMPRESSOR WILL START AND ATTEMPT TO MAINTAIN INSTRUMENT NITROGEN PRESSURE. IF THE COMBINED USAGE AND SEVERITY IS ABOVE THE CAPACITY OF THE LEAD COMPRESSOR, INST N2 PRESSURE WILL CONTINUE TO DECREASES AND THE LAG COMPRESSOR WILL START AND RESTORE THE INSTRUMENT NITROGEN PRESSURE IN THE HEADERS. DRYWELL PRESSURE WILL DECREASE CONSISTENT WITH THE AMOUNT OF NITROGEN LOST OUT OF THE LEAK. WHEN RECEIVER PRESS DROPS TO 75 PSIG, INSTRUMENT AIR WILL AUTOMATICALLY BACKUP & SUPPLY THE AFFECTED HEADER. THE INST N2 COMPRESSORS WILL BE DISCHARGING TO THE RX BLDG VIG THE RUPTURE. THE INCREASED LOAD ON INST. AIR WILL BE REFLECTED IN INCREASED INSTRUMENT AIR USAGE AS WELL AS A SMALL LEAKAGE THROUGH THE CHECKS ON THE DISCHARGE OF THE INSTRUMENT NITROGEN RECEIVERS. THE DRYWELL PRESSURE WILL CONTINUE TO DECREASE AND DRYWELL OXYGEN CONCENTRATION WILL INCREASE. SHUTTING THE INSTRUMENT NITROGEN SUCTION VALVES SV-8100 AND/OR AO-4235 OR AO-2509 ISOLATES THE DRYWELL FROM THE LEAK.

ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE AS FOLLOWS:

NITROGEN COMPRESSOR A OR B TROUBLE - C10388

REMOVAL OF THE MALFUNCTION REPAIRS THE NITROGEN RECEIVER LEAK AND ALLOWS THE INSTRUMENT NITROGEN RECEIVER TO REPRESSURIZE.

REFERENCES: P & ID, INSTRUMENT NITROGEN - M-333,
ELECTRICAL SCHEMATIC DIAGRAM,
INSTRUMENT NITROGEN COMPRESSORS, E-1670

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CAR01	MAIN CONDENSER AIR IN LEAKAGE	1-150

TYPE:DISCRETE, VARIABLE 0-100%

CAUSE:CRACK IN CONDENSER WELD JOINT. 100% SEVERITY IS EQUIVALENT TO A 1000 CFM LEAK.

PLT STA:100% POWER

EFFECTS: THIS MALFUNCTION RESULTS IN AIR IN LEAKAGE INTO MAIN CONDENSER "A" AT THE SELECTED SEVERITY. CONDENSER VACUUM DECREASES, OFF GAS FLOW INCREASES, MAIN TURBINE EXHAUST PRESSURE INCREASES, UNIT ELECTRICAL LOAD DECREASES. IF THE SEVERITY IS ABOVE THE CAPABILITY OF THE SJAES AND OFF GAS SYSTEM, THE CONDENSER VACUUM WILL DECREASE TO 23" AT WHICH TIME THE REACTOR WILL SCRAM. INCREASED SEVERITY CAN RESULT IN A MAIN TURB. TRIP (IF NOT TRIPPED ON REVERSE POWER FROM THE SCRAM), A RFPT TRIP, WHICH COULD NECESSITATE THE USE OF RCIC OR HPCI TO CONTROL REACTOR VESSEL LEVEL, A BYPASS VALVE TRIP, WHICH COULD LEAD TO SRVS CYCLING TO CONTROL PRESSURE. OXYGEN CONCENTRATIONS IN THE FEEDWATER WILL INCREASE AS WILL CONDUCTIVITY.

ALL OF THE MAIN CONDENSERS WILL BE EFFECTED BY THIS MALFUNCTION DUE TO THE SIZE OF THE EQUALIZING LINE. THE MAIN TURBINE WILL TAKE LESS TIME TO COAST DOWN FROM THE TRIP AT 1800 RPM IF THE TRIP IS FOLLOWED BY A SIGNIFICANT LOSS OF VACUUM.

ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE AS FOLLOWS:

MAIN TURBINE EMERGENCY TRIP - C203L
CONDENSER LOW VACUUM TRIP - C203R
CONDENSER LOW VACUUM - C205R
CONDENSER LOW VACUUM TRIP - C205L
"A" CHANNEL REACTOR AUTO SCRAM - C205R
"B" CHANNEL REACTOR AUTO SCRAM - C205R

REMOVAL OF THIS MALFUNCTION STOPS THE INLEAKAGE, HOWEVER, CONDENSER VACUUM RECOVERY WILL BE DEPENDENT UPON THE SEVERITY SELECTED AND PLANT STATUS.

REF: M-307, M310, MAIN CONTROL ROOM ANNUNCIATOR ELECTRICAL SCHEMATICS, C196 OFF GAS RECOMBINER ANNUNCIATOR SCHEMATIC DIAGRAM, E-1657-24

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CAR02	SJAE STEAM SUPPLY VALVE FAILS CLOSED	10040

TYPE:GENERIC, (A,B)

CAUSE:FAILURE OF SOLENOID VALVE SV-2466A(B) CAUSES STEAM SUPPLY VALVE AO-2466A(B) TO SHUT.

PLT STA:100% POWER

EFFECTS:WHEN ACTIVATED, THIS MALFUNCTION CAUSES THE SELECTED SOLENOID VALVE TO FAIL RESULTING IN THE RESPECTIVE AIR OPERATED SUPPLY VALVE GOING CLOSED. AIR EJECTOR STEAM SUPPLY PRESSURE WILL DECREASES, OFF GAS FLOW INDICATION ON THE RECORDER (ON PANEL C0C190) WILL DECREASE. CONDENSER VACUUM DECREASES, MAIN TURBINE EXHAUST PRESSURE INCREASES, UNIT ELECTRICAL LOAD DECREASES, CONTROL VALVES OPEN TO CONTROL REACTOR PRESSURE. THIS MALFUNCTION ONLY AFFECTS ONE SET OF VALVES. HOWEVER, UNLESS THE OTHER TRAIN OF SJAES IS PLACED IN SERVICE TO RESTORE VACUUM, THE CONDENSER VACUUM WILL CONTINUE TO DECREASE TO 2" AT WHICH TIME THE REACTOR WILL SCRAM, CONTINUED OPERATION WILL RESULT IN A MAIN TURBINE TRIP, A RFPT TRIP, WHICH COULD NECESSITATE THE USE OF RCIC OR HPCI TO CONTROL REACTOR VESSEL LEVEL, A BYPASS VALVE TRIP, WHICH COULD LEAD TO SRVS CYCLING TO CONTROL PRESSURE.

THE MAIN TURBINE WILL TAKE LESS TIME TO COAST DOWN FROM THE TRIP AT 1800 RPM IF THE TRIP IS FOLLOWED BY A SIGNIFICANT LOSS OF VACUUM.

ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE AS FOLLOWS:

MAIN TURBINE EMERGENCY TRIP - C20RL
CONDENSER LOW VACUUM TRIP - C20BR
CONDENSER LOW VACUUM - C20BR
CONDENSER LOW VACUUM TRIP - C20BL
"A" CHANNEL REACTOR AUTO SCRAM - C20BR
"B" CHANNEL REACTOR AUTO SCRAM - C20BR
INLET FLOW LOW - C19B

REMOVAL OF THIS MALFUNCTION STOPS THE INLEAKAGE, HOWEVER, CONDENSER VACUUM RECOVERY WILL BE DEPENDENT UPON THE SEVERITY SELECTED AND PLANT STATUS.

REF: M-307, M310, MAIN CONTROL ROOM ANNUNCIATOR ELECTRICAL SCHEMATICS, C19B OFF GAS RECOMBINER ANNUNCIATOR SCHEMATIC

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
	DIAGRAM, E-1637-24	
	REV. 3	

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CWS01	LOSS OF CONOWINGO POND	06010

TYPE:DISCRETE, VARIABLE(0-100%)

CAUSE:A BOMB EXPLODES IN CONOWINGO POND, RUPTURING THE DAM. 100% SEVERITY IS EQUIVALENT TO 6"/MIN LOSS.

PLT STA:100% POWER

EFFECTS:WHEN ACTIVATED, THIS MALFUNCTION CAUSES THE CONOWINGO POND LEVEL TO DECREASE AT A RATE SPECIFIED BY THE INSTRUCTOR. THE VELOCITY CONTROL GATES ON THE EFFLUENT OF THE DISCHARGE CANAL WILL OPEN DUE TO THE DIFFERENCE IN THE WATER LEVEL. THIS WILL CAUSE THE COOLING TOWER LIFT PUMPS TO TRIP WHEN THE LEVEL IS 98 FEET. AT AN INTAKE STRUCTURE LEVEL EQUIVALENT TO 90 FEET ELEVATION, THE MAIN CIRCULATING WATER PUMPS BEGIN TO DRAW AIR DUE TO VORTEX AND AT 87 FEET, THE PUMPS WILL LOSE SUCTION. ALL PUMP SUCTIONS WILL BE DRY AT 87 FEET. WHEN THE SERVICE WATER SYSTEM FLOW IS LOST, THOSE PLANT LOADS THAT REJECT HEAT TO THE SERVICE WATER SYSTEM WILL HEAT UP. DRYWELL PRESSURE WILL INCREASE DUE TO A LOSS OF DRYWELL COOLING, AT 2 PSIG THE DIESELS START CAUSING ESW AND ECW PUMP'S TO AUTO START. ESW PUMPS DO NOT DEVELOP A DISCHARE PRESSURE SO THE ECW DISCHARGE VALVE WILL AUTO OPEN AND THE ESW DISCHAPGE TO THE POND WILL AUTO CLOSE. THE ESW BOSTER PUMP WILL AUTO START AND THE ECW SYSTEM WILL PROVIDE A HEAT SINK FOR DG'S, RSCLW HX'S (IF RF IS USED), AND SAFEGUARD EQUIPMENT ROOM COOLERS. CONDENSER VACUUM WILL BE LOST RESULTING IN A REACTOR SCRAM AND AN ISOLATION OF THE REACTOR FROM THE CONDENSER FOR COOLING. DECAY HEAT REMOVAL AND VESSEL INVENTORY WILL BE CONTROLLED BY HPCI AND RCIC AFTER SEVERAL CYCLINGS OF THE SRVS TO CONTROL PRESSURE.

ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

TRAVELING SCREENS LO LEVEL - C207R
DISCHARGE CANAL SLUICE GATE LO-LO LEVEL - C212R
"A" COOLING TOWER PUMP TRIP - C212R
"B" COOLING TOWER PUMP TRIP - C212R
"C" COOLING TOWER PUMP TRIP - C212R

REMOVAL OF THIS MALFUNCTION REQUIRES REINITIALIZING THE SIMULATOR.

REFERENCES: PBAPS FSAR SECTION 11.4 & 12.2.14, PRIP.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
	CIRCULATING WATER SYSTEM, M-312, P&ID COOLING TOWERS, M-322 SHS 1&2, ANNUNCIATOR RESPONSE CARDS. SPECIAL EVENT PROCEDURE, SE-3, LOSS OF CONOWINGO POND OF MAR ?, 1983	
	REV. 2	

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CWS02	MAIN CIRC WATER PUMP TRIP	0C050

TYPE:GENERIC (A,B,C)

CAUSE:INTERNAL SHORT CAUSES THE PUMP MOTOR SUPPLY BREAKER TO TRIP ON OVERCURRENT.

PLT STA:100% POWER

EFFECTS:ACTIVATION OF THIS MALFUNCTION CAUSES THE SELECTED CIRCULATING WATER PUMP TO DEVELOP AN INTERNAL SHORT WHICH CAUSES AN OVERCURRENT TRIP OF THE BREAKER. MOTOR AMPERES WILL SPIKE SHARPLY UPWARD THEN DECREASE TO 0 WHEN THE PUMP BREAKER TRIPS DISCHARGE PRESSURE ON THE SELECTED PUMP WILL DECREASE TO 0. THE OTHER CIRCULATING WATER PUMPS DISCHARGE PRESSURE WILL DECREASE DUE TO THE INCREASED FLOW RESULTING FROM REVERSE FLOW WHILE THE TRIPPED PUMP'S DISCHARGE VALVE IS SHUTTING. CONDENSER VACUUM WILL DECREASE, THE RAPIDITY OF WHICH DEPENDS ON THE CIRC WATER TEMPERATURE. IF UNIT LOAD AND REACTOR POWER ARE NOT REDUCED, A LOW VACUUM SCRAM AND SUBSEQUENT MAIN TURBINE TRIP OCCUR. REDUCING REACTOR POWER TO A LEVEL AT WHICH MAIN CONDENSER VACUUM CAN BE MAINTAINED WILL PRECLUDE THE LOW VACUUM TRIP. INSERTING THE MALFUNCTION ON A NONRUNNING PUMP WILL PRODUCE NO EFFECTS. HOWEVER, IF THE PUMP IS STARTED WITH THE MALFUNCTION ACTIVE, IT TRIPS ON OVERCURRENT AND ANOTHER RESTART ATTEMPT WILL NOT SHUT THE PUMP BREAKER.

ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE AS FOLLOWS:

"A" CIRC WATER PUMP OVERLOAD - C207R
"A" CIRC WATER PUMP BREAKER TRIP - C207R
"B" CIRC WATER PUMP OVERLOAD - C207R
"B" CIRC WATER PUMP BREAKER TRIP - C207R
"C" CIRC WATER PUMP OVERLOAD - C207R
"C" CIRC WATER PUMP BREAKER TRIP - C207R

REMOVAL OF THE MALFUNCTION WILL RESTORE THE SELECTED CIRC WATER PUMP MOTOR TO NORMAL.

REFERENCES: P&ID CIRCULATING WATER SYSTEM, ELECTRICAL SCHEMATIC DIAGRAM, CIRCULATING WATER PUMP M.O. VALVE, E-143, ELECTRICAL SCHEMATIC DIAGRAM, CIRC. WATER PUMP 13.2KV BREAKER E-147 SHS 1-3.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CWS03	MAIN CONDENSER TUBE BLOCKAGE	06090

TYPE:DISCRETE (VARIABLE, 0-100%)

CAUSE:CLOGGED MAIN CONDENSER TUBES. 100% SEVERITY IS EQUIVALENT TO 34% OF ALL THE TUBES IN THE MAIN CONDENSER.

PLT STA:100% POWER

EFFECTS:WHEN ACTIVATED, THE MALFUNCTION CAUSES CLOGGING OF THE MAIN CONDENSER TUBES AT THE INSTRUCTOR SPECIFIED SEVERITY. THE TUBES WILL BE PLUGGED IN SUCH A MANNER THAT AN EQUAL DISTRIBUTION OF FLOW IS MAINTAINED TO EACH OF THE THREE CONDENSER SECTIONS. ULTIMATELY, CONDENSER HEAT TRANSFER WILL BE REDUCED BY THE INSTRUCTOR SPECIFIED SEVERITY AND CONDENSER VACUUM WILL BEGIN TO DECREASE ALONG WITH TURBINE AND OVERALL PLANT EFFICIENCY. CIRC WATER PUMP DISCHARGE PRESSURE AND MOTOR AMPS WILL INCREASE, (ASSUMING THAT THE CIRC WATER PUMPS ARE AT 250,000 GPM INITIAL FLOW). IF LOAD IS NOT REDUCED TO A LEVEL AT WHICH THE LOWER FLOW CAN MAINTAIN CONDENSER VACUUM, A LOW VACUUM SCRAM OCCURS AT 23" FOLLOWED SHORTLY BY A REVERSE POWER TRIP OF THE MAIN TURBINE.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION RESTORES THE MAIN CONDENSER TUBES TO NORMAL.

REFERENCES: CIRCULATING WATER SYSTEM P&ID, M-312; PBAPS TECHNICAL SPECIFICATIONS.

REV. ?

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CWS04	COOLING TOWER LIFT PUMP TRIP	07030

TYPE:GENERIC (A,B,C,D,E)

CAUSE:INTERNAL SHORT CAUSES THE PUMP MOTOR SUPPLY BREAKER TO TRIP ON OVERCURRENT.

PLT STA:100% POWER

EFFECTS:WHEN ACTIVATED, THIS MALFUNCTION CAUSES THE SELECTED COOLING TOWER LIFT PUMP TO TRIP DUE TO AN INTERNAL SHORT CIRCUIT. PUMP CURRENT WILL SPIKE SHARPLY UPWARD, THEN DECREASES TO 0 WHEN THE BREAKER TRIPS. DISCHARGE CANAL TEMPERATURE MAY INCREASE, DEPENDING ON THE OUTSIDE AIR TEMPERATURE AND THE UNIT LOAD. THIS INCREASE TO A NEW EQUILIBRIUM VALUE WILL OCCUR OVER A LONG PERIOD OF TIME.

THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

DISCHARGE CANAL HI TEMP. - C212R
"A" COOLING TOWER PUMP TRIP - C212R
"A" COOLING TOWER PUMP MOTOR OVERLOAD - C212R
"B" COOLING TOWER PUMP TRIP - C212R
"B" COOLING TOWER PUMP MOTOR OVERLOAD - C212R
"C" COOLING TOWER PUMP TRIP - C212R
"C" COOLING TOWER PUMP MOTOR OVERLOAD - C212R

REMOVAL OF THE MALFUNCTION WILL REMOVE THE SHORT CIRCUIT ON COOLING TOWER LIFT PUMP BREAKER AND RESET ANY OVERLOADS AND/OR LOCKOUTS O THE PUMP BREAKER, ALLOWING THE AFFECTED PUMP TO BE OPERATED NORMALLY.

REFERENCES: CIRCULATING WATER SYSTEM P&ID, M-312, COOLING TOWER SYSTEM P&ID, M-322, COOLING TOWER PP MOTOR 13.8 KV CKT BREAKER ELECTRICAL SCHEMATIC DIAGRAM, E-90 SHEETS 1,2,3

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CWS05	COOLING TOWER FANS TRIP	C031

TYPE:GENERIC (A-E)

CAUSE:THIS MALFUNCTION IS CAUSED BY A CONTACT ON LOCKOUT RELAY 386X38 SHORTING WHICH INTURN CAUSES THE PROTECTIVE RELAY FOR THAT COOLING TOWER GROUP TO ENERGIZE, TRIPPING THE FANS IN THAT GROUP.

CWS05A - CONTACTS 1-2 ENERGIZE RELAY 62-12A
CWS05B - CONTACTS 3-4 ENERGIZE RELAY 62-12B
CWS05C - CONTACTS 5-6 ENERGIZE RELAY 62-13 WHICH TRIPS THE "B" COOLING TOWER FAN
CWS05D - CONTACTS 7-8 ENERGIZE RELAY 62-14 WHICH TRIPS THE "C" COOLING TOWER FAN
CWS05E - CONTACTS 9-10 ENERGIZE RELAY 62-38 TRIPS THE "D" COOLING TOWER FANS
CWS05F - CONTACTS 11-12 ENERGIZE RELAY 62-39 TRIPS THE "E" COOLING TOWER FANS.

NOTE: THIS MALFUNCTION DOES NOT AFFECT THE OPERATION OF THE 386X38 LOCKOUT RELAY.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES ALL THE FANS OF THE SELECTED COOLING TOWER TO TRIP. DISCHARGE CANAL TEMPERATURE INCREASES TO A NEW, HIGHER EQUILIBRIUM VALUE, AS A FUNCTION OF THE EXTERNAL AIR TEMPERATURE AND UNIT LOAD. IF THE SELECTED COOLING TOWER FANS ARE NOT RUNNING WHEN THE MALFUNCTION IS ACTIVATED, NOTHING WILL HAPPEN. THEY WILL NOT START IF A START IS ATTEMPTED. THE MALFUNCTIONS FOR THE D & E COOLING TOWERS WILL ALSO CAUSE THE STATUS OF THE RESPECTIVE REMOTE FUNCTIONS TO CHANGE. THE REMOTE FUNCTION WILL TOGGLE TO START BUT WILL NOT REMAIN IN THAT STATE WHILE THE MALFUNCTION IS ACTIVE.

ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE AS FOLLOWS:

DISCHARGE CANAL HI TEMP - C212R
"A" COOLING TOWER FANS TROUBLE - C212R
"B" COOLING TOWER FANS TROUBLE - C212R
"C" COOLING TOWER FANS TROUBLE - C212R

REMOVAL OF THE MALFUNCTION WILL RESTORE THE AFFECTED CONTACT TO NORMAL, AND ALLOW NORMAL OPERATION OF THE COOLING TOWER

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

FANS.

REFERENCES: COOLING TOWER FANS ELECTRICAL SCHEMATIC DIAGRAM, E-328, SHEETS 1,2,3

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CWS06	TRAVELING SCREEN BLOCKAGE	06030

TYPE:GENERIC (A-M)

CAUSE:ACCUMULATION OF DEBRIS AND TRASH ON THE TRAVELING SCREENS CAUSE THE SCREEN TO BECOME BLOCKED.

PLT STA:100% POWER

EFFECTS:WHEN ACTIVATED, THIS MALFUNCTION CAUSES THE SELECTED TRAVELING SCREEN TO BLOCK DUE TO TRASH AND DEBRIS BUILDUP. DUE TO THE LACK OF INSTRUMENTATION AND THE SIZE OF THE TRAVELING SCREENS, BLOCKING INDIVIDUAL SCREENS PRODUCES NO OBSERVABLE EFFECTS. HOWEVER, WHEN 80% OF THE TOTAL TRAVELING SCREENS BECOME BLOCKED, THE LEVEL IN THE CIRC WATER INTAKE STRUCTURE WILL START TO DECREASE. CONTINUED OPERATION OF THE CIRC WATER PUMPS WILL LOWER THE LEVEL FUTHER. IF THE TRAVELING SCREEN ARE 100% BLOCKED AT FULL CIRC WATER FLOW, THE CIRC WATER PUMPS WILL LOSE SUCTION IN 30 MINUTES. WHEN THE HIGH-HIGH WATER DIFF LEVEL ANNUNCIATOR ANNUNCIATES, THE SHEER PINS ON THE TRAVELING SCREENS SHEER DUE TO THE ACCUMULATION OF TRASH. WHEN SERVICE WATER IS LOST, THOSE PLANT LOADS COOLED BY SERVICE WATER WILL BEGIN TO HEAT UP. THE MAIN EFFECTS IS A LOSS OF STATOR WATER COOLING, USING RECIRC PUMP TRIPS AND A TURBINE GENERATOR RUNBACK. CONTINUED OPERATION OF THE PLANT WITH LITTLE OR NO CIRCULATING WATER FLOW PRODUCES A LOSS OF VACUUM. THIS LOSS RESULTS IN A REACTOR SCRAM WITH RESULTANT TURBINE TRIP, A LOSS OF THE RFPTS AND OPERATION OF THE HPCI AND RCIC SYSTEMS FOR REACTOR VESSEL LEVEL CONTROL.

ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

SCREEN STRUCTURE SCREENS HI-HI DIFF WATER LEVEL - C207R
"A" INNER TRAVELLING SCREENS LO LEVEL - C207R
"B" INNER TRAVELLING SCREENS LO LEVEL - C207R
"C" INNER TRAVELLING SCREENS LO LEVEL - C207R
OUTER SCREEN STRUCTURE SCREEN STOPPED - C207R
CIRC WATER TRAVELLING SCREENS TROUBLE - C207R

REMOVAL OF THE MALFUNCTION WILL RESTORE THE TRAVELLING SCREENS TO NORMAL.

REF: M-312, ANNUNCIATOR RESPONSE CARDS FOR 20C207R,
M-310, E-046

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CWS07	TRASH RACKS BLOCKAGE	06020

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:ACCUMULATION OF DEBRIS AND TRASH ON THE TRASH RACKS CAUSES THE RACKS TO BECOME BLOCKED.

PLT STA:100% POWER

EFFECTS:WHEN ACTIVATED THE MALFUNCTION CAUSES THE TRASH RACKS TO BLOCK RESULTING IN A LEVEL DECREASE IN THE INLET BASIN. IF THE TRASH RACKS ARE 100% BLOCKED, THE CIRC WATER PUMPS WILL RUN FOR 30 MINUTES ON THE WATER STORED IN THE INLET BASIN. WHEN CIRC WATER FLOW IS SUFFICIENTLY LOW, THE VACUUM WILL BE LOST. WHEN SERVICE WATER IS LOST, THOSE PLANT LOADS COOLED BY SERVICE WATER WILL BEGIN TO HEAT UP. THE MAJOR EFFECT IS A LOSS OF STATOR WATER COOLING, WHICH CAUSES BOTH RECIRC PUMPS TO TRIP AND A TURBINE GENERATOR RUNBACK. CONTINUED OPERATION OF THE PLANT WITH LITTLE OR NO CIRCULATING WATER FLOW PRODUCES A LOSS OF VACUUM. THIS LOSS RESULTS IN A REACTOR SCRAM WITH RESULTANT TURBINE TRIP, A LOSS OF THE RFPTS AND OPERATION OF THE HPCI AND RCIC SYSTEMS FOR REACTOR VESSEL LEVEL CONTROL.

ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:
"A" INNER TRAVELLING SCREENS LO LEVEL - C207R
"B" INNER TRAVELLING SCREENS LO LEVEL - C207R
"C" INNER TRAVELLING SCREENS LO LEVEL - C207R

REMOVAL OF THE MALFUNCTION WILL RESTORE THE TRAVELLING SCREENS TO NORMAL.

REF: M-312, ANNUNCIATOR RESPONSE CARDS FOR 20C207R,
M-310, E-246

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MCS01	MAIN CONDENSER TUBE LEAKAGE	14020

TYPE:GENERIC (A/B/C), VARIABLE (0-100%)

CAUSE:TUBE RUPTURES IN THE SPECIFIED CONDENSER. 100% SEVERITY IS EQUIVALENT TO A 100 GPM LEAK AT 26.5" HG VACUUM WITH 6 PSIG CIRC WATER PUMP DISCHARGE PRESSURE.

PLT STA:100%

EFFECT: INSERTION OF THIS MALFUNCTION CAUSES A TUBE LEAK IN THE SPECIFIED CONDENSER AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO A 100 GPM LEAK AT 26.5" HG VACUUM WITH 6 PSIG CIRC WATER PUMP DISCHARGE PRESSURE. CONDENSER HOTWELL LEVEL STARTS TO INCREASE DUE TO THE LEAK. THIS CAUSES REJECT FLOW TO THE CONDENSATE STORAGE TANK TO INCREASE, MAINTAINING HOTWELL LEVEL. THE SYSTEMS THAT TAKE A SUCTION ON THE CST WILL INDICATE THE CHANGE IN CONDUCTIVITY AND PASS IT THROUGH THEIR RESPECTIVE SYSTEMS. THE A (B/C) CONDENSER CONDUCTIVITY INCREASES CAUSING THE CONDENSATE DEMINERALIZER TURBIDITY INDICATION ON THE PPC TO INCREASE. CONDENSATE OXYGEN CONCENTRATION INCREASES AS INDICATED ON THE OXYGEN RECORDER ON PANEL C07A. THE FILTER DEMIN TROUBLE ANNUNCIATOR ACTUATES DUE TO HIGH DEMIN INLET CONDUCTIVITY AND THE FILTER DEMINS REMOVE THE IMPURITIES FROM THE CONDENSATE. THE FILTER DEMINS WILL EXHAUST AT AN ACCELLERATED RATE WITH FEEDWATER CONDUCTIVITY INCREASING, CLEANUP INLET CONDUCTIVITY INCREASING, OFFGAS FLOW INCREASING, AND MAIN STEAM LINE RAD MONITOR LEVELS INCREASING AS THE DEMINERALIZERS BECOME EXHAUSTED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A/B/C CONDENSER HI CONDUCTIVITY - 207L
TURBINE BLDG SAMPLING STATION 1 TROUBLE - 207R

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-311 CONDENSATE FILTER/DEMIN SYSTEM P&ID, M-307 CONDENSATE SYSTEM P&ID, M-328 PROCESS SAMPLING SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MCS02	HOTWELL LEVEL TRANSMITTER FAILS HIGH	14050

TYPE:GENERIC (A,B,C)

CAUSE:A SHORT IN LEVEL TRANSMITTERS (LT-2085A,LT-2085B,LT-2085C) CAUSES THE OUTPUT OF THE LEVEL TRANSMITTER TO FAIL HIGH.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED HOTWELL LEVEL TRANSMITTER TO FAIL HIGH. LR-2085 WILL INDICATE HIGH FOR THE FAILED TRANSMITTER AND THE ACTUAL VALUES FOR THE OPERATIONAL TRANSMITTERS. IF THE HOTWELL LEVEL CONTROL SWITCH IS IN THE EFFECTED TRANSMITTER'S POSITION, THE COURSE AND FINE REJECT VALVES OPEN, DRAINING WATER FROM THE CONDENSATE PUMP DISCHARGE HEADER TO THE CONDENSATE STORAGE TANK. REJECT FLOW INCREASES ON THE PPC AND ACTUAL HOTWELL LEVEL DECREASES. AS LEVEL DECREASES BELOW THE MINIMUM SUCTION HEAD REQUIRED FOR THE CONDENSATE PUMPS, THE CONDENSATE PUMPS CAVITATE AS INDICATED BY FLUCTUATIONS IN THEIR AMPS AND COMMON DISCHARGE PRESSURE. REACTOR FEED PUMP SUCTION PRESSURE DECREASES AND THE FEED PUMPS TRIP ON LOW SUCTION PRESSURE. THE RECIRC PUMP'S RUNBACK TO 30% SPEED, REACTOR WATER LEVEL DECREASES, THE MAIN TURBINE CONTROL VALVES THROTTLE CLOSED TO MAINTAIN REACTOR PRESSURE AS REACTOR POWER DECREASES. WHEN REACTOR WATER LEVEL REACHES 0 INCHES, THE REACTOR SCRAMS AND THE MAIN TURBINE TRIPS. REACTOR PRESSURE INCREASES DUE TO DECAY HEAT AND THE BYPASS VALVES OPERATE TO MAINTAIN REACTOR PRESSURE. REACTOR WATER LEVEL CONTINUES TO DECREASE AND THE HPCI AND RCIC SYSTEMS OPERATE TO MAINTAIN REACTOR WATER LEVEL. IF THE HOTWELL LEVEL CONTROL SWITCH IS IN ONE OF THE OPERATIONAL TRANSMITTER'S POSITIONS, THE INDICATION ON THE HOTWELL LEVEL RECORDER INCREASES UPSCALE, BUT NO OTHER EFFECTS ARE OBSERVED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A/B/C HOTWELL LOW LEVEL - 207L
CONDENSATE HEADER LO PRESSURE - 207L
A/B/C RFPT TRIP - 206L

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF

TABLE 1.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

THE LEVEL TRANSMITTER TO NORMAL.

REF: E17-303 CONDENSER HOTWELL LEVEL INSTRUMENTATION UNIT 2 SCHEMATIC DIAGRAM, M-307 CONDENSATE SYSTEM P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MCS03	HOTWELL LEVEL TRANSMITTER FAILS LOW	14050

TYPE:GENERIC (A,B,C)

CAUSE:AN OPEN IN LEVEL TRANSMITTERS (LT-2085A,LT-2085B,LT-2085C) CAUSES THE OUTPUT OF THE LEVEL TRANSMITTER TO FAIL LOW.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED HOTWELL LEVEL TRANSMITTER TO FAIL LOW. LR-2085 WILL INDICATE LOW FOR THE FAILED TRANSMITTER, AND THE ACTUAL VALUES FOR THE OPERATIONAL TRANSMITTERS. IF THE HOTWELL LEVEL CONTROL SWITCH IS IN THE EFFECTED TRANSMITTER'S POSITION, THE COURSE AND FINE MAKE-UP VALVES OPEN, VACUUM DRAGGING WATER FROM THE CONDENSATE STORAGE TANK TO THE MAIN CONDENSER, CAUSING ACTUAL HOTWELL LEVEL TO INCREASE. AS CONDENSATE COVERS THE MAIN CONDENSER TUBES, MAIN CONDENSER VACUUM DECREASES. WHEN VACUUM REACHES 25 INCHES, THE LO VACUUM ANNUNCIATOR ACTUATES AND AT 23 INCHES THE REACTOR SCRAMS. THE MAIN TURBINE TRIPS, REACTOR PRESSURE INCREASES DUE TO DECAY HEAT AND THE BYPASS VALVES OPERATE TO MAINTAIN REACTOR PRESSURE. IF THE HOTWELL LEVEL CONTROL SWITCH IS IN ONE OF THE OPERATIONAL TRANSMITTER'S POSITIONS, THE INDICATION ON THE HOTWELL LEVEL RECORDER FOR THE FAILED TRANSMITTER DECREASES TO 0, BUT NO OTHER EFFECTS ARE OBSERVED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A/B/C HOTWELL HIGH LEVEL - 207L
A/B/C CONDENSER LO VACUUM - 207L

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE LEVEL TRANSMITTER TO NORMAL.

REF: E17-303 CONDENSER HOTWELL LEVEL INSTRUMENTATION UNIT 2 SCHEMATIC DIAGRAM, M-207 CONDENSATE SYSTEM P&ID.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MCS04	HOTWELL LEVEL TRANSMITTER FAILS AS IS	14050

TYPE:GENERIC (A,B,C)

CAUSE:A CLOG IN THE SENSING LINE OF THE AFFECTED LEVEL TRANSMITTER (LT-20858, LT-20858, LT-20858) CAUSES THE OUTPUT OF THE LEVEL TRANSMITTER FAIL AS IS.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED HOTWELL LEVEL TRANSMITTER TO FAIL AS IS. THE 3-PEN RECORDER ON PANEL C07 WILL INDICATE THE CONSTANT OUTPUT FROM THE FAILED TRANSMITTER AND THE ACTUAL LEVEL ON THE REMAINING LEVEL TRANSMITTERS. IF THE LEVEL CONTROL SELECTOR SWITCH IS IN THE FAILED TRANSMITTERS POSITION, THE COURSE AND FINE LEVEL CONTROLLERS WILL RESPOND TO THE FAILED TRANSMITTERS OUTPUT. IF THE HOTWELL LEVEL CONTROL SWITCH IS IN ONE OF THE OTHER TWO TRANSMITTERS POSITIONS, NO SYSTEM EFFECTS (OTHER THAN THE RECORDER INDICATION) WILL BE OBSERVED.

NO ANNUNCIATORS ARE ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE LEVEL TRANSMITTER TO NORMAL.

REF: 617-303 CONDENSER HOTWELL LEVEL INSTRUMENTATION UNIT 2 SCHEMATIC DIAGRAM, M-307 CONDENSATE SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
ESD01	LOSS OF EXTRACTION STEAM TO FW HEATER	C071

TYPE:GENERIC (A-I)

CAUSE:THE AIR OPERATED ISOLATION VALVE IN THE STEAM SUPPLY LINE TO THE EFFECTED HEATER FAILS CLOSED.

THE FOLLOWING MALFUNCTIONS ARE ALIGNED WITH THE FOLLOWING AIR OPERATED VALVES AND HEATERS:

ESD01A - AO-6119A HEATER A3
ESD01B - AO-6119B HEATER B3
ESD01C - AO-6119C HEATER C3
ESD01D - AO-6120A HEATER A4
ESD01E - AO-6120B HEATER B4
ESD01F - AO-6120C HEATER C4
ESD01G - AO-6121A HEATER A5
ESD01H - AO-6121B HEATER B5
ESD01I - AO-6121C HEATER C5

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED FW HEATER TO LOSE EXTRACTION STEAM. THE SELECTED VALVES POSITION INDICATOR ON PANEL C068 WILL INDICATE CLOSED, AND THE VALVES HAND SWITCH WILL BE INOPERABLE. FEEDWATER TEMPERATURES AS INDICATED ON TI-2100 AND THE PPC WILL INDICATE A LOWER DIFFERENTIAL TEMPERATURE ACROSS THE AFFECTED HEATER. THE EFFECTS OF THE LOWER TEMPERATURE WILL BE PROPAGATED THROUGHOUT THE FW SYSTEM AS INDICATED BY LOWER TEMPERATURES, LOWER HEATER DRAIN FLOWS FOR THE AFFECTED HEATER STRING, INCREASED REACTOR POWER, AND DECREASED PLANT EFFECIENCY. FW HEATER DRAIN FLOWS AND TEMPERATURES DOWNSTREAM OF THE FAILED HEATER WILL ALSO DECREASE.

NO ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RETURNS THE OPERATION OF THE AOV TO NORMAL AND OPENS THE VALVE IF THE HAND SWITCH FOR THE VALVE IS IN NORMAL AFTER OPEN.

REF: M-304 TURBINE AND EXTRACTION STEAM P&ID, M-305 VENTS & DRAINS HEATERS 3, 4, 5 & 6, M-307 CONDENSATE SYSTEM P&ID, M-309 FEED SYSTEM P&ID.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
ESD04	MOISTURE SEPARATOR DRAIN TANK LEVEL CONTROL VALVE FAILS CLOSED	05010

TYPE:GENERIC (A-F)

CAUSE:ELECTRONIC FAILURE OF LC-2012 (A-F) CAUSES OUTPUT TO FAIL LOW.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED DRAIN TANK LEVEL CONTROL VALVE TO FAIL CLOSED. THE VALVE WILL INDICATE CLOSED ON PANEL C05B. MOISTURE SEPARATOR DRAIN TANK LEVEL INCREASES, AND THE AFFECTED MOISTURE SEPARATOR'S HIGH LEVEL DUMP VALVE OPENS TO DRAIN WATER FROM THE MOISTURE SEPARATOR TO THE MAIN CONDENSER. THE MOISTURE SEPARATOR'S WATER LEVEL STABILIZES. FEEDWATER HEATER A4/B4/C4 LOSES THE DRAIN FLOW FROM THE FAILED MOISTURE SEPARATOR AND IT'S FEEDWATER HEATER TRAINS' FLOWS AND TEMPERATURES REFLECT THE LOSS OF DRAIN FLOW. THE EFFECTS OF THE LOWER TEMPERATURE'S WILL BE PROPAGATED THROUGHOUT THE PLANT WITH REACTOR POWER INCREASING AND PLANT EFFECIENCY DECREASING.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION:

A MOISTURE SEPERATOR DRAIN TANK HI LEVEL - 208P
B MOISTURE SEPERATOR DRAIN TANK HI LEVEL - 208R
C MOISTURE SEPERATOR DRAIN TANK HI LEVEL - 208R
D MOISTURE SEPERATOR DRAIN TANK HI LEVEL - 208R
E MOISTURE SEPERATOR DRAIN TANK HI LEVEL - 208R
F MOISTURE SEPERATOR DRAIN TANK HI LEVEL - 208R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF LC-2012A-F TO NORMAL.

REF: E-155 SH. 1 CONTROL VALVE POSITION INDICATOR LIGHTS ELECTRICAL SCHEMATIC DIAGRAM, M-304 TURBINE AND EXTRACTION STEAM P&ID, M-305 VENTS & DRAINS HEATERS 3, 4, & 5, M-307 CONDENSATE SYSTEM P&ID, M-308 FEED SYSTEM P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MSS01	STEAM LEAKAGE INSIDE THE PRIMARY CONTAINMENT	08030

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:"B" MAIN STEAM LINE LEAK AT RV-71-F MOUNTING BOSS. 100% SEVERITY IS EQUIVALENT TO 850,000 LB/HR AT 1025 PSIG REACTOR PRESSURE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A STEAM LINE LEAK AT THE INSTRUCTOR SPECIFIED SEVERITY 0-100% WHERE 100% = 850 KLB/HR AT NORMAL OPERATING PRESSURE. A MAIN STEAM LINE FLOW INDICATION DECREASES DUE TO THE LEAK BEING UPSTREAM OF THE FLOW ELEMENT, REACTOR PRESSURE DECREASES AND DRYWELL PRESSURE AND TEMPERATURE INCREASES RAPIDLY. THE REACTOR SCRAMS DUE TO HIGH DRYWELL PRESSURE, WITH A PCIS GROUP II AND III ISOLATION OCCURRING. THE APPROPRIATE ECCS SYSTEMS AUTO START, VENTILLATION SYSTEMS ISOLATE, AND THE STANDBY GAS TREATMENT INITIATES. STEAM CONTINUES TO FLOW FROM THE LEAK CAUSING REACTOR PRESSURE TO DECREASE FURTHER. WHEN PRESSURE REACHES 850 PSIG, A PCIS GROUP I ISOLATION OCCURS CAUSING THE MSIV'S TO CLOSE. REACTOR WATER LEVEL INITIALLY INCREASES DUE TO SWELL WHEN THE LEAK OCCURS, THEN DECREASES DUE TO MASS LOST FROM THE LEAK. THE FEED PUMPS OPERATE INITIALLY ON RESIDUAL STEAM AND INCREASE REACTOR WATER LEVEL. THE HPCI AND RCIC SYSTEMS OPERATE TO INCREASE WATER LEVEL TO 45 INCHES, THEN TRIP. CONTAINMENT RAD LEVELS INCREASE DUE TO THE STEAM LEAK.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

DRYWELL HI-LO PRESS .25-.75 - C203R
DRYWELL HIGH PRESS TRIP 2.0 PSIG - C205L
GROUP II/III OUTBOARD ISOL RELAYS NOT RESET - 204M
GROUP II/III INBOARD ISOL RELAYS NOT RESET - 204M
CHANNEL A GROUP I ISOL RELAYS NOT RESET - 205R
CHANNEL B GROUP I ISOL RELAYS NOT RESET - 205R
SYSTEM I MAIN STEAM LINE LO PRESS 850 PSIG - 203AA
SYSTEM II MAIN STEAM LINE LO PRESS 850 PSIG - 203BB
A CHANNEL REACTOR AUTO SCRAM - C205R
B CHANNEL REACTOR AUTO SCRAM - C205R

REMOVAL OF THE MALFUNCTION WILL REQUIRE REINITIALIZATION OF THE SIMULATOR.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EDU NO.

REF: M-301, M-1-3-13 PRIMARY CONTAINMENT ISOLATION P&ID, M-1-3-54 RPS P&ID, M-304 MAIN STEAM P&ID, M-351-21 NUCLEAR BOILER P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

MSS02 MSL RUPTURE INSIDE THE PRIMARY CONTAINMENT 08070

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:"A" MAIN STEAM LINE RUPTURES UPSTREAM OF THE INBOARD MSIV AND DOWNSTREAM OF THE FLOW RESTRICTOR. 100% SEVERITY IS EQUIVALENT TO THE DOUBLE ENDED SHEER OF A 26" STEAM LINE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A STEAM LINE LEAK AT INSTRUCTOR SPECIFIED SEVERITY 0-100%, WHERE 100% = DOUBLE ENDED SHEER ON THE 26" A MAIN STEAM LINE. A MAIN STEAM LINE FLOW INDICATION INCREASES, AND THE REACTOR SCRAMS DUE TO HIGH STEAM FLOW THRU A MAIN STEAM LINE (OR HIGH DRYWELL PRESSURE AT LOWER MALFUNCTION SEVERITIES). THE HIGH STEAM FLOW SIGNAL CAUSES A PCIS GROUP I ISOLATION WHICH CLOSES THE MSIV'S, HOWEVER THE LEAKAGE FROM THE PIPING RUPTURE CONTINUES. DRYWELL PRESSURE AND TEMPERATURE INCREASES RAPIDLY WITH A PCIS GROUP II AND III ISOLATION OCCURRING. THE APPROPRIATE ECCS SYSTEMS AUTO START, VENTILLATION SYSTEMS ISOLATE, AND THE STANDBY GAS TREATMENT INITIATES. REACTOR WATER LEVEL INITIALLY INCREASES DUE TO SWELL WHEN THE LEAK OCCURS, THEN DECREASED DUE TO MASS LOST FROM THE LEAK. THE HPCI AND RCIC SYSTEMS ATTEMPT TO RECOVER WATER LEVEL BUT ISOLATE AS REACTOR PRESSURE REACHES 100 AND 50 PSIG RESPECTIVELY. CORE SPRAY/LPCI AND CONDENSATE PUMPS OPERATE TO RECOVER REACTOR WATER LEVEL WITH THE ADS SYSTEM INITIATING IF REACTOR WATER LEVEL HAS NOT RECOVERED ABOVE -130 INCHES IN 105 SECONDS. THE RECIRC PUMP DISCHARGE VALVES AUTO CLOSE WHEN REACTOR PRESSURE REACHES 225 PSIG WITH DRYWELL PRESSURE 2 PSIG OR REACTOR WATER LEVEL LESS THAN -150 INCHES. CORE SPRAY/LPCI, AND CONDENSATE PUMPS FILL THE CORE UNTIL WATER FLOWS OUT OF THE LEAK. CONTAINMENT RADIATION LEVELS INCREASE DUE TO THE STEAM LEAK.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

REACTOR HI-LO WATER LEVEL - 203L
SYSTEM I REACTOR VESSEL LO-LO LEVEL - 203AA
SYSTEM II REACTOR VESSEL LO-LO LEVEL - 203BB
SYSTEM I REACTOR VESSEL LO-LO-LO LEVEL - 203AA
SYSTEM II REACTOR VESSEL LO-LO-LO LEVEL - 203BB
SYSTEM I REACTOR VESSEL LO PRESS 500 PSIG - 203AA
SYSTEM I REACTOR VESSEL LO PRESS 500 PSIG - 203BB

TABLE 1.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
	DRYWELL HI-LO PRESS .25-.75 - C203B	
	DRYWELL HIGH PRESS TRIP 2.0 PSIG - C205L	
	GROUP II/III OUTBOARD ISOL RELAYS NOT RESET - 204M	
	GROUP II/III INBOARD ISOL RELAYS NOT RESET - 204M	
	CHANNEL A GROUP I ISOL RELAYS NOT RESET - 205R	
	CHANNEL B GROUP I ISOL RELAYS NOT RESET - 205R	
	SYSTEM I MAIN STEAM LINE HI FLOW - 203AA	
	SYSTEM II MAIN STEAM LINE HI FLOW - 203BA	
	A/B/C/D CORE SPRAY PUMP AUTO START - 203A/B/C/D	
	A/B/C/D RHR PUMP AUTO START - 203A/B/C/D	
	HPCI RELAYS NOT RESET - 203BA	
	BLOWDOWN TIMERS INITIATED 120 SEC - 203AA	
	RCIC RELAYS NOT RESET - 203AA	
	A CHANNEL REACTOR AUTO SCRAM - C205R	
	B CHANNEL REACTOR AUTO SCRAM - C205R	

REMOVAL OF THE MALFUNCTION WILL REQUIRE REINITIALIZATION OF THE SIMULATOR.

REF: M-301, M-1-S-23 PRIMARY CONTAINMENT ISOLATION P&ID, M-1-S-54 RPS P&ID, M-104 MAIN STEAM P&ID, M-351-21 NUCLEAR BOILER P&ID, M-1-S-35 HIGH PRESSURE COOLANT INJECTION SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, E-359 RECIRC PUMP SUCTION AND DISCHARGE VALVES ELECTRICAL SCHEMATIC DIAGRAM, M-1-S-42 RCIC SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-1-S-40 CORE SPRAY SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-1-S-65 RHR SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-1-S-52 ADS SYSTEM ELECTRICAL SCHEMATIC DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MSS03	MSL RUPTURE OUTSIDE PRIMARY AND SECONDARY CONTAINMENT	03130

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:RUPTURE OF MAIN STEAM PIPE DOWNSTREAM OF AO-80C IN THE REACTOR BLDG. 100% SEVERITY IS EQUIVALENT TO A DOUBLE ENDED SHEER OF THE 26" STEAM LINE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A STEAM LINE LEAK AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS EQUIVALENT TO A DOUBLE ENDED SHEER OF THE 26" "C" MAIN STEAM LINE. C MAIN STEAM LINE FLOW INCREASES, REACTOR PRESSURE DECREASES, AND STEAM TUNNEL TEMPERATURE INCREASES. A PCIS GROUP I ISOLATION OCCURS DUE TO MAIN STEAM LINE LOW PRESSURE AT 850 PSIG AND THE MSIV'S CLOSE ISOLATING THE LEAK. THE REACTOR SCRAMS DUE TO MSIV CLOSURE, REACTOR WATER LEVEL INITIALLY INCREASES DUE TO SWELL THEN DECREASES DUE TO THE MASS LOST FROM THE LEAK. VENTILATION TEMPERATURES AND RADIATION LEVELS INCREASE. REACTOR PRESSURE INCREASE DUE TO DECAY HEAT AND THE RELIEF VALVES OPERATE TO MAINTAIN REACTOR PRESSURE. HPCI & RCIC INITIATE WHEN REACTOR WATER LEVEL REACHES -48 INCHES TO RECOVER LEVEL.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

SYSTEM I MAIN STEAM LINE LO PRESS - C203A
SYSTEM II MAIN STEAM LINE LO PRESS - C203B
SYSTEM I MAIN STEAM LINE HI FLOW - C203A
SYSTEM II MAIN STEAM LINE HI FLOW - C203B
SYSTEM I STEAM TUNNEL HI TEMP - C203A
SYSTEM II STEAM TUNNEL HI TEMP - C203B
MAIN STEAM LINE ISO. VALVES NOT FULL OPEN TRIP - 205L
A CHANNEL REACTOR AUTO SCRAM - C205K
B CHANNEL REACTOR AUTO SCRAM - C205K
REACTOR LOW WATER LEVEL -48 IN - C048

REMOVAL OF THIS MALFUNCTION WILL REQUIRE REINITIALIZATION OF THE TRAINER.

REF: M-1-S-23 PCIS SYSTEM P&ID, FSAR VOL.6 14.6.5, M-304 MAIN STEAM SYSTEM P&ID, M-334 VENTILATION RADIATION MONITORING SYSTEM P&ID, M-321 PRIMARY CONTAINMENT ISOLATION DIAGRAM, M-38B REACTOR BLDG VENTILATION

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

FLOW DIAGRAM, M-1-S-54 RPS SYSTEM ELECTRICAL SCHEMATIC DIAGRAM.

REV. 4

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MSS04	MAIN STEAM HEADER PRESSURE TRANSMITTER PT-2134/PT-2135 FAILURE	TC

TYPE:GENERIC (A-B), VARIABLE (0-100%)

CAUSE:ELECTRONIC FAILURE OF PRESSURE TRANSMITTER FAILS OUTPUT TO INSTRUCTORs SPECIFIED VALUE. 100% SEVERITY IS EQUIVALENT TO 100% RANGE OR SCALE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES (A) PT-2134 OR (B) PT-2135 TO FAIL TO THE INSTRUCTOR SPECIFIED VALUE 0-100% WHERE 100% IS EQUIVALENT TO 100% OF RANGE OR SCALE. MAIN STEAM PRESSURE INDICATION ON PI-2134/2135 INDICATES THE FAILED VALUE. ASSUMING THE 10 PSIG BIAS IS ON A, THE B REGULATOR WOULD BE IN CONTROL, IF PT-2134(A) IS FAILED LOW NOTHING HAPPENS. IF PT-2135(B) IS FAILED LOW, THE TCV'S WILL START TO CLOSE, THIS CAUSES RPV PRESSURE TO INCREASE WHICH CAUSES POWER TO INCREASE. WHEN THROTTLE PRESSURE REACHES APPROXIMATELY 900 PSIG, THE TCV'S WILL BE OPEN TO 100% TURBINE LOAD POSITION AND THE EHC SYSTEM WILL CONTROL THROTTLE PRESSURE AT APPROX. 10 PSIG HIGHER THAN ORIGINALLY. REACTOR WILL BE AT 100% POWER AND GENERATOR WILL BE CARRYING 100% LOAD. IF EITHER PRESSURE TRANSMITTER IS FAILED HIGH THAN ITS SETPOINT SUCH THAT THE DIFFERENCE BETWEEN THE FAILED PRESSURE AND ITS SETPOINT IS GREATER THAN THE DIFFERENCE BETWEEN THE OPPOSITE PRESSURE REGULATOR SETPOINT AND PRESSURE TRANSMITTER THEN THE EHC CONTROL SYSTEM WILL DECREASE REACTOR PRESSURE BY OPENING CONTROL VALVES AND/OR BYPASS VALVES. THE CONTROL VALVES AND BYPASS VALVES WILL OPEN UNTIL THE OPERATOR LOAD LIMIT AND MAXIMUM COMBINED FLOW LIMITS ARE REACHED (IF THE ERROR SIGNAL PRODUCED BY THE FAILED TRANSMITTER IS LARGE ENOUGH), AND WILL STAY OPEN UNLESS THE OPERATOR TRANSFERS PRESSURE CONTROL TO THE REDUNDANT PRESSURE REGULATOR. THIS CAUSES GENERATOR OUTPUT TO INCREASE AND REACTOR POWER TO DECREASE. REACTOR LEVEL WILL SWELL DUE TO THE INCREASED STEAM FLOW. WITH NO OPERATOR ACTION, REACTOR PRESSURE WILL DECREASE TO 850 PSIG CAUSING A PCIS GROUP I ISOLATION AND MSIV CLOSURE, WITH A RESULTANT REACTOR SCRAM. THE MAIN TURBINE TRIPS ON REVERSE POWER, THE AUX BUSSES FAST TRANSFER TO THEIR STARTUP SOURCES, AND THE RECIRC PUMP'S TRIP. REACTOR PRESSURE INCREASES DUE TO DECAY HEAT AND THE RELIEF VALVES OPERATE TO MAINTAIN REACTOR PRESSURE. REACTOR WATER LEVEL DECREASES DUE TO THE MASS LOST

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

FROM RELIEF VALVE ACTUATION AND THE HPCI AND RCIC SYSTEMS OPERATE TO MAINTAIN REACTOR WATER LEVEL.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

MAXIMUM COMBINED FLOW LIMIT IN CONTROL - C20BR
MAIN STEAM LINE BYPASS VALVE OPEN - C20HR
A CHANNEL REACTOR AUTO SCRAM - C20DR
B CHANNEL REACTOR AUTO SCRAM - C20DR

REMOVAL OF THIS MALFUNCTION WILL RETURN THE EFFECTED PRESSURE TRANSMITTER TO NORMAL OPERATION.

REF: M-2-372 EMC SYSTEM DEK, M-302 P&ID MAIN STEAM, BYPASS, & CROSSAROUND.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MSS05	MSIV DISC FAILURE	03010

TYPE:GENERIC (A-H)

CAUSE:STEM / DISC SEPARATION OF MSIV

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED MSIV TO FAIL CLOSED. THE TIME REQUIRED FOR THE MSIV TO CLOSE WILL VARY WITH STEAM FLOW AT THE TIME OF MALFUNCTION INSERTION. POSITION INDICATION FOR THE FAILED MSIV WILL INDICATE OPEN. STEAM FLOW IN THE EFFECTED LINE WILL DECREASE TO ZERO AND STEAM FLOW IN THE UNEFFECTED LINES WILL INCREASE. THE REACTOR SCRAMS DUE TO HIGH FLUX. THE MAIN TURBINE TRIPS ON HIGH LEVEL DUE TO POST SCRAM FEEDWATER CONTROL THE AUX BUSSES FAST TRANSFER TO THEIR STARTUP SOURCES, AND THE RECIRC PUMP'S TRIP. REACTOR PRESSURE INCREASES DUE TO DECAY HEAT AND THE BYPASS VALVES OPERATE TO MAINTAIN REACTOR PRESSURE. REACTOR WATER LEVEL DECREASES DUE TO THE MASS LOST FROM BYPASS VALVES. IF REACTOR POWER IS INITIALLY LESS THAN 80%, REACTOR POWER INCREASES DUE TO VOID COLLAPSE, STEAM FLOWS IN THE REMAINING MAIN STEAM LINES INCREASE, GENERATOR OUTPUT DECREASES, THE TURBINE CONTROL VALVES OPEN TO MAINTAIN REACTOR PRESSURE, REACTOR POWER DECREASES TO NORMAL, AND GENERATOR OUTPUT INCREASES TO NORMAL.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

APRM HI/HI INOP - 205R

NEUTRON MONITORING SYSTEM TRIP - 205L
A CHANNEL REACTOR AUTO SCRAM - C205R
B CHANNEL REACTOR AUTO SCRAM - C205R

REMOVAL OF THIS MALFUNCTION WILL REQUIRE REINITIALIZATION OF THE TRAINER.

REF: M-303 MAIN STEAM BYPASS AND CROSSAROUND P&ID, M-1-S-23 PCIS SYSTEM P&ID, FSAR VOL.6 14.6.5, M-304 MAIN STEAM SYSTEM P&ID, M-334 VENTILATION RADIATION MONITORING SYSTEM P&ID, M-391 PRIMARY CONTAINMENT ISOLATION DIAGRAM, M-338 REACTOR BLDG VENTILATION FLOW DIAGRAM, 1-1-5-54 RPS SYSTEM ELECTRICAL SCHEMATIC DIAGRAM.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MS506	MSIV FAILS CLOSED	01010

TYPE:GENERIC (A-M)

CAUSE:AIR LINE TO MSIV AIR OPERATOR RUPTURES CAUSING MISV TO FAIL CLOSED.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED MSIV TO FAIL CLOSED. STEAM FLOW IN THE EFFECTED LINE WILL DECREASE TO ZERO AND STEAM FLOW IN THE UNEFFECTED LINES WILL INCREASE. THE REACTOR SCRAMS DUE TO HIGH FLUX THE MAIN TURBINE TRIPS ON HIGH LEVEL, THE AUX BUSSES FAST TRANSFER TO THEIR STARTUP SOURCES, AND THE RECIRC PUMPS TRIP. THE FEED PUMPS INCREASE WATER LEVEL TO THE HIGH LEVEL TRIP SETPOINT. REACTOR PERSSURE INCREASES DUE TO DECAY HEAT AND THE RELIEF VALVES OPERATE TO LOWER PRESSURE. MASS IS LOST DUE TO BYPASS VALVE ACTUATION FOLLOWING RFPT TRIPS ON HIGH LEVEL. IF THE MALFUNCTION IS INSERTED WHEN PO ER IS LESS THAN ABOUT 80%, REACTOR POWER INREASES DUE TO VOID COLLAPSE, STEAM FLOWS IN THE REMAINING STEAM LINES INCREASE, GENERATOR OUTPUT DECREASES, THE TURBINE CONTROL VALVES OPEN TO MAINTAIN REACTOR PRESSURE, REACTOR POWER DECREASES TO NORMAL, AND GENERATOR OUTPUT INCREASES TO NORMAL. IF AN INBOARD MSIV IS FAILED, DRYWELL PRESSURE MAY SLOWLY INCREASE DUE TO NITROGEN LEAKING INTO THE DRYWELL.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

APRM HI/HI/INOP - 205R

NEUTRON MONITORING SYSTEM TRIP - 205L
A CHANNEL REACTOR AUTO SCRAM - C205R
B CHANNEL REACTOR AUTO SCRAM - C205R

REMOVAL OF THIS MALFUNCTION WILL REQUIRE REINITIALIZATION OF THE TRAINER.

REF: M-303 MAIN STEAM BYPASS AND CROSSAROUND PRID, M-1-S-23 PCIS SYSTEM PRID, FSAR VOL.6 14.6.5, M-304 MAIN STEAM SYSTEM PRID, M-334 VENTILATION RADIATION MONITORING SYSTEM PRID, M-301 PRIMARY CONTAINMENT ISOLATION DIAGRAM, M-368 REACTOR BLDG VENTILATION FLOW DIAGRAM, M-1-S-54 RPS SYSTEM ELECTRICAL SCHEMATIC DIAGRAM.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MSS07	MSIV SLOW CLOSURE TIME	03010

TYPE:GENERIC (A-H)

CAUSE:FAILURE OF 3/4" AUTO - PONENT FLOW CONTROL VALVE IN THE HYDRAULIC DASHPOT UNIT.

PLT STA:MSIV STROKING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED MSIV TO CLOSE IN 60 SEC. WHEN IT'S HAND SWITCH IS POSITIONED TO CLOSE OR A FAST CLOSURE SIGNAL IS RECEIVED WHILE THIS MALFUNCTION IS ACTIVE. THE OPENING TIME WILL NOT BE AFFECTED BY THE INSERTION OF THIS MALFUNCTION.

NO ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE EFFECTED MSIV OPERATION TO NORMAL.

REF: M-1-S23 MAIN STEAM SYSTEM. P&ID, M-1-J-80-1 MSIV GEK.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MSS10	STEAM LEAKAGE IN THE TURB BLDG STEAM TUNNEL.	0310

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:"D" MAIN STEAM LINE WILD CRACKS.
100% IS EQUIVALENT TO 850,000 LB/HR AT 1030 PSIG
REACTOR PRESSURE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A STEAM LINE LEAK AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS EQUIVALENT TO 850,000 LB/HR LEAK ON THE "D" MAIN STEAM LINE AT NORMAL OPERATING PRESSURE. D MAIN STEAM LINE FLOW INCREASES, REACTOR PRESSURE DECREASES AND STEAM TUNNEL HIGH TEMPERATURE CAUSES A GROUP I PCIS ISOLATION WHICH CLOSES THE MSIV'S AND ISOLATES THE LEAK. THE REACTOR SCRAMS DUE TO MSIV CLOSURE, THE MAIN TURBINE TRIPS ON REVERSE POWER, THE AUX BUSSES FAST TRANSFER TO THEIR STARTUP SOURCES, AND THE RECIRC PUMP'S TRIP. THE FEED PUMPS OPERATE INITIALLY ON RESIDUAL STEAM AND ATTEMPT TO RESTORE WATER LEVEL. REACTOR PRESSURE INCREASES DUE TO DECAY HEAT AND THE RELIEF VALVES OPERATE TO MAINTAIN PRESSURE. REACTOR LEVEL DECREASES DUE TO THE MASS LOST FROM RELIEF VALVE ACTUATION AND THE HPCI AND RCIC SYSTEMS OPERATE TO MAINTAIN REACTOR WATER LEVEL.

SYSTEM I STEAM TUNNEL HI TEMP - C203AA
SYSTEM II STEAM TUNNEL HI TEMP - C203BB
CHANNEL A GROUP I ISOL RELAYS NOT RESET - C205R
CHANNEL B GROUP I ISOL RELAYS NOT RESET - C205R
MAIN STEAM LINE ISO. VALVES NOT FULL OPEN TRIP - C203AA
A CHANNEL REACTOR AUTO SCRAM - C205R
B CHANNEL REACTOR AUTO SCRAM - C205R

REMOVAL OF THIS MALFUNCTION WILL REQUIRE REINITIALIZATION OF THE TRAINER.

REF: M-1-823 PCIS SYSTEM P&ID, FSAR VOL. , M-304 MAIN STEAM SYSTEM P&ID, M-354 VENTILATION RADIATION MONITORING SYSTEM P&ID, M-391 PRIMARY AND SECONDARY CONTAINMENT ISOLATION DIAGRAM, M-389 REACTOR BLDG VENTILATION FLOW DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MS511	MSL FLOW TRANSMITTER FT-6-51 FAILURE	15020

TYPE:GENERIC (A-D) VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE IN FLOW TRANSMITTER FAILS OUTPUT TO INSTRUCTORS SPECIFIED VALUE. 100% IS EQUIVALENT TO FULL RANGE OR SCALE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED MAIN STEAM LINE FLOW TRANSMITTER TO FAIL TO THE INSTRUCTORS SPECIFIED VALUE 0-100%, WHERE 100% IS FULL SCALE OR RANGE. IF THE FLOW TRANSMITTER IS FAILED HIGHER THAN ACTUAL STEAM FLOW, THE STEAM LINE FLOW INDICATOR ON PANEL C05, AND THE TOTAL STEAM FLOW INDICATION ON FR-6-98, PANEL C05 INCREASES. THE FEEDWATER CONTROL SYSTEM SENSES A FEED FLOW/STEAM FLOW MISMATCH AND INCREASES THE SPEED OF THE OPERATING FEED PUMPS. REACTOR WATER LEVEL INCREASES, AND THE FEED PUMPS MAINTAIN REACTOR WATER LEVEL AT A SLIGHTLY HIGHER VALUE. IF THE FLOW TRANSMITTER IS FAILED LOWER THAN ACTUAL STEAM FLOW, THE STEAM LINE FLOW INDICATOR ON PANEL C05 AND THE TOTAL STEAM FLOW INDICATION ON FR-6-98 ON PANEL C05 DECREASES. THE FEEDWATER CONTROL SYSTEM SENSES A FEED FLOW/STEAM FLOW MISMATCH AND DECREASES THE SPEED OF THE OPERATING FEED PUMPS. REACTOR WATER LEVEL DECREASES AND THE FEED PUMPS MAINTAIN REACTOR WATER LEVEL AT A SLIGHTLY LOWER VALVE.
IF THE FEEDWATER CONTROL SYSTEM IS IN SINGLE ELEMENT CONTROL, NO EFFECTS ON THE FEEDWATER CONTROL SYSTEM WILL BE OBSERVED.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE EFFECTED FLOW TRANSMITTER TO NORMAL.

REF: M-351 NUCLEAR BOILER P&ID, M-1-T-2 FEEDWATER CONTROL SYSTEM IED, M-1-JJ-104 GEK-9684 VOL 3 PART 2 FEEDWATER CONTROL SYSTEM GEK.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MS512	MSL PRESSURE TRANSMITTER PT-6-60 FAILURE	13020

TYPE:GENERIC (A-D) VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE IN PRESSURE TRANSMITTER FAILS OUTPUT TO INSTRUCTORS SPECIFIED VALUE. 100% IS EQUIVALENT TO FULL RANGE OR SCALE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED MAIN STEAM LINE PRESSURE TRANSMITTER TO FAIL TO THE INSTRUCTORS SPECIFIED VALUE 0-100%, WHERE 100% IS FULL SCALE OR RANGE. THIS PRESSURE TRANSMITTER PROVIDES THE PRESSURE REFERENCE SIGNAL FOR DENSITY COMPENSATION IN THE FEEDWATER CONTROL SYSTEM AND THE MAIN STEAM LINE FLOW INDICATORS. IF THE PRESSURE TRANSMITTER IS FAILED HIGHER THAN ACTUAL STEAM PRESSURE, THE STEAM LINE FLOW INDICATOR ON PANEL C08, AND THE TOTAL STEAM FLOW INDICATION ON FR-6-[illegible], PANEL C05 INCREASE. THE FEEDWATER CONTROL SYSTEM SENSES A FEED FLOW/STEAM FLOW MISMATCH AND INCREASES THE SPEED OF THE OPERATING FEED PUMPS. REACTOR WATER LEVEL INCREASES, AND THE FEED PUMPS MAINTAIN REACTOR WATER LEVEL AT A HIGHER VALUE. IF THE FEEDWATER CONTROL SYSTEM IS IN SINGLE ELEMENT CONTROL, NO EFFECTS ON THE FEEDWATER CONTROL SYSTEM WILL BE OBSERVED.

IF THE PRESSURE TRANSMITTER IS FAILED LOW, SIMILAR BUT OPPOSITE EFFECTS WILL BE OBSERVED.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE EFFECTED PRESSURE TRANSMITTER TO NORMAL.

REF: M-351 NUCLEAR BOILER P&ID, M-1-T-3 FEEDWATER CONTROL SYSTEM IED., M-1-JJ-104 GEK-9664 VOL 3 PART 2 FEEDWATER CONTROL SYSTEM GEK.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MSS13	STEAM LEAKAGE OUTSIDE CONTAINMENT	09030

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:RUPTURE OF THE MAIN STEAM PIPE JUST DOWNSTREAM OF MSV-2. 100% SEVERITY IS EQUIVALENT TO 850,000 LB/HR LEAKAGE AT 1030 REACTOR PRESSURE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A STEAM LINE LEAK AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS EQUIVALENT TO 850,000 LB/HR, ON THE MAIN STEAM PIPING JUST DOWNSTREAM OF MSV-2 AT MO-25348 PIPE WELD. ALL FOUR MAIN STEAM LINE FLOWS INCREASE, WITH REACTOR PRESSURE AND MAIN STEAM LINE PRESSURES DECREASING. REACTOR WATER LEVEL INCREASES INITIALLY DUE TO SWELL, THEN DECREASES TO NORMAL AS THE TURBINE CONTROL VALVES CLOSE TO MAINTAIN REACTOR PRESSURE. GENERATOR LOAD DECREASES BY APPROXIMATELY 70 MWE. TURBINE BLDG VENTILATION TEMPS AND AREA RADIATION INCREASES. TURBINE BUILDING SUMP LEVELS INCREASE AND CONDENSOR MAKE-UP INCREASES.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

1) TURB BLDG VENT PANEL 20C131 TROUBLE - C212L
2) COMMON TURB BLDG PIPE TUNNEL FLOOR DRAIN SUMP LVL HI-HI - C212L
3) UNIT 2 TURB BLDG PIPE TUNNEL SUMP HI-HI - C212L

REMOVAL OF THIS MALFUNCTION WILL REQUIRE REINITIALIZATION OF THE TRAINER.

REF: FSAR VOL.5, M-304 MAIN STEAM SYSTEM P&ID, M-334 VENTILATION RADIATION MONITORING SYSTEM P&ID, M-380 TURBINE BLDG VENTILATION TEMP CONTROL DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EDU NO.
MTA05	STEAM SEAL REGULATOR FAILS OPEN	03050

TYPE:DISCRETE

CAUSE:MECHANICAL FAILURE OF PC-2551 CAUSES OUTPUT TO FAIL HIGH.

PLT STA:TURBINE STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE STEAM SEAL REGULATOR TO FAIL OPEN. SEAL HEADER PRESSURE AS INDICATED ON PI-2324 AND THE PPC INCREASES. SEAL HEADER PRESSURE IS LIMITED BY HO-2623A/HO-2623B (SPUV-1/2) WHICH DUMPS SEAL STEAM TO FEEDWATER HEATER A1; HEADER PRESSURE STABILIZES AT THE SETPOINT OF HO-2623A/B. STEAM SEAL HEADER TEMPERATURE INDICATION ON TR-2358 INCREASES SLIGHTLY AS FLOW THROUGH THE STEAM SEAL HEADER INCREASES. THE OPERATOR MAY OPEN THE STEAM SEAL HEADER MANUAL UNLOADING VALVE MO-2548 TO LOWER PRESSURE, OR, AT LOADS > 40%, CLOSE THE STEAM SEAL SYSTEM MAIN SUPPLY VALVE MO-2323 TO ISOLATE THE STEAM SEAL REGULATOR AND ALLOW THE MAIN TURBINE LEAKOFF STEAM TO SUPPLY THE SEAL STEAM SYSTEM.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF PC-2551 TO NORMAL.

REF: M-304 TURBINE AND EXTRACTION STEAM SYSTEM P&ID,
M-305 VENTS AND DRAINS HEATERS 3, 4, & 5.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
MTA06	STEAM SEAL REGULATOR FAILS CLOSED	03050

TYPE:DISCRETE

CAUSE:MECHANICAL FAILURE OF PC-2551 CAUSE OUTPUT TO FAIL LOW.

PLT STA:TURBINE STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE MAIN TURBINE SEAL STEAM REGULATOR TO FAIL CLOSED. STEAM SEAL HEADER PRESSURE AS INDICATED ON PI-2324 AND THE PPC DECREASES TO 0. STEAM SEAL HEADER TEMPERATURE DECREASES AND MAIN CONDENSER VACUUM SLOWLY DECREASES. THE OPERATOR MAY OPEN STEAM SEAL BYPASS VALVE MO-2322 TO RAISE PRESSURE IN THE STEAM SEAL HEADER. IF THE MALFUNCTION IS INSERTED WHEN TURBINE LOAD IS GREATER THAN 40%, NO EFFECTS WILL BE OBSERVED DUE TO THE SELF SEALING EFFECTS OF THE TURBINE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

STEAM SEAL HEADER LO PRESS - 20&R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF PC-2551 TO NORMAL.

REF: M-304 TURBINE AND EXTRACTION STEAM SYSTEM P&ID,
M-305 VENTS AND DRAINS HEATERS 3, 4, & 5.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
APR01	APRM CHANNEL FAILS UPSCALE	05020

TYPE:GENERIC (A-F)

CAUSE:AVERAGING AMPLIFIER OUTPUT FAILS TO MAXIMUM

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED APRM CHANNEL TO FAIL UPSCALE. THE METER ON THE INSTRUMENT DRAWER, THE RECORDER ON PANEL C05, AND THE PPC POINT WILL REFLECT THE UPSCALE READING.

THE HIGH-HIGH OR INOP AND HIGH LIGHTS ON PANEL C05 FOR THE EFFECTED APRM CHANNEL ILLUMINATE.
IF THE APRM CHANNEL IS NOT BYPASSED, A ROD BLOCK AND AN RPS HALF SCRAM SIGNAL IS GENERATED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A APRM HI HI INOPERATIVE	C205
B APRM HI HI INOPERATIVE	C205
APRM HIGH	C205
NEUTRON MONITORING SYSTEM TRIP	C205
A CHANNEL AUTO REACTOR SCRAM	C205
B CHANNEL AUTO REACTOR SCRAM	C205
ROD WITHDRAW BLOCK	C205

REMOVAL OF THIS MALFUNCTION RESTORES THE APRM CHANNEL TO NORMAL OPERATION.

REFERENCES: M-1-S-34 POWER RANGE NEUTRON MONITORING SYSTEM ELEM DIAGRAM, M-1-JJ-105 POWER RANGE NEUTRON MONITORING SYSTEM DEK, M-1-S-20 RMCS SYSTEM ELEM DIAGRAM, M-1-S-54 RPS SYSTEM ELEM DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
APR02	APRM CHANNEL FAILS DOWNSCALE	05020

TYPE:GENERIC (A-F)

CAUSE:OPEN IN APRM AVERAGING CIRCUIT

PLT STA:100% POWER

EFFECTS:THE SELECTED APRM CHANNEL GOES DOWNSCALE WHEN THIS MALFUNCTION IS ACTIVATED. THE RECORDERS ON PANEL C05 AND ON THE INSTRUMENT DRAWER WILL INDICATE DOWNSCALE REGARDLESS OF ACTUAL NEUTRON FLUX LEVELS. THE DOWNSCALE LIGHTS ON THE INSTRUMENT DRAWER AND PANEL C05 ILLUMINATE. IF THE SELECTED APRM IS NOT BYPASSED, A ROD BLOCK SIGNAL IS GENERATED. IF THE ASSOCIATED IRM IS UPSCALE WHEN THE APRM IS DOWNSCALE, A RPS HALF SCRAM OCCURS. IF THE SELECTED APRM IS CHANNEL E OR CHANNEL F, RBM CHANNEL A OR B WILL GENERATE AN APRM REFERENCE DOWNSCALE SIGNAL. THE REF DNSCL LITE ON THE RBM DRAWER LITES AND THE RBM AUTOMATICALLY BYPASSES. IF THE FAILED REFERENCE APRM IS BYPASSED, THE RBM NULLS AND TRANSFERS TO ITS ALTERNATE REFERENCE APRM. IF THE SELECTED APRM CHANNEL IS BYPASSED, THE INPUTS TO THE REACTOR PROTECTION SYSTEM AND TO THE REACTOR MANUAL CONTROL SYSTEM WILL BE BYPASSED NEGATING THE SCRAM OR ROD BLOCK SIGNALS. THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD WITHDRAWAL BLOCK	C20F
APRM DOWNSCALE	C205
A CHANNEL AUTO REACTOR SCRAM	C205
B CHANNEL AUTO REACTOR SCRAM	C205
NEUTRON MONITORING SYSTEM TRIP	C20F

REMOVAL OF THIS MALFUNCTION RESTORES THE SELECTED APRM CHANNEL TO NORMAL OPERATION.

REFERENCES: M-1-S-34 POWER RANGE NEUTRON MONITORING SYSTEM ELEM DIAGRAM, M-1-JJ-106 POWER RANGE NEUTRON MONITORING SYSTEM SEK, M-1-S-20 RMCS SYSTEM ELEM DIAGRAM, M-1-S-54 RPS SYSTEM ELEM DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
APR03	APRM CHANNEL FAILS INOP	05100

TYPE:GENERIC (A-F)

CAUSE:COUNT CIRCUIT OUTPUT FAILS TO ZERO

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED APRM CHANNEL TO FAIL INOP. THE RECORDERS ON PANEL C05 AND ON THE INSTRUMENT DRAWER WILL INDICATE ACTUAL FLUX LEVELS IN THE CORE. THE INOP LITE ON THE INSTURMENT DRAWER AND THE HIGH-HIGH OR INOP LITES ON PANEL C05 ILLUMINATE. IF THE SELECTED APRM IS NOT BYPASSED, A ROD BLOCK SIGNAL AND AN RPS TRIP SIGNAL IS GENERATED. IF THE SELECTED APRM CHANNEL IS BYPASSED, THE ROD BLOCK AND RPS SIGNAL IS NEGATED. IF THE DRAWER MODE SWITCH IS PLACED IN COUNT THE APRM METER INDICATES 0. THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD WITHDRAWAL BLOCK	C205
A APRM HI HI INOPERATIVE	C205
B APRM HI HI INOPERATIVE	C205
A CHANNEL AUTO REACTOR SCRAM	C205
B CHANNEL AUTO REACTOR SCRAM	C205

REFERENCES: M-1-S-34 POWER RANGE NEUTRON MONITORING SYSTEM ELEM DIAGRAM, M-1-JJ-105 POWER RANGE NEUTRON MONITORING SYSTEM SEK, M-1-S-20 RMCS SYSTEM ELEM DIAGRAM, M-1-S-54 RPS SYSTEM ELEM DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
APR04	APRM CHANNEL AVERAGE CIRCUIT DEVIATION	05020

TYPE:GENERIC (A-F) VARIABLE, 0-100%

CAUSE:ELECTRONIC OSCILLATION IN AMPLIFIER Z-32. 100% SEVERITY EQUALS +/- 10% POWER. OSCILLATION HAS A 30 SECOND PERIOD.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED APRM CHANNEL TO OSCILLATE WITH AN AMPLITUDE SPECIFIED BY THE INSTRUCTOR IN A SINUSOIDAL MANNER. AT 100% SEVERITY, POWER OUTPUT OF THE APRM CHANNEL WILL VARY AT A PERIOD OF 30 SECONDS WITH A PEAK TO PEAK AMPLITUDE OF 20%. AT 100% POWER AND WITH A SEVERITY OF 100%, THE SELECTED APRM CHANNEL WILL VARY FROM 90% TO 110%. IF THE OUTPUT OF THE APRM CHANNEL IS ABOVE THE TRIP SETPOINT (.58W+62) AT ANY TIME THE APRM CHANNEL IS NOT BYPASSED, THE HIGH LITES ON THE APRM PANEL AND PANEL C05 ILLUMINATE, A ROD BLOCK SIGNAL IS GENERATED AND THE "APRM HIGH" ANNUNCIATOR ACTUATES. THE METER ON THE INSTURMENT DRAWER, RECORDER ON PANEL C05 AND PLANT PROCESS COMPUTER WILL INDICATE THE OSCILLATION IN APRM OUTPUT. THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD WITHDRAWAL BLOCK	C205
APRM HIGH	C205

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE SPECIFIED APRM CHANNEL TO NORMAL OPERATION.

REFERENCES: M-1-S-34 POWER RANGE NEUTRON MONITORING SYSTEM ELEM DIAGRAM, M-1-JJ-106 POWER RANGE NEUTRON MONITOR SCHEMATIC, M-1-S-20 RMCS SYSTEM ELEM DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
APR05	APRM FAILS TO TRIP DOWNSCALE	05090

TYPE:GENERIC (A-F)

CAUSE:RELAY K3 STICKS SHUT

PLT STA:REACTOR SHUTDOWN WITH APRM SURVEILLANCE IN PROGRESS

EFFECTS:INSERTING THIS MALFUNCTION CAUSES THE DOWNSCALE RELAY K3 OF THE SELECTED APRM CHANNEL TO STICK IN THE ENERGIZED OR SHUT POSITION. THIS PREVENTS TRANSMITTAL OF THE DOWNSCALE TRIP SIGNAL TO THE REACTOR PROTECTION SYSTEM, THE REACTOR MANUAL CONTROL SYSTEM, THE PROCESS COMPUTER, THE PLANT ANNUNCIATOR SYSTEM AND THE DOWNSCALE LIGHTS ON THE C05 PANEL. THE RECORDER ON THE C05 PANEL AND THE METER ON THE INSTRUMENT DRAWER WILL CONTINUE TO INDICATE PROPERLY AND THE WHITE DOWNSCALE LIGHTS ON THE INSTRUMENT DRAWER WILL ILLUMINATE IF THE APRM LEVEL FALLS BELOW THE DOWNSCALE TRIP SETPOINT. IF THE MALFUNCTION IS INSERTED WHEN A DOWNSCALE SIGNAL IS PRESENT, NO EFFECTS WILL BE SEEN.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE SELECTED APRM CHANNEL TO PROPER OPERATION.

REFERENCES: M-1-S-34 POWER RANGE NEUTRON MONITOR SYSTEM ELEM DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
APRM06	APRM FAILS TO TRIP INOPERATIVE	05100

TYPE:GENERIC (A-F)

CAUSE:FAILURE OF INOP TRIP RELAYS K14 AND K8

PLT STA:100% POWER OR APRM SURVEILLANCE

EFFECTS:INSERTING THIS MALFUNCTION CAUSES RELAYS K14 AND K8 TO STICK IN THE ENERGIZED STATE. THIS PREVENTS TRANSMITTAL OF THE INOPERATIVE TRIP SIGNAL TO THE REACTOR PROTECTION SYSTEM, THE REACTOR MANUAL CONTROL SYSTEM, THE PROCESS COMPUTER, THE PLANT ANNUNCIATOR SYSTEM AND THE HI-HI/INOP LIGHTS ON THE COS PANEL. THE RECORDER ON THE COS PANEL AND THE METER ON THE INSTRUMENT DRAWER WILL CONTINUE TO INDICATE PROPERLY. IF THE MALFUNCTION IS INSERTED AND AN INOP SIGNAL IS ALREADY PRESENT, NO EFFECTS WILL BE SEEN.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE SELECTED APRM CHANNEL TO PROPER OPERATION.

REFERENCES: M-1-S-34 POWER RANGE MONITOR.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
APR07	APRM FAILS TO TRIP UPSCALE (HI)	05010

TYPE:GENERIC (A-F)

CAUSE:RELAY K2 STICKS SHUT

PLT STA:REACTOR POWER INCREASE OR APRM SURVEILLANCE

EFFECTS:INSERTING THIS MALFUNCTION CAUSES THE UPSCALE HI RELAY K2 OF THE SELECTED APRM CHANNELL TO STICK IN THE ENERGIZED OR SHUT POSITION. THIS PREVENTS TRANSMITTAL OF THE UPSCALE HI TRIP SIGNAL TO THE REACTOR MANUAL CONTROL SYSTEM, THE PROCESS COMPUTER, THE PLANT ANNUNCIATOR SYSTEM AND THE UPSCALE HI LIGHTS ON THE COS PANEL. THE RECORDER ON THE COS PANEL AND THE METER ON THE INSTRUMENT DRAWER WILL CONTINUE TO INDICATE PROPERLY AND THE AMBER UPSCALE LIGHTS ON THE INSTRUMENT DRAWER WILL ILLUMINATE IF THE APRM LEVEL RISES ABOVE THE UPSCALE TRIP SETPOINT. IF THE MALFUNCTION IS INSERTED WHEN AN UPSCALE HIGH SIGNAL IS PRESENT, NO EFFECTS WILL BE SEEN.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE SELECTED APRM CHANNEL TO PROPER OPERATION.

REFERENCES: M-1-3-34 POWER RANGE MONITOR ELEM DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
APR08	APRM FAILS TO TRIP UPSCALE HI HI	05070

TYPE:GENERIC (A-F)

CAUSE:RELAY K1 FAILS TO OPEN

PLT STA:REACTOR POWER INCREASE OR APRM CHANNEL SURVEILLENCE

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED APRM HI HI TRIP RELAY TO FAIL TO DEENERGIZE. THIS PREVENTS TRANSMITTAL OF THE HIGH-HIGH TRIP SIGNAL TO THE REACTOR PROTECTION SYSTEM, PLANT PROCESS COMPUTER, HIGH HIGH OR INOP LIGHT ON THE C05 PANEL, AND THE PLANT ANNUNCIATOR IF GENERATED. THE METER ON THE INSTRUMENT DRAWER AND RECORDER ON PANEL C05 WILL INDICATE PROPERLY AND THE HIGH-HIGH LIGHT ON THE INSTRUMENT DRAWER WILL ILLUMINATE IF A HIGH-HIGH TRIP SIGNAL IS RECEIVED. IF THE MALFUNCTION IS INSERTED AND A HIGH-HIGH TRIP IS ALREADY PRESENT, NO EFFECTS WILL BE SEEN.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RETURNS THE APRM CHANNEL OPERATION TO NORMAL.

REFERENCES: M-1-S-34 POWER RANGE NEUTRON MONITORING SYSTEM ELEM DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

IRM01 IRM CHANNEL FAILS UPSCALE 03030

TYPE:GENERIC (A-H)

CAUSE:OPERATIONAL AMPLIFIER FAILS TO MAXIMUM.

PLT STA:REACTOR STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SPECIFIED IRM TO FAIL UPSCALE AND REMAIN UPSCALE IRRESPECTIVE OF THE DETECTED NEUTRON FLUX LEVEL OR RANGE SWITCH POSITIONS. THE RESPECTIVE RECORDER WILL FOLLOW THE METER OUTPUT. IF THE REACTOR MODE SWITCH IS NOT IN RUN AND THE IRM IS NOT BYPASSED, A ROD BLOCK AND A REACTOR HALFSCRAM OCCURS. THE HIGH AND HIGH-HIGH OR INOP LIGHTS ON PANEL C05 AND THE HIGH AND UPSCALE HIGH LIGHTS ON THE IRM DRAWER ILLUMINATE. IF THE MODE SWITCH IS IN RUN AND THE COMPANION APRM CHANNEL IS DOWNSCALE, A REACTOR HALF-SCRAM AND A BLOCK OCCURS.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

IRM HI-HI INOP - 205L
ROD WITHDRAWAL BLOCK - 205R
IRM HIGH - 205L
NEUTRON MONITORING SYSTEM TRIP - 205L
A CHANNEL REACTOR AUTO SCRAM - 205R
B CHANNEL REACTOR AUTO SCRAM - 205R

REMOVAL OF THIS MALFUNCTION RESTORES THE SELECTED IRM CHANNEL TO NORMAL OPERATION.

REF: M-1-S-37 STARTUP RANGE NEUTRON MONITORING SYSTEM ELEM DIAGRAM, M-1-S-20 RMCS ELEM DIAGRAM, M-1-S-54 REACTOR PROTECTION SYSTEM ELEM DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
IRM02	IRM CHANNEL FAILS DOWNSCALE	03031

TYPE:GENERIC (A-H)

CAUSE:OPERATIONAL AMPLIFIER OUTPUT FAILS TO ZERO

PLT STA:REACTOR STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SPECIFIED IRM TO FAIL DOWNSCALE AND REMAIN DOWNSCALE IRRESPECTIVE OF THE DETECTED NEUTRON FLUX LEVEL OR RANGE SWITCH POSITIONS. THE RESPECTIVE RECORDER WILL FOLLOW THE METER OUTPUT. IF THE REACTOR MODE SWITCH IS NOT IN RUN, THE IRM IS NOT BYPASSED, AND THE IRM RANGE SWITCH IS NOT ON RANGE 1, A ROD BLOCK OCCURS. THE DNSCL LIGHT ON PANEL C05 AND THE DOWNSCALE LIGHT ON THE IRM DRAWER ILLUMINATE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

IRM DOWNSCALE - 205L
ROD WITHDRAWAL BLOCK - 205R

REMOVAL OF THE MALFUNCTION RESTORES THE SELECTED IRM CHANNEL TO NORMAL OPERATION.

REF: M-1-S-57 STARTUP RANGE NEUTRON MONITORING SYSTEM ELEM DIAGRAM, M-1-S-20 RMCS ELEM DIAGRAM, M-1-S-54 REACTOR PROTECTION SYSTEM ELEM DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
IRM03	IRM CHANNEL FAILS INOP	03070

TYPE:GENERIC (A-H)

CAUSE:HIGH VOLTAGE POWER SUPPLY FAILS LOW

PLT STA:REACTOR STARTUP

EFFECTS:

INSERTION OF THIS MALFUNCTION CAUSES THE SPECIFIED IRM TO FAIL DOWNSCALE AND REMAIN DOWNSCALE IRRESPECTIVE OF THE DETECTED NEUTRON FLUX LEVEL OR RANGE SWITCH POSITIONS. THE RESPECTIVE RECORDER WILL FOLLOW THE METER OUTPUT. IF THE REACTOR MODE SWITCH IS NOT IN RUN AND THE IRM IS NOT BYPASSED, A ROD BLOCK AND A REACTOR HALFSCRAM OCCURS. THE DNSCL AND HIGH-HIGH OR INOP LIGHTS ON PANEL C05 AND AND THE INOP AND DOWNSCALE LIGHTS ON THE IRM DRAWER ILLUMINATE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

IRM HI-HI INOP - 205L
IRM DOWNSCALE - 205L
ROD WITHDRAWAL BLOCK - 205R
IRM HIGH - 205L
A CHANNEL REACTOR AUTO SCRAM - 205R
B CHANNEL REACTOR AUTO SCRAM - 205R
NEUTRON MONITORING SYSTEM TRIP - 205L

REMOVAL OF THE MALFUNCTION RESTORES THE SELECTED IRM CHANNEL TO NORMAL OPERATION.

REF: M-1-S-37 STARTUP RANGE NEUTRON MONITORING SYSTEM ELEM DIAGRAM, M-1-S-20 RMCS ELEM DIAGRAM, M-1-S-54 REACTOR PROTECTION SYSTEM ELEM DIAGRAM.
REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
IRM04	IRM CHANNEL DETECTOR STUCK	01020

TYPE:GENERIC (A-H)

CAUSE:DETECTOR DRIVE MOTOR BINDS

PLT STA:REACTOR STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED IRM DETECTOR TO STOP AT ITS PRESENT POSITION WHETHER MOVING OR STATIONARY. THE DETECTOR WILL NOT RESPOND TO ANY INSERT OR WITHDRAWAL SIGNAL. THE DETECTOR WILL CONTINUE TO MONITOR CORE NEUTRON FLUX LEVEL ADJACENT TO ITS LOCATION IN THE CORE.

NO ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE SELECTED IRM CHANNEL DETECTOR DRIVE TO NORMAL OPERATION.

REF: M-1-S-58 STARTUP RANGE DETECTOR DRIVE ELEM DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
IRM05	IRM CHANNEL FAILS TO TRIP INOP	03070

TYPE:GENERIC (A-H)

CAUSE:FAILURE OF RELAYS, K1A(B,C,D,E,F,G,H)

PLT STA:REACTOR STARTUP OR IRM SURVEILLANCE TESTING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INOP TRIP RELAY K1A FOR THE INSTRUCTOR SPECIFIED IRM TO REMAIN IN THE ENERGIZED OR SHUT POSITION. IF THE SELECTED IRM DRAWER DOES NOT HAVE AN INOP SIGNAL PRESENT AND THE MALFUNCTION IS INSERTED, THE INOP SIGNALS FOR THE REACTOR PROTECTION SYSTEM AND THE PLANT ANNUNCIATOR WILL NOT ACTIVATE IF AN INOP TRIP SIGNAL IS RECEIVED. IF THE IRM DRAWER HAS AN INOP SIGNAL PRESENT WHEN THE MALFUNCTION IS INSERTED, NO EFFECTS WILL BE SEEN.

THE INSTRUMENT DRAWER AND THE IRM METERS AND RECORDERS ON THE CDS PANEL WILL INDICATE THE PROPER FLUX. HOWEVER, IF THE IRM TRIPS INOP THE INOP LIGHT ON THE CDS PANEL WILL NOT ILLUMINATE AND THE ROD BLOCKS, RPS TRIPS, AND PLANT ANNUNCIATORS WILL NOT ACTUATE. THE INOP LIGHT ON THE IRM DRAWER IS NOT EFFECTED BY THE MALFUNCTION.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION RESTORES THE NORMAL OPERATION OF RELAY K1 AND THE NORMAL OPERATION OF THE IRM.

REF: M-1-S-37 SH. 3, 4, 5, & 10. INTERMEDIATE RANGE MONITOR ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
IRM06	IRM CHANNEL FAILS TO TRIP DOWNSCALE	03060

TYPE:GENERIC (A-H)

CAUSE:FAILURE OF RELAYS, K2 (A-H)

PLT STA:REACTOR STARTUP OR IRM SURVEILLANCE TESTING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE DOWNSCALE TRIP RELAY K2 FOR THE INSTRUCTOR SPECIFIED IRM TO REMAIN IN THE ENERGIZED OR SHUT POSITION. IF THE SELECTED IRM DRAWER DOES NOT HAVE A DOWNSCALE SIGNAL PRESENT AND THE MALFUNCTION IS INSERTED, THE DOWNSCALE SIGNALS FOR THE REACTOR MANUAL CONTROL SYSTEM AND THE ANNUNCIATOR WILL NOT ACTIVATE. IF THE MALFUNCTION IS INSERTED ON A DRAWER WITH A DOWNSCALE SIGNAL ALREADY PRESENT, NO EFFECTS WILL BE SEEN.

THE INSTRUMENT DRAWER AND THE IRM METERS AND RECORDERS ON THE COS PANEL WILL INDICATE THE PROPER READING. HOWEVER, IF THE IRM CHANNEL OUTPUT IS LESS THAN THE DOWNSCALE SETPOINT, THE DOWNSCALE LIGHTS ON THE COS PANEL WILL NOT ILLUMINATE. THE DOWNSCALE LIGHTS ON THE IRM DRAWER ARE NOT AFFECTED BY THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCION WILL RESTORE THE NORMAL OPERATION OF RELAY K2 AND THE IRM CHANNEL.

REF: INTERMEDIATE RANGE MONITOR M-1-S-37 ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
IRM07	IRM CHANNEL FAILS TO TRIP UPSCALE HI	03050

TYPE:GENERIC (A-H)

CAUSE:FAILURE OF RELAYS, K3 (A-H)

PLT STA:REACTOR STARTUP OR IRM SURVEILLANCE TESTING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE UPSCALE TRIP RELAY K3A FOR THE INSTRUCTOR SPECIFIED IRM TO REMAIN IN THE ENERGIZED OR SHUT POSITION. IF THE SELECTED IRM DRAWER DOES NOT HAVE AN UPSCALE HIGH TRIP SIGNAL PRESENT AND THE MALFUNCTION IS INSERTED, THE REACTOR MANUAL CONTROL SYSTEM ROD BLOCK AND PLANT ANNUNCIATOR WILL NOT ACTIVATE. IF THE MALFUNCTION IS INSERTED AND AN UPSCALE HIGH SIGNAL IS ALREADY PRESENT, NO EFFECTS WILL BE SEEN.

THE INSTRUMENT DRAWER AND THE IRM METERS ON THE C05 PANEL WILL INDICATE THE PROPER FLUX. HOWEVER, IF THE HI TRIP SETPOINT IS EXCEEDED, THE UPSCALE HI LIGHT ON THE C05 PANEL WILL NOT ILLUMINATE. THE UPSCALE HIGH LIGHT ON THE IRM DRAWER IS NOT EFFECTED BY THIS MALFUNCTION.

NO ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION RESTORES THE NORMAL OPERATION OF RELAY K3 AND THE IRM CHANNEL.

REF: M-1-S-37 INTERMEDIATE RANGE MONITOR ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
IRM08	IRM CHANNEL FAILS TO TRIP UPSCALE (HI HI)	03040

TYPE:GENERIC (A-H)

CAUSE:FAILURE OF RELAYS, K4 (A-H)

PLT STA:REACTOR STARTUP OR IRM SURVEILLANCE TESTING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE UPSCALE TRIP RELAY K4A FOR THE INSTRUCTOR SPECIFIED IRM TO REMAIN IN THE ENERGIZED OR SHUT POSITION. IF THE SELECTED IRM DRAWER DOES NOT HAVE AN UPSCALE HIGH-HIGH SIGNAL PRESENT WHEN THE MALFUNCTION IS INSERTED, THE HI HI TRIP SIGNALS FOR THE REACTOR PROTECTION SYSTEM AND THE PLANT ANNUNCIATOR WILL NOT ACTIVATE. IF THE MALFUNCTION IS INSERTED ON AN IRM CHANNEL WITH AN UPSCALE HIGH-HIGH SIGNAL ALREADY PRESENT, NO EFFECTS WILL BE SEEN.

THE INSTRUMENT DRAWER AND THE IRM METERS ON THE COS PANEL WILL INDICATE THE PROPER FLUX. HOWEVER, IF THE HI HI TRIP SETPOINT IS EXCEEDED, THE UPSCALE HI HI LIGHTS ON THE COS PANEL WILL NOT ILLUMINATE. THE UPSCALE HIGH-HIGH LIGHTS ON THE IRM DRAWER ARE NOT EFFECTED BY THE MALFUNCTION.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE NORMAL OPERATION OF RELAY K4 AND THE IRM CHANNEL.

REF: M-1-3-37 INTERMEDIATE RANGE MONITOR ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
LPR01	LPRM FAILS UPSCALE	04030

TYPE:GENERIC (XX-YY-ZZ)

CAUSE:DETECTOR SHORT CIRCUIT

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED LPRM TO FAIL UPSCALE. IF A ROD ADJACENT TO THE EFFECTED LPRM IS SELECTED ON THE ROD SELECT RELAY PANEL, THE LPRM INDICATION ON THE FOUR ROD DISPLAY AND THE ASSOCIATED RBM CHANNEL, IF SELECTED TO THE LPRM'S POSITION WILL INDICATE UPSCALE. THE ASSOCIATED APRM/RBM CHANNEL AVERAGE INDICATION INCREASES PROPORTIONAL TO THE INCREASE IN LPRM COUNTS. THE HIGH LITES FOR THE SELECTED LPRM ON THE ASSOCIATED APRM/LPRM CHANNEL CABINET AND THE FULL CORE DISPLAY ILLUMINATE. THE PROCESS COMPUTER WILL INDICATE THE LPRM'S UPSCALE READING.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

LPRM HIGH - 205R

REMOVAL OF THE MALFUNCTION RESTORES THE SELECTED LPRM TO NORMAL OPERATION.

REF: M-1-S-34 POWER RANGE NEUTRON MONITORING SYSTEM ELEMENTARY DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

LPRD2 LPRM FAILS DOWNSCALE 04030

TYPE:GENERIC (XX-YY-ZZ)

CAUSE:OPEN IN LPRM DETECTOR

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED LPRM TO FAIL DOWNSCALE. IF A ROD ADJACENT TO THE EFFECTED LPRM IS SELECTED ON THE ROD SELECT RELAY PANEL, THE LPRM INDICATION ON THE FOUR ROD DISPLAY AND THE ASSOCIATED RBM CHANNEL, IF SELECTED TO THE LPRM'S POSITION WILL INDICATE DOWNSCALE. THE ASSOCIATED APRM AVERAGE INDICATION DECREASES PROPORTIONAL TO THE DECREASE IN LPRM COUNTS. THE LOW AND DOWNSCALE LITES ON THE ASSOCIATED APRM/LPRM CHANEL CABINET AND THE FULL CORE DISPLAY ILLUMINATE. THE PROCESS COMPUTER WILL INDICATE THE LPRM'S DOWNSCALE READING.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

LPRM DOWNSCALE - 205R

REMOVAL OF THE MALFUNCTION RESTORES THE SELECTED LPRM TO NORMAL OPERATION.

REF: M-1-S-34 POWER RANGE NEUTRON MONITORING SYSTEM ELEMENTARY DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RBM01 RBM CHANNEL FAILS UPSCALE 06100

TYPE:GENERIC (A,B)

CAUSE:AMPLIFIER A2 IN RBM GAIN CHANGE CARD OUTPUT FAILS HIGH.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RBM CHANNEL TO FAIL UPSCALE. THE METER ON THE INSTRUMENT DRAWER, THE RECORDER ON PANEL C05, AND THE PPC POINT WILL REFLECT THE UPSCALE READING.

THE HIGH LITES ON PANEL C05 AND AT THE INSTRUMENT DRAWER ILLUMINATE. IF THE REACTOR MODE SWITCH IS IN RUN AND THE RBM CHANNEL IS NOT BYPASSED (EITHER MANUALLY OR AUTOMATICALLY), A ROD BLOCK SIGNAL IS GENERATED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

RBM HIGH INOPERATIVE - C205
RBM WITHDRAWAL BLOCK - C205

REMOVAL OF THIS MALFUNCTION RESTORES THE RBM CHANNEL TO NORMAL OPERATION.

REF: M-1-3-34 POWER RANGE NEUTRON MONITORING SYSTEM ELEM DIAGRAM, M-1-JJ-106 POWER RANGE NEUTRON MONITORING SYSTEM GEK, M-1-3-20 PMCS SYSTEM ELEM DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RBM02 RBM CHANNEL FAILS DOWNSCALE 06100

TYPE:GENERIC (A,B)

CAUSE:THE AMPLIFIER ON THE AVERAGING CARD OUTPUT (A2 GAIN CHANGE AMPLIFIER) FAILS LOW.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RBM CHANNEL TO FAIL DOWNSCALE. THE METER ON THE INSTRUMENT DRAWER, THE RECORDER ON PANEL C05, AND THE PPC POINT WILL REFLECT THE DOWNSCALE READING.

THE DNSCL LITES ON PANEL C05 AND AT THE INSTRUMENT DRAWER ILLUMINATE. IF THE REACTOR MODE SWITCH IS IN RUN AND THE RBM CHANNEL IS NOT BYPASSED (EITHER MANUALLY OR AUTOMATICALLY), A ROD BLOCK SIGNAL IS GENERATED.

THE ANNUNCIATORS DRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

RBM DOWNSCALE - C205
ROD WITHDRAWAL BLOCK - C205

REMOVAL OF THIS MALFUNCTION RESTORES THE RBM CHANNEL TO NORMAL OPERATION.

REF: M-1-S-34 POWER RANGE NEUTRON MONITORING SYSTEM ELEM DIAGRAM, M-1-JJ-106 POWER RANGE NEUTRON MONITORING SYSTEM GEK, M-1-S-20 RMCS SYSTEM ELEM DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EGU NO.
RBM03	RBM CHANNEL FAILS INOP	06150

TYPE:GENERIC (A,B)

CAUSE:FAILURE OF 5 VOLT POWER SUPPLY TO INOP TRIP REFERENCE CIRCUIT.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RBM CHANNEL TO FAIL INOP. THE INOP LITES ON PANEL C05 AND THE INSTRUMENT DRAWER ILLUMINATE. IF THE REACTOR MODE SWITCH IS IN RUN AND THE RBM CHANNEL IS NOT BYPASSED (EITHER MANUALLY OR AUTOMATICALLY), A ROD BLOCK SIGNAL IS GENERATED. THE PPC POINT (A512) WILL REFLECT THE INOP CONDITION.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

RBM HIGH INOPERATIVE - C20[illegible]
ROD WITHDRAWAL BLOCK - C21[illegible]

REMOVAL OF THIS MALFUNCTION RESTORES THE RBM CHANNEL TO NORMAL OPERATION.

REF: M-1-S-34 POWER RANGE NEUTRON MONITORING SYSTEM ELEM DIAGRAM, M-1-JJ-106 POWER RANGE NEUTRON MONITORING SYSTEM GEK, M-1-S-20 RMCS SYSTEM ELEM DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RRS04	RECIRC FLOW UNIT FAILS INOP	04050

TYPE:GENERIC (A/B)

CAUSE:LOSS OF POWER TO SELECTED FLOW UNIT.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC FLOW UNIT TO FAIL INOPERATIVE. THE AFFECTED FLOW CONVERTER'S DICATION DECREASES DOWNSCALE AND THE COMPARITOR LIGHT ILLUMINATES DUE TO GREATER THAN A 10% DIFFERENCE BETWEEN FLOW UNIT OUTPUTS, AND THE UPSCALE/INOP LIGHT ILLUMINATES ON PANEL C37. A ROD WITHDRAWAL BLOCK SIGNAL IS GENERATED WITH THE WHITE ROD WITHDRAWAL PERMISSIVE LIGHT ON PANEL C05A GOING OUT. THE ASSOCIATED APRM CHANNELS GENERATE A HIGH AND HI-HI TRIP SIGNAL WITH THE APRM HIGH AND HI-HI/INOP LITES AT THEIR RESPECTIVE CABINETS AND PANEL C05A ILLUMINATING. A REACTOR HALF SCRAM OCCURS DUE TO THE APRM HIGH TRIP SIGNAL. THE RBM CHANNEL ASSOCIATED WITH THE FAILED FLOW UNIT GENERATES A HIGH TRIP SIGNAL AS INDICATED BY IT'S RBM CHANNEL A/B HIGH LIGHT ILLUMINATING ON THE INSTRUMENT CABINET. THE RBM A (B) HIGH LIGHT ILLUMINATES ON PANEL C05A IF A ROD IS SELECTED AT THE ROD SELECT RELAY PANEL. IF THE ASSOCIATED APRM/RBM ROD BLOCK RECORD PUSHBUTTON IS PRESSED WHILE THE MALFUNCTION IS ACTIVE, A LOW SETPOINT FOR THE ROD BLOCK WILL BE INDICATED ON THE RESPECTIVE RECORDER. THE FLOW INDICATIONS ON THE ASSOCIATED APRM/RBM CHANNELS WILL INDICATE THE FAILED VALUE FROM THE FLOW UNIT.

THE ANNUNCIATORS DRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

APRM FLOW BIAS OFF NORMAL - 205R
ROD WITHDRAWAL BLOCK - 205R
RBM HIGH INOPERATIVE - 205R

REMOVAL OF THE MALFUNCTION RESTORES THE POWER TO THE FAILED FLOW UNIT.

REF: M-1-S20 REACTOR MANUAL CONTROL SYSTEM ELEMENTARY DIAGRAM, M-1-S34 AVERAGE POWER RANGE NEUTRON MONITORING SYSTEM ELEMENTARY DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RRS05	RECIRC FLOW UNIT COMPARATOR FAILURE	04070

TYPE:GENERIC (A,B)

CAUSE:ELECTRONIC FAILURE OF FLOW UNIT COMPARATOR CAUSES OUTPUT TO FAIL HIGH (RELAYS K4, K5 DENERGIZE)

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE RECIRC FLOW UNIT COMPARATOR TO FAIL. THE COMPARATOR LIGHT ON PANEL C37 ILLUMINATES, THE APRM FLOW BIAS OFF NORMAL ANNUNCIATOR ACTUATES, AND A ROD WITHDRAWAL BLOCK OCCURS. FLOW UNIT OUTPUT INDICATIONS ARE NOT AFFECTED BY THIS MALFUNCTION.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD WITHDRAWAL BLOCK - 205P
APRM FLOW BIAS OFF NORMAL

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATATION OF THE FLOW UNIT COMPARATOR TO NORMAL.

REF: M-1-S10 REACTOR MANUAL CONTROL SYSTEM ELEMENTARY DIAGRAM, M-1-S34 AVERAGE POWER RANGE NEUTRON MONITORING SYSTEM ELEMENTARY DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
SRM01	SRM CHANNEL FAILS UPSCALE	02010

TYPE:GENERIC (A-D)

CAUSE:LOG COUNT RATE AMPLIFIER FAILS TO MAXIMUM OUTPUT

PLT STA:REACTOR STARTUP OR SRM SURVEILLANCE TESTING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SPECIFIED LOG COUNT RATE METER TO PEG HIGH AND REMAIN HIGH IRRESPECTIVE OF THE DETECTED NEUTRON FLUX LEVEL. THE RESPECTIVE RECORDER WILL FOLLOW THE METER OUTPUT. SOURCE RANGE PERIOD WILL INDICATE A SHORT PERIOD WHICH WILL INTEGRATE TO INFINITY WHEN THE SRM METER IS FULL SCALE.

THE APPLICABLE SRM UPSCALE ROD BLOCKS AND RPS SCRAMS WILL OCCUR. IF THE SELECTED SRM CHANNEL IS BYPASSED, THE ASSOCIATED TRIPS AND ROD BLOCKS WILL NOT OCCUR.

THE SRM HIGH AND HIGH-HIGH OR INOP LITES ON PANEL C05 AND THE SRM DRAWER ILLUMINATE. IF SOURCE RANGE COUNTS WERE LESS THAN 100 CPS, THE SRM DRAWER RETRACT NOT PERMIT LITE GOES OUT AND THE RETRACT PERMIT LITE AT PANEL C05 ILLUMINATES.

THE FOLLOWING ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD WITHDRAWAL BLOCK - C205
SRM PERIOD 20 SEC. - C205
SRM HIGH INOP - C205

REMOVAL OF THE MALFUNCTION RESTORES THE SELECTED SRM CHANNEL TO NORMAL OPERATION.

REF: FSAR SECTION 7.5, M-1-JJ-105-3 SOURCE RANGE NEUTRON MONITORING SYSTEM GEK, M-1-S-37 SRM SYSTEM ELEM DIAGRAM M-1-S-20 REACTOR MANUAL CONTROL SYSTEM ELEM DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

SRM02 SRM CHANNEL FAILS DOWNSCALE 02010

TYPE:GENERIC (A-D)

CAUSE:LOG INTEGRATOR OUTPUT FAILS TO ZERO

PLT STA:REACTOR STARTUP OR SRM SURVEILLANCE TESTING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SPECIFIED LOG COUNT RATE METER TO FAIL TO ZERO AND REMAIN THERE IRREGARDLESS OF ACTUAL NEUTRON FLUX. THE RESPECTIVE RECORDER WILL FOLLOW THE METER OUTPUT. SOURCE RANGE PERIOD WILL INDICATE A SHORT NEGATIVE PERIOD WHICH WILL INTEGRATE TO INFINITY.

THE MALFUNCTION CAUSES A ROD BLOCK TO BE ENFORCED IF THE SELECTED CHANNEL IS NOT BYPASSED OR IF THE IRM'S ARE NOT SELECTED TO RANGE 3 OR ABOVE. IF SOURCE RANGE COUNTS WERE GREATER THAN 100 CPS, THE RETRACT NOT PERMIT LITE ON THE SRM DRAWER ILLUMINATES AND THE RETRACT PERMIT LITE ON PANEL C05 GOES OUT.

THE SRM DNSCL LITES ON PANEL C05 AND THE SRM DRAWER ILLUMINATE.

THE FOLLOWING ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD WITHDRAWAL BLOCK - C205
SRM DOWNSCALE - C205
SRM RETRACT NOT PERMITTED - C205

REMOVAL OF THE MALFUNCTION RESTORES THE SELECTED SRM CHANNEL TO NORMAL OPERATION.

REF: FSAR SECTION 7.5, M-1-JJ-106-3 SOURCE RANGE NEUTRON MONITORING SYSTEM GEK, M-1-3-37 SRM SYSTEM ELEM DIAGRAM, M-1-3-20 REACTOR MANUAL CONTROL SYSTEM ELEM DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

SRM03 SRM CHANNEL FAILS INOP 02060

TYPE:GENERIC (A-D)

CAUSE:HIGH VOLTAGE POWER SUPPLY FAILURE

PLT STA:REACTOR STARTUP OR SRM SURVEILLANCE TESTING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SPECIFIED LOG COUNT RATE METER TO FAIL TO ZERO AND REMAIN THERE IRRESPECTIVE OF THE DETECTED NEUTRON FLUX LEVEL. THE RESPECTIVE RECORDER WILL FOLLOW THE METER OUTPUT. SOURCE RANGE PERIOD WILL INDICATE A SHORT NEGATIVE PERIOD WHICH WILL INTEGRATE TO INFINITY WHEN THE SRM METER IS DOWNSCALE.

THE MALFUNCTION CAUSES A ROD BLOCK TO BE ENFORCED IF THE SELECTED CHANNEL IS NOT BYPASSED OR IF THE IRM'S ARE NOT SELECTED TO RANGE 3 OR ABOVE. IF SOURCE RANGE COUNTS WERE GREATER THAN 100 CPS, THE RETRACT NOT PERMIT LITE ON THE SRM DRAWER ILLUMINATES AND THE RETRACT PERMIT LITE ON PANEL C05 GOES OUT.

THE SRM DNSCL AND HIGH-HIGH OR INOP LITES ON PANEL C05 AND THE SRM DRAWER DOWNSCALE AND INOP LITES ILLUMINATE.

THE FOLLOWING ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD WITHDRAWAL BLOCK - C205
SRM DOWNSCALE - C205
SRM RETRACT NOT PERMITTED - C205
SRM HIGH INOP - C205

REMOVAL OF THE MALFUNCTION RESTORES THE SELECTED SRM CHANNEL TO NORMAL OPERATION.

REF: FSAR SECTION 7.5, M-1-JJ-105-3 SOURCE RANGE NEUTRON MONITORING SYSTEM DIA, M-1-S-37 SRM SYSTEM ELEM DIAGRAM, M-1-S-20 REACTOR MANUAL CONTROL SYSTEM ELEM DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

SRM04 SRM CHANNEL DETECTOR STUCK 01020

TYPE:GENERIC (A-D)

CAUSE:DRIVE MECHANISM JAMS IN DETECTOR HOUSING

PLT STA:REACTOR STARTUP OR SRM SURVEILLANCE TESTING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SPECIFIED SRM CHANNEL'S DETECTOR TO BECOME JAMMED AT ITS PRESENT POSITION WHETHER MOVING OR STATIONARY. THE DETECTOR WILL NOT RESPOND TO ANY INSERT OR WITHDRAWAL SIGNALS. THE SRM WILL RESPOND TO CHANGES IN NEUTRON FLUX IN THE AREA ADJACENT TO WHERE IT IS LOCATED. ALL ALARM AND TRIP FUNCTIONS WILL BE OPERABLE.

NO ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE SELECTED SRM CHANNEL DETECTOR DRIVE TO NORMAL OPERATION.

REF: M-1-S-58 SRM/IRM DETECTOR DRIVE ELEM DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
SRM05	SRM CHANNEL RETRACT PERMIT FAILURE	02050

TYPE:GENERIC (A-D)

CAUSE:RELAY K3 FAILS TO ENERGIZE FOR SELECTED SRM.

PLT STA:REACTOR STARTUP OR SRM SURVEILLANCE TESTING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SPECIFIED SRM CHANNEL'S K3 RELAY TO DEENERGIZE. IF THE ASSOCIATED SRM DETECTOR IS NOT FULLY INSERTED, A ROD BLOCK SIGNAL WILL BE ENFORCED BY THE RMCS SYSTEM UNLESS THE IRM RANGE SWITCHES ARE ON RANGE 3 OR ABOVE.

THE RETRACT NOT PERMIT LITE ON THE SRM DRAWER ILLUMINATES AND THE RETRACT PERMIT LITE ON PANEL C05 GOES OUT.

THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

SRM RETRACT NOT PERMITTED - C205

REMOVAL OF THE MALFUNCTION RESTORES THE SELECTED SRM CHANEL TO NORMAL OPERATION.

REF: M-1-S-57 SRM SYSTEM ELEM DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
SRM06	SRM CHANNEL FAILS TO TRIP INOP	02060

TYPE:GENERIC (A-D)

CAUSE:FAILURE OF RELAYS, K1A(B,C,D)

PLT STA:REACTOR STARTUP OR SRM SURVEILLANCE TESTING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INOP TRIP RELAY K1 FOR THE INSTRUCTOR SPECIFIED SRM TO REMAIN IN THE ENERGIZED OR SHUT POSITION. IF AN INOP SIGNAL IS RECIEVED AFTER THE MALFUNCTION IS INSERTED, THE INOP TRIPS FOR THE RX MANUAL CONTROL SYSTEM AND THE PLANT ANNUNCIATOR WILL NOT ACTIVATE. IF THE MALFUNCTION IS INSERTED ON A SRM CHANNEL WITH AN INOP SIGNAL ALREADY PRESENT, NO EFFECTS WILL BE SEEN.

THE INSTRUMENT DRAWER AND THE SRM METERS ON THE C05 PANEL WILL INDICATE THE PROPER FLUX. HOWEVER, IF THE INOP SETPOINT IS EXCEEDED, THE UPSCALE HIGH/INOP LITES ON THE C05 PANEL WILL NOT ILLUMINATE. THE LITES ON THE SRM DRAWER ARE NOT EFFECTED BY THIS MALFUNCTION.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION WILL RESTORE THE NORMAL OPERATION OF RELAY K1 AND THE EFFECTED SRM CHANNEL TO NORMAL.

REF: SOURCE RANGE MONITOR; M-1-3-37, SH 2,3&10

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
SRM07	SRM CHANNEL FAILS TO TRIP DOWNSCALE	02070

TYPE:GENERIC (A-D)

CAUSE:FAILURE OF RELAY, K2A(B,C,D)

PLT STA:REACTOR STARTUP OR SRM SURVEILLANCE TESTING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE DOWNSCALE TRIP RELAY K2 FOR THE INSTRUCTOR SPECIFIED SRM TO REMAIN IN THE ENERGIZED OR SHUT POSITION. IF A DOWNSCALE SIGNAL IS RECIEVED AFTER THE MALFUNCTION IS INSERTED, THE DOWNSCALE TRIPS FOR THE REACTOR MANUAL CONTROL SYSTEM AND THE ANNUNCIATOR WILL NOT ACTIVATE. IF THE MALFUNCTION IS INSERTED ON A SRM CHANNEL WITH A DOWNSCALE SIGNAL ALREADY PRESENT, NO EFFECTS WILL BE SEEN.

THE INSTRUMENT DRAWER AND THE SRM METERS AND RECORDERS ON THE CO5 PANEL WILL INDICATE THE PROPER READING. HOWEVER, IF THE SRM CHANNEL OUTPUT IS LESS THAN THE DOWNSCALE SETPOINT, THE DOWNSCALE LITES ON THE CO5 PANEL WILL NOT ILLUMINATE. THE LITES ON THE SRM DRAWER ARE NOT EFFECTED BY THIS MALFUNCTION.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE NORMAL OPERATION OF RELAY K2 AND THE EFFECTED SRM CHANNEL O NORMAL.

REF: SOURCE RANGE MONITOR; M-1-S-37,SH-2,3&10

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
SRM08	SRM CHANNEL FAILS TO TRIP UPSCALE (HI)	02040

TYPE:GENERIC (A-D)

CAUSE:FAILURE OF RELAY, K4A(B,C,D)

PLT STA:REACTOR STARTUP OR SRM SURVEILLANCE TESTING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE UPSCALE TRIP RELAY K4 FOR THE INSTRUCTOR SPECIFIED SRM TO REMAIN IN THE ENERGIZED OR SHUT POSITION. IF A HIGH SIGNAL IS RECIEVED AFTER THE MALFUNCTION IS INSERTED, THE HI TRIPS FOR THE RX MANUAL CONTROL SYSTEM AND THE PLANT ANNUNCIATOR WILL NOT ACTIVATE. IF THE MALFUNCTION IS INSERTED ON A SRM CHANNEL WITH A HIGH SIGNAL AREADY PRESENT, NO EFFECTS WILL BE SEEN.

THE INSTRUMENT DRAWER AND THE SRM METERS ON THE C05 PANEL WILL INDICATE THE PROPER FLUX. HOWEVER, IF THE HI SETPOINT IS EXCEEDED, THE UPSCALE HI LITES ON THE C05 PANEL WILL NOT ILLUMINATE. THE LITES ON THE SRM DRAWER ARE NOT EFFECTED BY THIS MALFUNCTION.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION RESTORE THE NORMAL OPERATION OF RELAY K4 AND THE EFFECTED SRM CHANNEL TO NORMAL.

REF: SOURCE RANGE MONITOR; M-1-S-37, SH-2,3810

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
SRM09	SRM CHANNEL FAILS TO TRIP UPSCALE (HI HI)	02030

TYPE:GENERIC (A-D)

CAUSE:FAILURE OF RELAY, K6A(B,C,D)

PLT STA:REACTOR STARTUP OR SRM SURVEILLANCE TESTING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE UPSCALE TRIP RELAY K6 FOR THE INSTRUCTOR SPECIFIED SRM TO REMAIN IN THE ENERGIZED OR SHUT POSITION. IF A HIGH-HIGH TRIP SIGNAL IS RECIEVED AFTER THE MALFUNCTION IS INSERTED, THE HI HI TRIP OF THE RX PROTECTION SYSTEM (NORMALLY JUMPERED) AND THE PLANT ANNUNCIATOR WILL NOT ACTIVATE. IF THE MALFUNCTION IS INSERTED ON A SRM CHANNEL WITH A HIGH-HIGH TRIP ALREADY PRESENT, NO EFFECTS WILL BE SEEN.

THE INSTRUMENT DRAWER AND THE SRM METERS ON THE COS PANEL WILL INDICATE THE PROPER FLUX. HOWEVER, IF THE HI HI TRIP SETPOINT IS EXCEEDED, THE UPSCALE HI HI LITES ON THE COS PANEL WILL NOT ILLUMINATE. THE LITES ON THE SRM DRAWER ARE NOT EFFECTED BY THE MALFUNCTION.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE OPERATION OF RELAY K6 AND THE EFFECTED CHANNEL TO NORMAL.

REF: SOURCE RANGE MONITOR; M-1-857,SH-2,3910

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
TIP01	TIP DETECTOR STUCK	07110

TYPE:GENERIC (A-E)

CAUSE:MECHANICAL BINDING IN THE GUIDE TUBE

PLT STA:100%

EFFECTS:THIS MALFUNCTION CAUSES THE SPECIFIED TIP DETECTOR TO BECOME STUCK IN IT'S PRESENT POSITION WHILE INSERTED IN THE GUIDE TUBE. THE DETECTOR WILL RESPOND TO ALL NEUTRON FLUX VARIATIONS IN THE CORE WHILE THIS MALFUNCTION IS ACTIVE. THE DETECTOR WILL NOT RESPOND TO INSERT OR WITHDRAW SIGNALS, INCLUDING AN AUTO ISOLATION WITHDRAW SIGNAL. IF THE MALFUNCTION IS INSERTED PRIOR TO THE TIP DETECTOR ENTERING A GUIDE TUBE, NO EFFECTS WILL BE OBSERVED UNTIL THE DETECTOR REACHES THE CORE, AT WHICH TIME THE TIP DETECTOR WILL BECOME STUCK AT THE BOTTOM CORE LIMIT POSITION OF THE GUIDE TUBE.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION WILL RESTORE NORMAL OPERATION OF THE TIP DRIVE.

REF: M-1-JJ-105 TIP SYSTEM GFK.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
TIP02	TIP IN CORE GUIDE TUBE RUPTURE	07210

TYPE:GENERIC (XX/YY)

CAUSE:TIP GUIDE TUBE MECHANICAL FAILURE

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED TIP GUIDE TUBE TO RUPTURE. REACTOR WATER LEAKS FROM THE SELECTED GUIDE TUBE INTO THE INDEXER. THE LEAKAGE INTO THE INDEXER CAUSES REACTOR WATER TO LEAK INTO THE DRYWELL DUE TO THE CLEARANCES BETWEEN THE INDEXER MECHINISM AND THE GUIDE TUBE. DRYWELL TEMPERATURE AND PRESSURE INCREASES, DRYWELL CHILLED WATER SYSTEM TEMPERATURES INCREASE, AND A REACTOR SCRAM OCCURS WHEN DRYWELL PRESSURE REACHES 2 PSIG. THE DIESEL GENERATORS AUTO START AND THE APPROPRIATE ECCS SYSTEMS INITIATE. THE PLANT RESPONDS DYNAMICALLY TO THE REACTOR SCRAM. DRYWELL FLOOR DRAIN SUMP LEVEL INCREASES (PANEL C04A). PRIMARY CONTAINMENT RADIATION LEVELS INCREASE, AND DRYWELL PRESSURE CONTINUES TO INCREASE. IF A TIP DETECTOR IS INSERTED INTO THE GUIDE TUBE WHEN THE MALFUNCTION IS INSERTED, THE SAME EFFECTS WILL BE OBSERVED.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-1-JJ-105 TIP SYSTEM GEK.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
OGR01	EXPLOSION IN THE OFF GAS PIPING	01020

TYPE:DISCRETE

CAUSE:STATIC SPARK IN THE MOISTURE SEPERATOR CAUSES A HYDROGEN EXPLOSION.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A HYDROGEN EXPLOSION IN THE MOISTURE ENTRAINMENT SEPARATOR DET-14. SJAE OUTLET PRESSURE/OFF GAS INLET PRESSURE INCREASES RAPIDLY AS INDICATED ON PR3-2779 AND PI-2771. WHEN PRESSURE AS INDICATED ON PI-2771 > 3.5 PSIG, JET COMPRESSOR AIR SUCTIONS MO-2991A/B AUTO CLOSE. AO-2236 A THRU F SJAE AIR SUCTION VALVES AUTO CLOSE 10 SECONDS AFTER MO-2991A/B CLOSES. OFFGAS INLET PRESSURE DECREASES, OFFGAS FLOW DECREASES, OFFGAS TEMPERATURES DECREASE, RECOMBINER CONDENSER PRESSURE DECREASES, RECOMBINER INLET/OUTLET AND DIFFERENTIAL TEMPERATURES DECREASE SLIGHTLY, AND ADSORBER BED DIFFERENTIAL PRESSURE DECREASES. WHEN MO-2991 A/B REACH THE CLOSED POSITION, AND PRESSURE IN PI-2771 < 3.5 PSIG, MO-2991 A/B, AND AO-2236 A THRU F WILL REOPEN, RESTORING OFF-GAS PARAMETERS WILL RETURN TO NORMAL.
IF THE MALFUNCTION IS INSERTED WHEN REACTOR POWER IS LESS THAN APPROXIMATELY 20%, NO HYDROGEN EXPLOSION WILL OCCUR. THIS IS DUE TO THE LACK OF SUFFECIENT HYDROGEN GENERATION IN THE CORE TO PRODUCE A CONCENTRATION IN THE ENTRAINMENT MOISTURE SEPARATOR WHICH CAN CAUSE AN EXPLOSION. IF THE OPERATOR ATTEMPTS TO REOPEN THE JET COMPRESSOR AIR SUCTION VALVES BEFORE THE MALFUNCTION IS REMOVED, THE EXPLOSION AGAIN OCCURS IF THE REACTOR HAS NOT SCRAMMED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

JET COMPRESSOR "SUCTION PRESSURE HIGH" - 196
GUARD BED/ADSORBER "INLET FLOW LOW" - 196

REMOVAL OF THE MALFUNCTION ALLOWS NORMAL OPERATION OF THE OFFGAS SYSTEM TO RESUME WITHOUT CAUSING A HYDROGEN EXPLOSION.

REF: OFFGAS SYSTEM DESCRIPTION FOR PECO PHAPS UNIT 2, E-1657 ANNUNCIATION OFF GAS RECOMBINER, M-310 AIR EJECTION AND OFF GAS SYSTEM P&ID, E-165 SJAE SYSTEM SOLONOID OPERATED VALVES ELECTRICAL SCHEMATIC DIAGRAM,

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
	E-1655 OFF GAS RECOMBINER MOTOR OPERATED VALVES ELECTRICAL SCHEMATIC DIAGRAM.	
	REV. 2	

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

OGR02 WATER IN THE OFF GAS PIPING 04040

TYPE:DISCRETE

CAUSE:THE CAUSE OF THIS MALFUNCTION IS AN INADVERTANT CLOSURE OF THE GLYCOL TANK OUTLET

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES AN INADVERTANT CLOSURE OF THE GLYCOL TANK OUTLET VALVE. THE OPERATING GLYCOL PUMPS CAVITATE AS INDICATED BY THEIR DISCHARGE PRESSURE FLUCTUATING AND DECREASING TO 0. THE STANDBY GLYCOL CIRCULATING PUMP AUTO STARTS WITH GLYCOL PUMP DISCHARGE PRESSURE MOMENTARY INCREASING THEN DECREASING TO 0. THE GLYCOL CHILLERS TRIP, THE COOLER CONDENSER/MOISTURE SEPARATOR OUTLET TEMPERATURE INCREASES, CC/MS OUTLET MOISTURE INCREASES AS TEMPERATURE INCREASES. GUARD BED DIFFERENTIAL PRESSURE INCREASES, AND GUARD BED TEMPERATURE INCREASES AS MOISTURE COLLECTS IN THE GUARD BED. THE GUARD BED IS DESIGNED TO ALLOW CONTINUED OPERATION FOR FOUR HOURS FOLLOWING A CC/MS FAILURE WITHOUT MOISTURE CARRYOVER TO THE ADSORBER BED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

OUTLET MOISTURE HIGH - 196
PUMP PRESS LOW - 196
COOLER "OUTLET TEMP HIGH/LOW" - 196
GUARD BED "DIFFERENTIAL PRESSURE HIGH" - 196
CHILLER OUTLET TEMP HIGH - 196

REMOVAL OF THE MALFUNCTION OPENS THE GLYCOL TANK OUTLET VALVE AND RESTORES NORMAL SUCTION PRESSURE TO THE GLYCOL CIRCULATING PUMPS.

REF: OFFGAS SYSTEM DESCRIPTION FOR PECO PBAPS UNIT 2, E-1657 ANNUNCIATION OFF GAS RECOMBINER, M-310 ATR EJECTION AND OFF GAS SYSTEM P&ID, E-[illegible] OFFGAS RECOMBINER SYSTEM GLYCOL COOLER UNIT ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
OGR03	OFF GAS CONDENSER LEVEL HIGH	02070

TYPE:DISCRETE

CAUSE:CONDENSER DRAIN LINE BLOCKAGE

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE DRAIN LINE ON THE RECOMBINER CONDENSER TO CLOG. CONDENSER LEVEL INCREASES CAUSING THE HIGH LEVEL ANNUNCIATOR TO ACTUATE. (NOTE THAT IT WILL TAKE APPROXIMATELY 15 MINUTES TO COMPLETELY FILL THE RECOMBINER CONDENSER). THE INCREASING LEVEL RESULTS IN REDUCED COOLING OF THE RECOMBINER OUTLET FLOW WITH CONDENSER OFFGAS OUTLET TEMPERATURE INCREASING, RECOMBINER CONDENSER COOLING WATER OUTLET TEMPERATURE DECREASING, AND RECOMBINER CONDENSER PRESSURE INCREASING. WHEN RECOMBINER CONDENSER PRESSURE REACHES 7 PSIG, THE RECYCLE VALVE OPENS, EXHAUSTING RECOMBINER CONDENSER OUTLET FLOW (GAS AND WATER) TO THE MAIN CONDENSER. WHEN RECOMBINER CONDENSER PRESSURE REACHES 8 PSIG, THE OFFGAS SYSTEM ISOLATES WITH MO-2990A/B CLOSING OFFGAS STEAM FLOW DECREASING, AND MO-2991A/B CLOSING. RECOMBINER CONDENSER PRESSURE DECREASES AND THE RECYCLE VALVE AUTO CLOSES. ANY SUBSEQUENT ATTEMPT TO RESTART THE OFFGAS SYSTEM WILL CAUSE SIMILAR RESULTS AS LISTED ABOVE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

CONDENSER "LEVEL HIGH" - 196
RECYCLE VALVE OPEN - 196

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECOMBINER CONDENSER DRAIN LINE TO NORMAL.

REF: OFFGAS SYSTEM DESCRIPTION FOR PECO PSAPS UNIT 2, E-1657 ANNUNCIATION OFF GAS RECOMBINER, M-310 AIR EJECTION AND OFF GAS SYSTEM P&ID, M05-1-8 SETTING PLAN FOR OFFGAS RECOMBINER CONDENSER, M-2950 OFFGAS SYSTEM PROCESS FLOW DATA.

REV. 0

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
DCW01	DW CHILLED WATER PUMP TRIP	05060

TYPE:GENERIC (A,B,C)

CAUSE:FAILURE OF 42 RELAY IN DCW MOTOR CONTROL CIRCUIT.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES A FAILURE OF THE 42 RELAY IN THE INSTRUCTOR SPECIFIED DRYWELL CHILLED WATER PUMP MOTOR CONTROL. THIS FAILURE CAUSES THE AFFECTED DRYWELL CHILLED WATER PUMP TO TRIP. DRYWELL CHILLED WATER FLOW AND RECIRC PUMP MOTOR CHILLED WATER FLOWS DECREASE. 15 SECONDS AFTER THE RUNNING PUMP TRIPS, THE STANDBY DRYWELL CHILLED WATER PUMP AUTO STARTS AND RESTORES SYSTEM FLOW TO NORMAL. IF DRYWELL CHILLED WATER PUMPS ARE FAILED SUCH THAT SYSTEM FLOW IS REDUCED LESS THAN NORMAL, DRYWELL CHILLER INLET AND OUTLET, CHILLED WATER HEADER SUPPLY AND RETURN, DRYWELL COOLER FANS OUTLET AND RETURN, DRYWELL EQUIPMENT DRAIN SUMP OUTLET, RECIRC PUMP MOTOR TEMPERATURES, AND DRYWELL AREA TEMPERATURES INCREASE. DRYWELL PRESSURE ALSO INCREASES DUE TO THE INCREASE IN TEMPERATURE. THE MANUAL LOADING ON THE DRYWELL CHILLED WATER CHILLERS CAN BE INCREASED USING A REMOTE FUNCTION TO COMPENSATE FOR THE REDUCTION IN FLOW PROVIDED THAT AT LEAST ONE DRYWELL CHILL WATER PUMP IS RUNNING.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

DRYWELL CHILLED WATER LO FLOW 500 GPM - C212
A/B/C/D/E/F/G DRYWELL COOLER AIR HI TEMP - C212
A/B/D DRYWELL CHILLER DISCHARGE HIGH TEMPERATURE - C212
DRYWELL CHILLED WATER HI-LO TEMP - C212
RECIRC PUMP MOTOR HI TEMP - C204L

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE DRYWELL CHILLED WATER PUMP 42 RELAY TO NORMAL.

REF: M-327 CHILLED WATER SYSTEM DRYWELL COOLING P&ID, E-282 DRYWELL CHILLED WATER SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-330 DRYWELL TEMPERATURE CONTROL DIAGRAM, M-333 REACTOR RECIRCULATION PUMP SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
DCWD2	DW CHILLED WATER CHILLER TRIP	08071

TYPE:GENERIC (A,B,C)

CAUSE:SPURIOUS CHILLER MOTOR HI TEMPERATURE

PLT STA:100%

EFFECTS:THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED DRYWELL CHILLED WATER CHILLER TO TRIP. THE EFFECTED CHILLER OUTLET TEMPERATURE INCREASES, CHILLED WATER HEADER SUPPLY AND RETURN, DRYWELL COOLER FANS OUTLET AND RETURN, DRYWELL EQUIPMENT DRAIN SUMP OUTLET, RECIRC PUMP MOTOR TEMPERATURES, AND DRYWELL AREA TEMPERATURES INCREASE. DRYWELL PRESSURE ALSO INCREASES DUE TO THE INCREASE IN TEMPERATURE. THE MANUAL LOADING ON THE OPERATING DRYWELL CHILLED WATER CHILLERS CAN BE INCREASED USING A REMOTE FUNCTION TO MITIGATE THE EFFECTS OF THE TEMPERATURE INCREASE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

DRYWELL CHILLER TROUBLE - C212
A/B/C/D/E/F/G DRYWELL COOLER AIR HI TEMP - C212
DRYWELL CHILLED WATER HI-LO TEMP - C212
RECIRC PUMP MOTOR HI TEMP - C204L
A/B/C DRYWELL CHILLER DISCHARGE HIGH TEMPERATURE - C212

REMOVAL OF THIS MALFUNCTION RESTORES THE DRYWELL CHILLED WATER CHILLER MOTOR TEMPERATURE CIRCUIT TO NORMAL AND ALLOWS THE OPERATOR TO RESET THE CHILLER.

REF: M-327 CHILLED WATER SYSTEM DRYWELL COOLING P&ID, SCHEMATIC DIAGRAM, M-382 DRYWELL TEMPERATURE CONTROL DIAGRAM, M-353 REACTOR RECIRCULATION PUMP SYSTEM P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
DCW03	DWCW/RBCCW AUTO SWAPOVER FAILURE	08030

TYPE:DISCRETE

CAUSE:OPEN IN CIRCUIT DOWNSTREAM OF THE LOSS OF CHILLER POWER SENSING CIRCUIT, BETWEEN TERMINALS 83211 AND 83714.

PLT STA:100%

EFFECTS:THIS MALFUNCTION CAUSES THE RBCCW/DCW SUPPLY VALVES MO-20246, MO-20245, AO-5154A/B, AND AO-8155A/B AND AO-2253 NRHX COOLING WATER SUPPLY VALVES TO FAIL TO REPOSITION SUCH THAT THE RBCCW SYSTEM WATER IS NOT LINED UP TO THE DRYWELL CHILLED WATER SYSTEM ON A LOSS OF POWER TO THE DRYWELL CHILLED WATER CHILLER AND PUMPS. IF A DCW PUMP AND CHILLER ARE STILL OPERATING, CHILLER OUTLET TEMPERATURE INCREASES, CHILLED WATER HEADER SUPPLY AND RETURN, DRYWELL COOLER FANS OUTLET AND RETURN, DRYWELL EQUIPTMENT DRAIN SUMP OUTLET, RECIRC PUMP MOTOR TEMPERATURES, AND DRYWELL AREA TEMPERATURES INCREASE. DRYWELL PRESSURE ALSO INCREASES DUE TO THE INCREASE IN TEMPERATURE. IF A CHILLER AND DCW PUMP ARE NOT OPERATING, THE TEMPERATURES NOTED ABOVE INCREASE AT A FASTER RATE WITH DRYWELL TEMPERATURE AND PRESSURE INCREASING AND CAUSING A DRYWELL HIGH PRESSURE TRIP TO OCCUR. THE DCW/RBCCW SWAPOVER VALVES AND THE NON-ESSENTIAL LOAD VALVE IN THE RBCCW SYSTEM (MO-20246, MO-20245, AO-5154A/B, AND AO-8155A/B AND AO-2253) MAY BE OPERATED USING THIER RESPECTIVE HAND SWITCHES TO MITIGATE THE EFFECTS OF THE MALFUNCTION.

NO ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION, HOWEVER DUE TO THE LOSS OF COOLING INCURRED BY THE FAILURE OF THE RBCCW SYSTEM TO SUPPLY THE DCW SYSTEM, COMPONENT HIGH TEMPERATURE ANNUNCIATORS CAN BE EXPECTED.

REMOVAL OF THIS MALFUNCTION WILL RESTORE THE SWAPOVER CIRCUIT TO NORMAL.

REF: M-327 CHILLED WATER SYSTEM DRYWELL COOLING P&ID, SCHEMATIC DIAGRAM, M-302 DRYWELL TEMPERATURE CONTROL DIAGRAM, M-353 REACTOR RECIRCULATION PUMP SYSTEM P&ID, E-154 DRYWELL CHILLED WATER SUPPLY ELECTRICAL SCHEMATIC M-315 REACTOR BLDG COOLING WATER SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
DCW04	DWCW LEAKAGE INSIDE THE DRYWELL	02120

TYPE:DISCRETE, VARIABLE 0-100%

CAUSE:DCW LINE BREAKS AT PENETRATION CONNECTION DOWNSTREAM OF MO-2201A INSIDE THE DRYWELL. 100% SEVERITY IS EQUIVALENT TO 500 GPM AT 100% OPERATING PRESSURE.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES A DCW RUPTURE AT THE INSTRUCTORS SPECIFIED SEVERITY. THE MALFUNCTION FLOW RATE IS LINEAR WITH RESPECT TO THE SEVERITY SELECTED WITH 100% EQUIVALENT TO 500 GPM. DCW HEAD TANK LEVEL DECREASES AND WITH 100% SEVERITY SELECTED, EMPTIES IN ABOUT 30 SECONDS. THE DCW CIRC PUMPS CAVITATE AS INDICATED BY FLUCTUATIONS IN DCW FLOW AND RECIRC PUMP MOTOR COOLING WATER FLOW. WHEN DCW FLOW DECREASES LESS THAN 500 GPM, THE STANDBY PUMP STARTS AND ALSO CAVITATES. WHEN CHILLER D/P DECREASES TO LESS THAN 1 PSID, THE OPERATING CHILLERS TRIP. CHILLER OUTLET TEMPERATURE, CHILLED WATER HEADER SUPPLY AND RETURN, DRYWELL COOLER FANS OUTLET AND RETURN, DRYWELL EQUIPTMENT DRAIN SUMP OUTLET, RECIRC PUMP MOTOR TEMPERATURES, AND DRYWELL AREA TEMPERATURES INCREASE. DRYWELL PRESSURE ALSO INCREASES DUE TO THE INCREASE IN TEMPERATURE AND CAUSES A DRYWELL HIGH PRESSURE SCRAM TO OCCUR. IF THE RBCCW SYSTEM IS SUPPLYING THE DCW SYSTEM WHEN THE MALFUNCTION IS INSERTED, THE RBCCW SYSTEM WATER WILL LEAK THROUGH THE DCW PIPING AND A LOSS OF RBCCW WILL OCCUR. IF PUMP CAVITATION OCCURS FOR 5 MINUTES THE EFFECTED PUMP WILL SEIZE AND TRIP ON OVERCURRENT DUE TO OVERHEATING. THE DRYWELL FLOOR DRAIN SUMP FILLS AS INDICATED BY PUMP FLOW INCREASING AND THE "DRYWELL FLOOR DRAIN HI-HI LEVEL" ANNUNCIATOR ACTUATING.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

DRYWELL CHILLED WATER LO FLOW 500 GPM - C212
A/B/C/D/E/F/G DRYWELL COOLER AIR HI TEMP - C212
DRYWELL CHILLED WATER HI-LO TEMP - C212
DRYWELL CHILLER TROUBLE - C212
DRYWELL CHILLED WATER LO LEVEL - C212
DRYWELL FLOOR DRAIN HI-HI LEVEL - C214

REMOVAL OF THIS MALFUNCTION REPAIRS THE DCW PIPING AND

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

ALLOWS THE SYSTEM TO REFILL FROM THE DEMIN WATER SYSTEM. IF PUMP DAMAGE HAS OCCURRED, THE SIMULATOR MUST BE RESET TO RESTORE PUMP OPERATION TO NORMAL.

REF: M-327 CHILLED WATER SYSTEM DRYWELL COOLING P&ID, SCHEMATIC DIAGRAM, M-382 DRYWELL TEMPERATURE CONTROL DIAGRAM, M-353 REACTOR RECIRCULATION PUMP SYSTEM P&ID, E-154 DRYWELL CHILLED WATER SUPPLY ELECTRICAL SCHEMATIC DIAGRAM, M-315 REACTOR BLDG COOLING WATER SYSTEM P&ID.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
PCS03	TORUS-DRYWELL VACUUM BREAKER FAILS OPEN	03033

TYPE:GENERIC (A-L)

CAUSE:FAILURE OF VACUUM BREAKER TEST SWITCH CAUSES VACUUM BREAKER TO FAIL OPEN

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED TORUS-DRYWELL VACUUM BREAKER TO FAIL OPEN. DRYWELL AND TORUS PRESSURES EQUALIZE. IF DRYWELL PRESSURE REACHES .25 PSIG, THE DRYWELL HI-LO PRESSURE ANNUNCIATOR ACTUATES.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

DRYWELL HI-LO PRESS .25-.75 - 203B

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE TEST SWITCH TO NORMAL.

REF: M-367 CONTAINMENT ATMOSPHERIC CONTROL SYSTEM P&ID, E-1655 TORUS VACUUM RELIEF VALVES TEST AND INDICATION UNITS 2 & 3 ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE 1.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
PCS04	DW PRESSURE TRANSMITTER PT-5-12 FAILURE	05030

TYPE:GENERIC (A-D) VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE OF PRESSURE TRANSMITTER FAILS TO INSTRUCTOR SPECIFIED VALUE. 100% SEVERITY IS EQUIVLENT TO 100% OF RANGE OR SCALE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED DRYWELL PRESSURE TRANSMITTER TO FAIL TO THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO 100% OF RANGE OR SCALE. IF THE PRESSURE TRANSMITTER IS FAILED HIGHER THAN 2 PSIG, A RPS HALF SCRAM OCCURS, THE RPS HIGH DRYWELL PRESSURE TRIP ANNUNCIATOR ACTUATES, HIGH DRYWELL PRESSURE PPC POINT ALARMS, AND THE ASSOCIATED RPS RELAY TRIPS (5A-K4A/B/C/D). PCIS GROUP II AND III ISOLATION SIGNALS WILL BE PROCESSED IN 1 OUT OF 2 TAKEN TWICE LOGIC. IF ONE DRYWELL PRESSURE TRANSMITTER IS FAILED LOW AND AN ACTUAL HIGH DRYWELL PRESSURE CONDITION EXISTS, THE TRIPS PROVIDED BY THE ABOVE SYSTEM WILL NOT BE INHIBITED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

DRYWELL HIGH PRESS TRIP 2.0 PSIG - 205L
CHANNEL A REACTOR AUTO SCRAM - 205R
CHANNEL B REACTOR AUTO SCRAM - 205R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE AFFECTED PRESSURE TRANSMITTER TO NORMAL.

REF: M-1-S-54 RPS SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-1-S23 PCIS ELECTRICAL SCHEMATIC DIAGRAM, M-1-61 RHR SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RBVD1 REACTOR BLDG SUPPLY FAN TRIP 06010

TYPE:DISCRETE (A,B,C)

CAUSE:INTERNAL SHORT IN FAN 24V-14 (28V-14/20V-14) MOTOR.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED REACTOR BLDG VENT SUPPLY FAN TO TRIP. THE VENT PANEL 20C132 TROUBLE ANNUNCIATOR ACTUATES AND THE STANDBY REACTOR BLDG VENT SUPPLY FAN AUTO STARTS 15 SECONDS LATER. NO OTHER EFFECTS ARE OBSERVED. IF ALL REACTOR BLDG VENT SUPPLY FANS ARE FAILED, REACTOR BLDG NEGATIVE PRESSURE INCREASES IN THE NEGATIVE DIRECTION, AND STEAM TUNNEL TEMPERATURE INCREASES VERY SLOWLY (PANEL C21). WHEN REACTOR BLDG NEGATIVE PRESSURE REACHES -.5", THE REACTOR BLDG. ELEVATION 195'0" HI-LO PRESSURE ANNUNCIATOR ACTUATES, AND THE REACTOR BLDG AREA EXHAUST FANS TRIP. REACTOR BLDG. PRESSURE THEN STABILIZES. IF ONE OF THE FANS IS SUBSEQUENTLY RESTARTED (EG. MALFUNCTION IS REMOVED), THE HOT AIR IN THE STEAM TUNNEL IS PASSED THRU THE STEAM TUNNEL COOLER AND CAUSES A PCIS GROUP I ISOLATION TO OCCUR. (THE ROOM TEMPERATURE SENSOR IS LOCATED ON THE DISCHARGE OF THE COOLER). IF A PCIS GROUP I ISOLATION OCCURS, THE MSIV'S AUTO CLOSE, THE REACTOR SCRAMS, THE TURBINE TRIPS, THE RECIRC PUMPS TRIP, AND THE AUX BUSSES FAST TRANSFER TO THEIR STARTUP SOURCES. THE FEED PUMPS OPERATE INITIALLY ON RESIDUAL STEAM AND INCREASE REACTOR WATER LEVEL. REACTOR PRESSURE INCREASES DUE TO DECAY HEAT AND THE RELIEF VALVES OPERATE TO MAINTAIN PRESSURE. REACTOR WATER LEVEL DECREASES DUE TO MASS LOST FROM RELIEF VALVE ACTUATION AND THE HPCI AND RCIC SYSTEMS OPERATE TO MAINTAIN LEVEL.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

REACT BLDG VENT PANEL 20C132 TROUBLE - 212L
REACT BLDG EL. 195'0" HI-LO DIFF. PRESS - 212R
REACT BLDG REFUELING FLOOR HI-LO DIFF PRESS - 212P

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE REACTOR BLDG SUPPLY FAN'S MOTOR TO NORMAL. THE FANS MAY BE RESTARTED VIA REMOTE FUNCTIONS.

REF: E-27B REFUELING FLOOR AND RADWASTE BLDG AREA VENT EXHAUST FANS ELECTRICAL SCHEMATIC DIAGRAM, E-27?

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
	REACTOR BLDG AREA AND REFUELING FLOOR SUPPLY FANS ELECTRICAL SCHEMATIC DIAGRAM, M-1-323 PCIS SYSTEM ELECTRICAL SCHEMATIC DIAGRAM.	
	REV. 2	

TABLE I.C-1
SYSTEMS MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECTS	EQU NO.

RRS16 RECIRC PUMP DW CHILLED WATER FLOW LOSS

TYPE: GENERIC (A-B)

CAUSE: AIR OPERATED SUPPLY VALVE AO-20257-1/AO-20259-1 FAILS CLOSED

PLT STA: 100%

EFFECTS: INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC PUMP DW CHILLED WATER SUPPLY VALVE TO FAIL CLOSED. THIS MALFUNCTION EFFECTS THE FOLLOWING VALVES:

A: AO-20256-1 C: AO-20258-1
B: AO-20257-1 D: AO-20259-1

IF THE VALVES THAT ARE SUPPLYING FLOW TO A RECIRC PUMP ARE FAILED, THE VALVES CLOSE. THE AFFECTED RECIRC PUMP'S CHILLED WATER FLOW DECREASES TO 0, RECIRC PUMP WINDING TEMPERATURES INCREASE AND CAUSE A SHORT TO DEVELOP IN THE RECIRC PUMP MOTOR. GENERATOR WATTS AND AMPS INCREASE AND THE DRIVE MOTOR TRIPS DUE TO OVERCURRENT. THE DRIVE MOTOR BREAKER OPENS, THE RECIRC PUMP'S LOCKOUT RELAY TRIPS AND THE GENERATOR FIELD BREAKER TRIPS. THE PLANT RESPONDS DYNAMICALLY TO THE TRIP OF THE RECIRC PUMP.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RECIRC PUMP MOTOR COOLING WATER LOW FLOW - 204M
B RECIRC PUMP MOTOR COOLING WATER LOW FLOW - 204M
RECIRC PUMP MOTOR HIGH TEMP - 204L
A RECIRC DRIVE MOTOR TRIP - 204M
B RECIRC DRIVE MOTOR TRIP - 204M
A RECIRC GENERATOR LOCKOUT TRIP - 204M
A RECIRC GENERATOR AUX LOCKOUT TRIP - 204M
B RECIRC GENERATOR LOCKOUT TRIP - 204M
B RECIRC GENERATOR AUX LOCKOUT TRIP - 204M
A RECIRC PUMP LOW DIFF PRESS - 204M
B RECIRC PUMP LOW DIFF PRESS - 204M

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE AIR OPERATED SUPPLY VALVE TO NORMAL. IF RECIRC PUMP DAMAGE HAS OCCURRED, THE SIMULATOR MUST BE RESET TO REMOVE THE DAMAGE.

REF: M-327 DRYWELL CHILLED WATER SYSTEM P&ID, M-351 NUCLEAR BOILER SYSTEM P&ID, M-353 REACTOR RECIRCULATION PUMP

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
SGT01	STANDBY GAS FAILS TO AUTO INITIATE	06071

TYPE:GENERIC (A,B)

CAUSE:FAILURE OF CONTACT 63Z-1/2 IN STANDBY GAS TREATMENT FAN CONTROL CIRCUIT.

PLT STA:SGT AUTO INITIATION SIGNAL PRESENT.

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED SGT FAN TO FAIL TO START WHEN AN AUTO START SIGNAL IS RECEIVED. IF FAN A/B IS FAILED AND AN INITIATION SIGNAL IS RECEIVED, THE VENTILLATION SYSTEMS ISOLATE AND THE PROPER DAMPERS OPEN AND ALIGN TO THE SGT SYSTEM HOWEVER, SGT FAN A/B DOES NOT START. STANDBY GAS FLOW INCREASES TO NORMAL ON FR-2000R ON PANEL C12, SGT FILTER D/P INCREASES, AND OFFGAS STACK FLOW INCREASES. FAN A MAY BE STARTED USING IT'S HAND SWITCH, IF DESIRED.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF CONTACT 63Z-1/2 IN STANDBY GAS TREATMENT FAN CONTROL CIRCUIT TO NORMAL AND STARTS THE FAN IF AN AUTO START SIGNAL IS PRESENT.

REF: M-397 STANDBY GAS TREATMENT CONTROL DIAGRAM, E-206 STANDBY GAS TREATMENT FANS AND FILTERS ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RCI01	RCIC TURBINE CONTROL OIL PRESSURE LOSS	02060

TYPE:DISCRETE

CAUSE:MECHANICAL FAILURE OF THE GOVERNOR ACTUATOR HYDRAULIC RESERVOIR CAUSES A LOSS OF OIL TO THE TURBINE CONTROL VALVE GOVERNOR ASSEMBLY.

PLT STA:RCIC IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A LOSS OF OIL TO THE RCIC TURBINE CONTROL VALVE GOVERNOR ASSEMBLY. THE TURBINE CONTROL VALVE OPENS FULLY AND CAUSES THE RCIC TURBINE SPEED TO INCREASE. A MECHANICAL OVERSPEED TRIP OCCURS WITH THE TRIP THROTTLE VALVE CLOSING AND RCIC TURBINE SPEED, FLOW DISCHARGE PRESSURE, AND EXHAUST PRESSURE DECREASING TO 0. NO LOSS OF LUBE OIL FLOW TO THE RCIC BEARINGS WILL OCCUR.
IF THE MECHANICAL OVERSPEED IS RESET VIA THE REMOTE FUNCTION AND THE TRIP THROTTLE VALVE IS REOPENED, RCIC TURBINE SPEED AGAIN INCREASES TO IT'S OVERSPEED TRIP SETPOINT AND THE TRIP THROTTLE VALVE AUTO CLOSES.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

RCIC TURB TRIP - 204C
RCIC LO FLOW - 204C

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE GOVERNOR ACTUATOR HYDRAULIC RESERVOIR TO NORMAL.

REF: M-1-S42 RCIC SYSTEM ELECTRICAL SCHEMATIC DIAGRAM,
M-360 SSHEETS 1 THROUGH 4 RCIC SYSTEM P&ID'S.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RCIO2	RCIC FAILS TO AUTO START	03050

TYPE:DISCRETE

CAUSE:FAILURE OF AUTO-START RELAYS 13A-K1 AND 13A-K2

PLT STA:RCIC AUTO INITIATION SIGNAL PRESENT.

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A FAILURE OF THE RCIC SYSTEM TO AUTO START WHEN REACTOR WATER LEVEL IS -48 INCHES. ALL RCIC AUTO INITIATION ACTIONS WILL BE INHIBITED UNTIL THE MALFUNCTION IS REMOVED. THE OPERATOR MAY START THE RCIC SYSTEM IF DESIRED BY OPENING THE STEAM SUPPLY VALVE MO-13-131, AND THE PUMP DISCHARGE VALVE MO-13-21.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF RELAYS 13A-K1 AND 13A-K2 TO NORMAL AND STARTS THE RCIC SYSTEM IF AN INITIATION SIGNAL IS PRESENT.

REF: M-1-142 RCIC SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-360 SHEETS 1 THROUGH 4 RCIC SYSTEM P&ID'S.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RCIJ4	RCIC FLOW CONTROLLER AUTO CIRCUIT FAILS LOW	01160

TYPE:DISCRETE

CAUSE:ELECTRONIC FAILURE OF RCIC FLOW CONTROLLER CAUSES AUTO OUTPUT TO FAIL TO MINIMUM.

PLT STA:RCIC IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE RCIC FLOW CONTROLLER AUTO OUTPUT TO FAIL LOW. THE TURBINE GOVERNOR CONTROL VALVE CLOSES CAUSING RCIC FLOW, DISCHARGE PRESSURE, SPEED, AND EXHAUST PRESSURE TO DECREASE TO THE MINIMUM SETPOINT OF THE FLOW CONTROLLER. THE RCIC MIN FLOW VALVE OPENS WHEN RCIC FLOW DECREASES TO LESS THAN 120 GPM. THE SYSTEM RECEIVING FLOW FROM THE RCIC SYSTEM REACTS DYNAMICALLY TO THE LOSSOF FLOW. THE OPERATOR MAY PLACE THE RCIC FLOW CONTROLLER IN MANUAL AND CONTROL RCIC FLOW IF DESIRED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

RCIC LO FLOW - 2040

REMOVAL OF THE MALFUNCTION RESTORES THE AUTO OPERATION OF THE RCIC FLOW CONTROLLER TO NORMAL.

REF: M-1-842 RCIC SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-360 SHEETS 1 THROUGH 4 RCIC SYSTEM P&ID'S.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RCI05	RCIC FLOW CONTROLLER AUTO CIRCUIT FAILS HIGH	01160

TYPE:DISCRETE

CAUSE:ELECTRONIC FAILURE OF RCIC FLOW CONTROLLER CAUSES AUTO OUTPUT TO FAIL TO MAXIMUM.

PLT STA:RCIC IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE RCIC FLOW CONTROLLER AUTO OUTPUT TO FAIL HIGH. THE TURBINE GOVERNOR CONTROL VALVE OPENS CAUSING RCIC TURBINE SPEED, DISCHARGE PRESSURE, FLOW, AND EXHAUST PRESSURE TO INCREASE. A MECHANICAL OVERSPEED TRIP OCCURS. THE TRIP THROTTLE VALVE CLOSES AND RCIC TURBINE SPEED, FLOW DISCHARGE PRESSURE, AND EXHAUST PRESSURE DECREASES TO 0. IF THE MECHANICAL OVERSPEED CONDITION IS RESET USING THE REMOTE FUNCTION AND THE TRIP THROTTLE VALVE IS SUBSEQUENTLY OPENED WITH THE FLOW CONTROLLER IN AUTO, AN OVERSPEED TRIP AGAIN OCCURS. THE OPERATOR MAY PLACE THE RCIC FLOW CONTROLLER IN MANUAL IF DESIRED TO CONTROL FLOW.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

RCIC TURB TRIP - 204C
RCIC LO FLOW - 204C

REMOVAL OF THE MALFUNCTION RESTORES THE AUTO OPERATION OF THE RCIC FLOW CONTROLLER TO NORMAL.

REF: M-1-S42 RCIC SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-360 SHEETS 1 THROUGH 4 RCIC SYSTEM P&ID'S.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RCI06	RCIC FLOW CONTROLLER OSCILLATION	011+0

TYPE:DISCRETE VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE OF RCIC FLOW CONTROLLER CAUSES THE AUTOMATIC OUTPUT TO OSCILLATE WITH A 30 SECOND PERIOD. 100% SEVERITY IS EQUIVALENT TO A 10% OSCILLATION OR 20% PEAK TO PEAK. THIS MALFUNCTION DOES NOT AFFECT THE MANUAL OPERATION OF THE CONTROLLER.

PLT STA:RCIC IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE AUTO OUTPUT OF THE RCIC FLOW CONTROLLER TO OSCILLATE AT THE INSTRUCTOR'S SPECIFIED SEVERITY 0-100%, WHERE 100% IS EQUIVALENT TO A 10% OSCILLATION, 20% PEAK TO PEAK WITH 30 SECOND PERIOD. RCIC FLOW, SPEED, DISCHARGE PRESSURE, AND EXHAUST PRESSURE OSCILLATES. THE OPERATOR MAY PLACE THE FLOW CONTROLLER IN MANUAL AND CONTROL RCIC FLOW (WITH NO OSCILLATIONS OCCURRING).

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE AUTO OPERATION OF THE RCIC FLOW CONTROLLER TO NORMAL.

REFF: M-1-542 RCIC SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, M-360 SHEETS 1 THROUGH 4 RCIC SYSTEM PRID'S.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
AMIF2	ARI POWER SUPPLY FAILURE	02160

TYPE:GENERIC (A-B)

CAUSE:BLOWN POWER SUPPLY FUSE

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION WILL CAUSE A LOSS OF POWER TO THE SELECTED (A OR B) ARI CHANNEL, RESULTING IN A LOSS OF INDICATION FOR SV-2-03-141A(B) AND SV-2-03-142A(B). IF THE EFFECTED ARI CHANNEL IS ARMED THE APPROPRIATE "CHANNEL A(B) ARI SWITCH ARMED" ANNUNCIATOR WILL ALARM. IF THE EFFECTED ARI CHANNEL INITIATION PUSHBUTTON IS DEPRESSED IT WILL HAVE NO EFFECT ON THE STIMULATOR.

THE ANNUNCIATOR DIRECTLY ASSOCIATED WITH THIS MALFUNCTION IS:

"ARI RPT SYSTEM INOP LOSS OF POWER" 207 E3

REMOVAL OF THE MALFUNCTION REPLACES THE BLOWN FUSE AND RETURNS THE EFFECTS ARI CHANNEL TO NORMAL OPERATION.

REFERENCES: E3010 SHEETS 1 & 2, E2389 SHEET 1, P&ID M-356 SHEET 1

REV. 1

TABLE I.C-1
SYSTEMS MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECTS	EQU NO.

ARI41 ARI ISOLATION/EXHAUST VALVE 141 FAILURE

TYPE:GENERIC (A-B)

CAUSE:MECHANICAL BINDING CAUSES VALVE TO FAIL "AS-IS"

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED VALVE(S) TO DEVELOP MECHANICAL BINDING, WHICH CAUSES THE VALVE TO FAIL "AS-IS". FAILING EITHER VALVE OPEN OR CLOSED WILL NEITHER CAUSE NOR PREVENT ARI FROM FUNCTIONING. THE 141 VALVES ARE NORMALLY OPEN VALVES WHICH CLOSE WHEN ARI IS INITIATED.

IF ARI IS INITIATED WITH THIS MALFUNCTION ACTIVE, THE GREEN INDICATING LIGHT (COMMON WITH THE ASSOCIATED 142 VALVE) WILL REMAIN LIT, WHILE THE RED INDICATING LIGHT FOR THE SELECTED 141 VALVE WILL NOT LIGHT.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION UNBINDS THE SELECTED VALVE AND IT WILL ASSUME ITS DEMANDED POSITION.

REFERENCES: P&ID M-356 SH. 1

REV. 1

TABLE I.C-1
SYSTEMS MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECTS	EQU NO.

ARI42 ARI EXHAUST VALVE 142 FAILURE

TYPE:GENERIC (A-B)

CAUSE:MECHANICAL BINDING CAUSES VALVE TO FAIL "AS-IS"

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED VALVE(S) TO DEVELOP MECHANICAL BINDING, WHICH CAUSES THE VALVE TO FAIL "AS-IS". FAILING EITHER VALVE CLOSED WILL PREVENT ARI FROM VENTING THE SCRAM AIR HEADER VIA THIS VENT PATH, HOWEVER VENTING MAY STILL BE ACCOMPLISHED IF BOTH 141 VALVES ARE CLOSED THE 142 VALVES ARE NORMALLY CLOSED VALVES WHICH OPEN WHEN ARI INITIATES.

IF ARI IS INITIATED WITH THIS MALFUNCTION ACTIVE THE GREEN INDICATING LIGHT (COMMON WITH ASSOCIATED 142 VALVE) FOR THE SELECTED VALVE WILL REMAIN LIT, AND THE RED INDICATING LIGHT FOR THE SELECTED 142 VALVE WILL NOT LIGHT.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION WILL UNBIND THE SELECTED VALVE AND IT WILL ASSUME ITS DEMANDED POSITION.

REFERENCES: P&ID M-356 SH. 1

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRH01	FLOW CONTROL VALVE FAILURE	05370

TYPE:GENERIC (A-B) VARIABLE 0-100%

CAUSE:FAILURE OF FLOW CONTROL E/P CONTROLLER. 100% SEVERITY IS EQUIVALENT TO THE VALVE BEING 100% OPEN.

PLY STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES A DP / FLOW CONTROL VALVE FCV-3-19A/B TO FAIL TO THE INSTRUCTORS SPECIFIED VALUE. THE VALVE WILL NOT RESPOND TO AUTOMATIC OR MANUAL SIGNALS FROM THE CRD FLOW CONTROLLER.

IF THE FLOW CONTROL VALVE IS FAILED OPEN, DRIVE WATER D/P, COOLING WATER D/P, COOLING WATER FLOW, AND CRD PUMP AMPS INCREASE; ACCUMULATOR CHARGING HEADER PRESSURE DECREASES. ROD INSERTION OR WITHDRAWAL WILL PRODUCE ABNORMALLY HIGH ROD SPEEDS AND DRIVE WATER FLOWS. CONTROL RODS MAY DRIFT INTO THE CORE DUE TO THE ABNORMALLY HIGH COOLING WATER D/P.

IF THE FLOW CONTROL VALVE IS FAILED CLOSED, DRIVE WATER D/P, COOLING WATER D/P, COOLING WATER FLOW, AND CRD PUMP AMPS DECREASE; ACCUMULATOR CHARGING HEADER PRESSURE INCREASES. COOLING WATER FLOW TO THE CRD UNITS IS ALSO DECREASED WHICH WILL CAUSE THE ASSOCIATED HIGH TEMPERATURE ANNUNCIATOR TO ACTUATE. ROD INSERTION OR WITHDRAWAL WILL HAVE ABNORMALLY LOW ROD SPEEDS AND LOW DRIVE WATER FLOWS.

THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

CRD CHARGING WATER HIGH PRESSURE - C103
CRD HYDRAULIC HI TEMP - C205

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE FLOW CONTROL VALVE TO NORMAL.

REFERENCES: M-356/357 CRD SYSTEM P & ID'S,
M-353 REACTOR RECIRC PUMP SYSTEM P & ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRH02	CRD DRIVE WATER FILTER CLOGGING	05120

TYPE:GENERIC (A-B) VARIABLE 0-100%

CAUSE:DEBRIS IN CRD DRIVE FILTER. 100% SEVERITY IS EQUAL TO 50 PSID ACROSS THE FILTER AT 60 GPM FLOW

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES A CRD DRIVE WATER FILTER TO CLOG AT THE INSTRUCTOR SPECIFIED SEVERITY. CRD SYSTEM FLOW AND PRESSURES DECREASE THEN INCREASE AS THE FLOW CONTROL VALVE OPENS TO MAINTAIN SYSTEM FLOW. ACCUMULATOR CHARGING PRESSURE DECREASES AS FILTER D/P INCREASES.
IF THE CRD FLOW CONTROL VALVE CANNOT MAINTAIN SYSTEM FLOW WITH 100% SEVERITY SELECTED, CRD DRIVE WATER AND COOLING WATER D/P'S AND FLOWS DECREASES. THE ALTERNATE DRIVE WATER FILTER MAY BE PLACED IN SERVICE USING REMOTE FUNCTION CRH04 IF DESIRED TO RETURN SYSTEM FLOWS AND PRESSURES TO NORMAL.

THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

CRD WATER FILTER FAILURE C005

REMOVAL OF THE MALFUNCTION REMOVES THE DEBRIS FROM THE DRIVE WATER FILTER AND RESTORES THE OPERATION OF THE DRIVE WATER FILTER TO NORMAL.

REFERENCES: M-356/357 CRD SYSTEM P&ID'S, M-353 REACTOR RECIRC PUMP SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRH03	CRD HYDRAULIC PUMP TRIP	05080

TYPE:GENERIC (A-S)

CAUSE:INTERNAL SHORT CAUSES AFFECTED PUMPS SUPPLY BREAKER TO TRIP ON OVERCURRENT.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED CRD PUMP TO TRIP ON OVERCURRENT. CRD PUMP AMPS SPIKE SHARPLY UPWARD, THE PUMP BREAKER TRIPS, AFTER WHICH THE MOTOR AMPS DECREASE TO 0. COOLING WATER, DRIVE WATER, AND ACCUMULATOR CHARGING PRESSURE AND FLOWS DECREASE. CRD TEMPERATURES INCREASE DUE TO THE LOSS OF COOLING FLOW.
AS THE CRD ACCUMULATORS PRESSURE DECREASES, THE ACCUMULATOR TROUBLE LIGHTS ON THE FULL CORE DISPLAY RANDOMLY ILLUMINATE. IF THE PUMP IS RESTARTED WITH THE MALFUNCTION STILL PRESENT, IT WILL AGAIN TRIP ON OVERCURRENT. PLACING THE OTHER CRD PUMP IN SERVICE WILL RESTORE NORMAL OPERATION OF THE CONTROL ROD DRIVE SYSTEM. NO CONTROL RODS CAN BE INSERTED OR WITHDRAWN WHILE NO CRD PRESSURE EXISTS.

THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

A CRD WATER PUMP TRIP - C205
B CRD WATER PUMP TRIP - C205
A CRD WATER PUMP OVERLOAD - C205
B CRD WATER PUMP OVERLOAD - C205
CRD ACCUMULATOR LOW PRESS HI LEVEL - C205
CRD HYDRAULIC HI TEMP - C205

REMOVAL OF THE MALFUNCTION RESTORES THE CRD PUMP MOTOR TO NORMAL OPERATION.

REFERENCES: M-356/357 CRD SYSTEM P&ID'S, M-351 REACTOR RECIRC PUMP SYSTEM P&ID, SCHEMATIC, E-189

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRHJ04	CONTROL ROD DRIFTS IN	02040

TYPE:GENERIC (XX/YY)

CAUSE:SCRAM OUTLET CONTROL VALVE (13-127) LEAKS

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES THE SELECTED CONTROL ROD TO DRIFT INTO THE CORE AT 1 INCH/SEC. ISOLATING THE SCRAM DISCHARGE VOLUME WILL CAUSE THE VOLUME TO FILL. WITHDRAWAL OF THE AFFECTED CONTROL ROD WILL BE POSSIBLE, BUT AT A SLOWER SPEED. REMOVAL OF THE WITHDRAWAL SIGNAL WILL CAUSE THE ROD TO DRIFT BACK IN AT 1 INCH/SEC. THE RED DRIFT LITE ILLUMINATES FOR THE SELECTED ROD ON THE FULL CORE DISPLAY. THE CRD COOLING WATER FLOW INCREASES DUE TO THE LEAKAGE PAST THE SCRAM OUTLET. LPRM READINGS ON THE FOUR ROD DISPLAY WILL SHOW THE CHANGE IN FLUX LEVELS, THE MAGNITUDE OF THE CHANGE DEPENDENT UPON THE RELATIVE POSITION OF THE ROD IN RELATION TO THE LPRM AND THE NEGATIVE REACTIVITY ADDED BY THE ROD. APRM INDICATION WILL PROBABLY NOT CHANGE SIGNIFICANTLY UNLESS A SIGNIFICANT AMOUNT OF REACTIVITY IS ADDED BY THE ROD INSERTION.

THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD DRIFT - C205

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE SCRAM OUTLET VALVE TO NORMAL OPERATION AND ALLOWS THE ROD TO SETTLE AT THE NEXT EVEN NOTCH.

REFERENCES: M-356/357 CRD SYSTEM PRID'S, M-1-S-20 RMCS SYSTEM ELEM DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRH05	CONTROL ROD ACCUMULATOR TROUBLE	05230

TYPE:GENERIC (XX/YY)

CAUSE:CRD ACCUMULATOR NITROGEN LEAK CAUSES ACCUMULATOR NITROGEN SIDE TO TOTALLY DEPRESSURIZE IN 15 SECONDS.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES THE SELECTED CONTROL ROD ACCUMULATOR NITROGEN PRESSURE TO TOTALLY DEPRESSURIZE IN 15 SECONDS. THE AMBER ACCUM LITE ON THE FULL CORE DISPLAY FOR THE SELECTED ACCUMULATOR ILLUMINATES. NO EFFECTS ARE SEEN IF THE ROD IS SCRAMMED AT NORMAL OPERATING PRESSURE, HOWEVER IF THE ROD IS SCRAMMED WHEN PLANT PRESSURE IS LESS THAN 950 PSI, IT WILL TAKE SIGNIFICANTLY LONGER FOR THE ROD TO REACH THE TOP OF THE CORE USING THE CRDH PUMPS TO SUPPLY DRIVING HEAD FOR ROD INSERTION. IF THE CRDH PUMPS ARE STOPPED PRIOR TO THE ROD REACHING FULL IN, THE ROD WILL SETTLE TO THE PREVIOUS EVEN NOTCH.

THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

CRD ACCUMULATOR LOW PRESS HI LEVEL C1D5

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE HCU ACCUMULATOR TO NORMAL AND RECHARGES THE NITROGEN SIDE OF THE EFFECTED ACCUMULATOR.

REFERENCES: M-356/357 CRD SYSTEM P&ID'S.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

CRM06 CRD STABILIZING VALVE FAILS CLOSED 05170

TYPE:GENERIC (A/B)

CAUSE:FAILURE OF CONTACTS (1-1T AND 2-2T OR 3-3T AND 4-4T) IN STAB VALVE SELECTOR SWITCH.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES THE SELECTED CRD STAB VALVES TO FAIL CLOSED. COOLING WATER FLOW DECREASES BY 6 GPM, CRD COOLING D/P DECREASES, THEN INCREASE AS THE FCV OPENS TO MAINTAIN SYSTEM FLOW. DRIVE WATER PRESSURE INCREASES, THEN CONTINUES TO INCREASE AS THE CRD FLOW CONTROL VALVE OPENS TO MAINTAIN SYSTEM FLOW. THE SELECTED STAB VALVES WILL NOT OPEN ON AN INSERT OR WITHDRAWAL SIGNAL FROM THE RMCS SYSTEM. WHEN AN INSERT OR WITHDRAWAL SIGNAL IS RECIEVED, THE CRD COOLING AND DRIVE WATER PRESSURES DECREASE THEN CONTINUES TO DECREASE WHEN THE FLOW CONTROL VALVE CLOSES TO MAINTAIN CONSTANT SYSTEM FLOW. COOLING WATER FLOW ALSO DECREASES BY 2 OR 4 GPM WHEN A ROD IS MOVED DUE TO THE WATER BEING DIVERTED TO THE DRIVE WATER HEADER.

THERE ARE NO ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE STAB VALVES TO NORMAL.

REFERENCES: M-356/357 CRD SYSTEM PRID'S, M-1-5-20 SH 10 AND 12 RMCS SYSTEM ELEM DIAGRAM.

REV. 5

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRH07	LOSS OF AIR PRESSURE TO CRD HCU'S	02050

TYPE:DISCRETE, VARIABLE 0-100%

CAUSE:BAD WELD ON PIPE CAUSES OPEN ENDED BREAK OF SUPPLY LINE FOR HCU'S AT MANUAL VALVE 122. 100% SEVERITY IS EQUIVIVENT TO 0 PSIg. A SEVERITY OF 40% RESULTS IN 60 PSIG.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE CRD HCU'S TO LOSS AIR PRESSURE DUE TO A PIPING RUPTURE ON THE AIR SUPPLY LINE. THE SEVERITY RANGE SELECTED CAUSES THE SCRAM PILOT AIR HEADER TO DEPRESSURIZE TO 100 PSIG MINUS THE SEVERITY SELECTED. FOR EXAMPLE, IF THE SEVERITY SELECTED IS 100%, 0 PSIG PRESSURE WILL BE ON THE SCRAM PILOT AIR HEADER. NO EFFECTS WILL BE SEEN UNTIL THE SEVERITY SELECTED IS GREATER THAN 30% DUE TO THE 70 PSIG PRESSURE CONTROL VALVE MAINTAINING AIR HEADER PRESSURE BETWEEN 1% AND 30% SEVERITY. IF SCRAM VALVE PILOT AIR HEADER PRESSURE REACHES 60 PSIG, THE HCU SCRAM INLET AND OUTLET VALVES OPEN AND RODS SCRAM IN A RANDOM MANNER. THE AIR HEADER PRESSURE INDICATOR ON PANEL C124 DECREASES TO THE SEVERITY'S PRESSURE EQUIVILENT. THE SCRAM DISCHARGE VOLUME VENT AND DRAIN VALVES CLOSE. IF THE HEADER PRESSURE DECREASES TO LESS THAN 30 PSIG, THE CRD FLOW CONTROL VALVE FAILS OPEN. AT 100% SEVERITY, THE AIR LEAKAGE FROM THE BROKEN PIPE IS 750 SCFM. IF THE BACKUP SCRAM VALVES ENERGIZE FOR ANY REASON, THE LEAKAGE STOPS, AND THE AIR SUPPLY TO THE CRD FLOW CONTROL VALVE IS RESTORED.

THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

SCRAM VALVE PILOT AIR HEADER PRESSURE LOW C205

REMOVAL OF THE MALFUNCTION REPAIRS THE PIPING RUPTURE AND ALLOWS THE AIR HEADER TO REPRESSURIZE.

REFERENCES: M-356 AND M-357, CRH SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRH08	SCRAM DISCHARGE VOLUME LEVEL HIGH	05350

TYPE:DISCRETE

CAUSE:LEAKAGE PAST SCRAM DISCHARGE VALVES AND BLOCKAGE IN SCRAM DISCHARGE VOLUME DRAIN LINE.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES WATER TO COLLECT IN THE SCRAM DISCHARGE VOLUME AT A RATE OF 10 GALLONS/MINUTE. AFTER 30 SECONDS, THE "SCRAM DISCHARGE VOLUME NOT DRAINED" ANNUNCIATOR ACTUATES. 2 1/2 MINUTES AFTER MALFUNCTION INSERTION, A ROD BLOCK SIGNAL IS GENERATED. 5 MINUTES AFTER MALFUNCTION INSERTION THE REACTOR AUTOMATICALLY SCRAMS. THE SCRAM DISCHARGE VOLUME WILL NOT DRAIN WITH THIS MALFUNCTION ACTIVE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD WITHDRAWAL BLOCK	C205
SCRAM DISCHARGE VOLUME NOT DRAINED	C205
SCRAM DISCHARGE VOLUME HIGH LEVEL TRIP SETPOINT	C205

REMOVAL OF THE MALFUNCTION STOPS THE LEAKAGE PAST THE SCRAM DISCHARGE VALVE AND RETURNS THE VOLUME DRAIN LINE TO NORMAL.

REFERENCES: M-35a CRD HYDRAULIC SYSTEM P&ID, M-1-S-54 RPS SYSTEM ELEM DIAGRAM, M-1-S-20 RMCS SYSTEM ELEM DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRHJ9	SCRAM DISCHARGE VENT VALVE FAILS OPEN	05050

TYPE:GENERIC (A-D)

CAUSE:STEM BINDS IN OPEN POSITION

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED SDV VENT VALVE TO STICK OPEN. NO EFFECTS WILL BE SEEN UNTIL AN AUTO CLOSE OR A MANUAL CLOSE SIGNAL IS RECEIVED. IF A CLOSED SIGNAL IS RECEIVED, THE AFFECTED VALVE WILL NOT CLOSE. THE VALVE POSITION INDICATION OF THE AFFECTED VALVE WILL INDICATE OPEN ON PANEL C05 AND THE PCIS MIMIC. IF THE SCRAM DISCHARGE VOLUME VENT VALVE IS CLOSED WHEN THE MALFUNCTION IS INSERTED, NO EFFECTS WILL BE SEEN UNTIL THE VALVE IS OPEN, AT WHICH TIME THE SELECTED VENT VALVE STICKS OPEN.

NO ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE SDV VENT VALVE TO NORMAL.

REFERENCES: M-356 CRH CRH SYSTEM P&ID.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRH10	SCRAM DISCHARGE VOLUME VENT VALVE FAILS CLOSED	05050

TYPE:GENERIC (A-D)

CAUSE:OPEN IN SDV VENT VALVE SOLONOID VALVES (SV-33A/B, SV-35A/B) FAILS VENT VALVES CLOSED.

PLT STA:100% POWER

EFFECTS:THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED SCRAM DISCHARGE VOLUME VENT VALVE TO FAIL CLOSED. THE VALVE POSITION INDICATION ON PANEL C05 AND THE PCIS MIMIC WILL INDICATE CLOSED. IF BOTH SDV VENT PATHS ARE CLOSED, THE SDV DOES NOT DRAIN WHEN THE SDV DRAIN VALVES ARE OPENED. THE FAILED SCRAM DISCHARGE VOLUME VENT VALVE DOES NOT OPEN ON A MANUAL OPEN SIGNAL.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE SCRAM DISCHARGE VOLUME VENT VALVE TO NORMAL.

REFERENCES: M-356 CRD HYDRAULIC SYSTEM P&ID, M-1-3-54 RPS SYSTEM ELEM DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRH11	SCRAM DISCHARGE VOLUME DRAIN VALVE FAILS OPEN	05050

TYPE:GENERIC (A-B)

CAUSE:STEM BINDS IN OPEN POSITION

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED SDV DRAIN VALVE TO STICK OPEN. NO EFFECTS ARE SEEN UNTIL AN AUTO CLOSE OR A MANUAL CLOSE SIGNAL IS RECEIVED. IF A CLOSE SIGNAL IS RECEIVED, THE VALVE REMAINS OPEN AS INDICATED BY THE VALVE POSITION INDICATION ON PANEL C05 AND THE PCIS MIMIC. IF THE SDV DRAIN VALVE IS CLOSED WHEN THE MALFUNCTION IS INSERTED, NO EFFECTS WILL BE SEEN UNTIL THE VALVE IS OPEN, AT WHICH TIME THE VALVE WILL STICK IN THE OPEN POSITION.

IF BOTH SDV DRAINS ARE STUCK OPEN WHEN A REACTOR SCRAM OCCURS, THE SDV PRESSURE DOES NOT INCREASE AS MUCH NOR WILL THE SDV FILL UP AS EXPECTED FROM THE SCRAM. THIS IS INDICATED BY THE SHORTER TIME IT WILL TAKE TO DRAIN THE SDV FOLLOWING A SCRAM AND FASTER ROD SPEEDS WILL BE DEVELOPED. ALSO THE REACTOR VESSEL INVENTORY THAT WOULD NORMALLY BE FED INTO THE VESSEL BY THE CRD PUMPS WILL BE LOST TO THE RADWASTE SYSTEM. IF THE CRD SYSTEM IS LOST, A SMALL FLOW FROM THE REACTOR TO RADWASTE VIA THE SDV DEVELOPS.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE SDV DRAIN VALVE TO NORMAL.

REFERENCES: M-356 CRH SYSTEM P&ID.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRH12	SCRAM DISCHARGE VOLUME DRAIN VALVE FAILS CLOSED	05050

TYPE:GENERIC (A-B)

CAUSE:OPEN IN SCRAM DISCHARGE VOLUME DRAIN VALVE SOLONOID VALVE (SV-33/SV-36) CAUSES DRAIN VALVE TO FAIL CLOSED

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED SDV DRAIN VALVE TO FAIL CLOSED. THE SDV DRAIN VALVE INDICATES CLOSED ON PANEL C05 AND THE PCIS MIMIC. THE VALVE WILL NOT RESPOND TO A MANUAL OPEN SIGNAL. THE SDV CANNOT BE DRAINED WITH THE MALFUNCTION ACTIVE.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE SDV SOLONOIDS TO NORMAL.

REFERENCES: M-356 CRH SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRM01	CONTROL ROD DRIFTS OUT	02040

TYPE:GENERIC (XX/YY)

CAUSE:COLLET PISTON STICKS KEEPING COLLET FINGERS DISENGAGED AFTER ROD WITHDRAWAL.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED CONTROL ROD DRIVE MECHANISM TO DEVELOP A BINDING IN THE COLLET ASSEMBLY. THIS BINDING CAUSES THE COLLET PISTON TO STICK IN THE "CAMMED OUT" POSITION AFTER A NORMAL ROD WITHDRAWAL. ROD POSITION WILL SHOW THE ROD POSITION CHANGING. THE REACTOR MANUAL CONTROL SYSTEM WILL NOT BE EFFECTED BY THE MALFUNCTION. THE ROD WILL INSERT, AND WITHDRAW AT NORMAL ROD SPEED AND CAN BE SCRAMMED. HOWEVER, THE ROD WILL CONTINUE TO DRIFT OUT UNTIL IT IS BACKSEATED AT ABOUT 1 IN/MIN DUE TO THE WEIGHT OF THE CONTROL ROD BLADE AND DRIVE MECHANISM. CRDH FLOWS AND PRESSURES WILL NOT RESPOND TO THE ROD MOVEMENT WHEN NO RMCS SIGNAL IS APPLIED. NEUTRON FLUX, AND REACTOR POWER WILL RESPOND APPROPRIATELY TO THE CONTROL ROD REACTIVITY ADDED.

THE FOLLOWING ANNUNCIATOR IS ASSOCIATED WITH THIS MALFUNCTION:

ROD DRIFT - C205R

REMOVAL OF THIS MALFUNCTION WILL FREE THE STUCK COLLET PISTON. IF NO OTHER ROD MOVEMENT SIGNAL IS APPLIED, THE ROD WILL SETTLE AT THE NEXT EVEN NOTCH POSITION.

REFERENCES: M-337, M-1-3-34, 62PD-M-1-JJ-1DT-1

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRM02	CONTROL ROD BLADE STUCK	02020

TYPE:GENERIC (XX/YY)

CAUSE:MECHANICAL BINDING AT CONTROL ROD BLADE

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED CONTROL ROD TO STICK. THE ROD WILL NOT MOVE FROM THE POSITION AT WHICH THE MALFUNCTION WAS ACTIVATED AND THE CRD SYSTEM WILL RESPOND AS IF THE ROD WAS FULLY WITHDRAWN AND BACKSEATED AT POSITION 48. HOWEVER, IF THE CONTROL ROD IS UNCOUPLED (MALFUNCTION CRM03) THE CONTROL ROD DRIVE CAN BE MOVED WITHOUT MOVING THE CONTROL ROD BLADE. IF THIS MALFUNCTION IS REMOVED WHILE THE ROD IS UNCOUPLED, THE CONTROL ROD BLADE WILL QUICKLY GO TO THE CONTROL ROD DRIVE POSITION. THE NEUTRON MONITORING SYSTEM WILL RESPOND TO THE CONTROL ROD BLADE POSITION.

THERE ARE NO ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION FREES THE CONTROL ROD BLADE.

REF: M-357, M-1-5-54, 0230-M-1-JJ-103-1

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

CRM03 CONTROL ROD UNCOUPLED 02120

TYPE:GENERIC (XX/YY)

CAUSE:COUPLING SPUD FAILURE

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED CONTROL BLADE ROD TO BECOME UNCOUPLED FROM THE CRD MECHANISM. IF THE CONTROL ROD BLADE MOVEMENT IS INHIBITED BY MALFUNCTION OR BY REACHING THE FULLY WITHDRAWN POSITION, THE DRIVE MECHANISM WILL TRAVEL OUT PAST NOTCH 48 IF IT IS WITHDRAWN OR IF THE MECHANISM IS STOPPED AT NOTCH 48 WHEN THE MALFUNCTION IS ACTIVE, THE ROD WILL DRIFT OUT TO THE OVERTRAVEL OUT POSITION. THIS POSITION CAUSES THE ROD POSITION INDICATION TO BE BACK LIT RED AND BLANK AND THE OVERTRAVEL ANNUNCIATOR WILL ANNUNCIATE. WHEN THE ROD IS NOT ATTACHED TO OR RESTING ON THE DRIVE, THE DRIVE WILL MOVE FASTER THAN IF MOVING THE CONTROL ROD BLADE.

ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD OVERTRAVEL - C205
ROD DRIFT - C205

REMOVAL OF THIS MALFUNCTION ALLOWS THE ROD TO BE RECOUPLED TO THE DRIVE. THE ROD MUST BE DRIVEN IN UNTIL THE ROD DRIVE STALLS IN THE INSERT DIRECTION BEFORE THE ROD IS RECOUPLED.

REF: M-357, M-1-2-54, 6E80-M-1-JJ-10[illegible]-1

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRM04	CONTROL ROD RPIS FAILURE	02130

TYPE:GENERIC (XX/YY)

CAUSE:REED SWITCH FAILS OPEN AT THE CURRENT ROD POSITION.

PLT STA:100% POWER

EFFECTS:ENTERING THIS MALFUNCTION CAUSES THE REED SWITCH AT THE CURRENT POSITION ON THE INSTRUCTOR SPECIFIED ROD TO FAIL OPEN. THIS CAUSES A LOSS OF CONTROL ROD POSITION, BOTH VISUALLY AND TO INTERFACING FUNCTIONS. THE PROCESS COMPUTER WILL PRINT "99" WHEN THE CONTROL ROD POSITION IS PRINTED. THE FULL CORE DISPLAY AND THE 4 ROD DISPLAY POSITION INDICATORS WILL BLANK. IF RSCS IS NOT BYPASSED, THE ROD MOVEMENT CONTROLS FROM RSCS WILL STILL BE ENFORCED. THE PWS WILL ABORT ON UNKNOWN ROD POSITION.

THE ANNUNCIATOR ASSOCIATED WITH THIS MALFUNCTION IS:

ROD DRIFT - C205R

REMOVING THE MALFUNCTION RESTORES THE SELECTED ROD POSITION INFORMATION TO NORMAL. THE ROD DRIFT ALARM CAN THEN BE RESET.

REF: M-1-554 RMCS SYSTEM ELEMENTARY DIAGRAM, 6280-M-1-JJ-103-1 RMCS SYSTEM GEK.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRM05	CONTROL ROD SLOW SCRAM TIME	02060

TYPE:GENERIC (XX/YY), VARIABLE (0-100%)

CAUSE:MECHANICAL BINDING OF SCRAM OUTLET VALVE. WHERE 0% SEVERITY RESULTS IN A SCRAM TIME 0 SEC LONGER THAN NORMAL AND 100% SEVERITY YIELDS A SCRAM TIME 60 SEC. LONGER THAN NORMAL.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED ROD TO INSERT SLOWLY WHEN THE CONTROL ROD IS SCRAMMED. THE SCRAM LIGHTS THAT INDICATE THAT THE SCRAM VALVES ARE OPEN WILL NOT LIGHT BECAUSES BOTH SCRAM VALVES ARE NOT FULL OPEN EVEN IF THE MALFUNCTION IS ENTERED AT 0% SEVERITY. THE APRM AND LPRM INDICATIONS WILL REFLECT THE CHANGE IN CORE FLUX, BUT THE MAGNITUDE OF THE CHANGE WILL BE A FUNCTION OF THE POSITION OF THE ROD IN RELATION TO LPRMS AND THE AMOUNT OF REACTIVITY ASSOCIATED WITH THE ROD.

THERE ARE NO ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THIS MALFUNCTION WILL RETURN THE SCRAM OUTLET VALVE TO NORMAL OPERATION.

REF: M-337, M-1-3-54, 6280-M-1-JJ-103-1

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/PANEL/CAUSE & EFFECT	EQU NO.

RMC01 RPIS TOTAL FAILURE 02131

TYPE:DISCRETE

CAUSE:FAILURE OF RPIS MASTER CLOCK

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A TOTAL LOSS OF THE RPIS SYSTEM. THE ROD POSITION INDICATION ON THE FULL CORE DISPLAY GOES BLANK AND THE PPC LOSES ALL INFORMATION CONCERNING CONTROL ROD POSITION. A RPIS INOP ROD SELECT BLOCK OCCURS CAUSING THE ROD SELECTED ON THE ROD SELECT RELAY PANEL TO BE DESELECTED AND THE FOUR ROD DISPLAYS TO GO BLANK. THE RWM PROGRAM IN THE PPC ABORTS AND A RWM INSERT AND WITHDRAW BLOCK IS ENFORCED UNTIL THE RWM IS MANUALLY BYPASSED. THE FOLLOWING INDICATORS ILLUMINATE ON THE RWM CONSOLE: INSERT BLOCK, WITHDRAW BLOCK, SELECT ERROR, RWM, COMP, PROG, AND BUFF. THE OPERATOR WILL NOT BE ABLE TO INSERT OR WITHDRAW RODS WHILE THIS MALFUNCTION IS ACTIVE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

RPIS INOPERATIVE - 2057
RWM ROD BLOCK - 2038
ROD WITHDRAWAL BLOCK - 2059

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RPIS MASTER CLOCK TO NORMAL AND ALLOWS THE OPERATOR TO INITIALIZE THE RWM IF DESIRED.

REF: M-1-S12 ROD WORTH MINIMIZER SYSTEM ELEMENTARY DIAGRAM, M-1-S20 SH.9 REACTOR MANUAL CONTROL SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, PEACH BOTTOM UNITS 2 AND 3 PLANT PROCESS COMPUTER GEK, M-1-S12 ROD WORTH MINIMIZER SYSTEM ELECTRICAL SCHEMATIC DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RMC02 ROD DRIVE CONTROL TIMER MALFUNCTION 01140

TYPE:DISCRETE

CAUSE:CONTACT 2A-2B OF TIMER 3A-3A FAILS TO CLOSE.

PLT STA:REACTOR STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A FAILURE OF THE ROD DRIVE CONTROL TIMER. IF A CONTROL ROD IS ATTEMPTED TO BE WITHDRAWN USING THE ROD MOVEMENT CONTROL SWITCH, THE INITIAL INSERT SIGNAL WILL NOT OCCUR IN THE RMCS SYSTEM. THIS CAUSES THE COLLETT FINGERS TO FAIL TO DISENGAGE FROM THE NOTCH ON CONTROL ROD. IF A ROD IS MOVING OUT OF THE CORE WHEN THE MALFUNCTION IS INSERTED, NO EFFECTS WILL BE OBSERVED UNTIL THE ROD HAS SETTLED AND A ROD IS ATTEMPTED TO BE WITHDRAWN AGAIN. THIS MALFUNCTION WILL NOT EFFECT THE NORMAL INSERT SIGNAL FROM THE RMCS SYSTEM.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE ROD DRIVE CONTROL TIMER TO NORMAL.

REF: A-1-520 REACTOR MANUAL CONTROL SYSTEM ELEMENTARY DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RPS01 CONTROL ROD SCRAMS 02050

TYPE:GENERIC (XX/YY)

CAUSE:INDIVIDUAL ROD SCRAM TEST SWITCH FAILURE

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED ROD TO SCRAM. THE ROD INSERTS FULLY INTO THE CORE WITH ITS GREEN BACKLIGHTING ILLUMINATING AND IT'S DIGITAL INDICATOR GOING BLANK ON THE FULL CORE DISPLAY. THE BLUE SCRAM LIGHT, AMBER ACCUM LIGHT, AND RED ROD DRIFT LIGHT ILLUMINATES ON THE FULL CORE DISPLAY. THE INLET AND OUTLET SCRAM VALVES FOR THE SELECTED ROD WILL REMAIN OPEN UNTIL THE MALFUNCTION IS REMOVED. THE LPRM INDICATION FOR THE LPRM'S ADJACENT TO THE SCRAMMED ROD DECREASE. THE AMOUNT OF DECREASE IS DEPENDENT UPON THE RELATIVE LOCATION OF THE LPRM WITH RESPECT TO THE ROD AND THE AMOUNT OF NEGATIVE REACTIVITY ADDED BY THE ROD. APRM INDICATIONS WILL NOT CHANGE APPRECIABLY.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD DRIFT - 205R
CRD ACCUMULATOR LO PRESS HI LEVEL - 206R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE INDIVIDUAL SCRAM TEST SWITCH TO NORMAL.

REF: M-1-S54 RPS SYSTEM ELEMENTARY DIAGRAM, M-1-S20 REACTOR MANUAL CONTROL SYSTEM ELEMENTARY DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RPS06	CONTROL ROD FAILS TO SCRAM	02050

TYPE:GENERIC (XX/YY)

CAUSE:BLOCKAGE .. AIR LINE BETWEEN SV-13-117 AND VALVES 126 AND 127

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A FAILURE OF THE SELECTED CONTROL ROD TO SCRAM. WHEN THE INLET AND OUTLET SCRAM VALVES ASSOCIATED WITH THE FAILED ROD DEENERGIZE, THE AIR DOES NOT BLEED OFF VALVES 126 AND 127, THE BLUE SCRAM LAMP ON THE FULL CORE DISPLAY DOES NOT ILLUMINATE INDICATING THAT THE SCRAM INLET AND OUTLET VALVES ARE NOT OPEN, AND THE ROD DOES NOT SCRAM. THE ROD MAY BE MANUALLY INSERTED INTO THE CORE IF DESIRED.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE AIR LINE BETWEEN SV-13-117 AND VALVES 126 AND 127 TO NORMAL.

REF: M-1-354 RPS SYSTEM ELEMENTARY DIAGRAM, M-356 CRD SYSTEM P&ID.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	SQU NO.
RSC01	RSCS TOTAL FAILURE	03030

TYPE:DISCRETE

CAUSE:LOSS OF POWER TO RSCS

PLT STA:REACTOR STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A LOSS OF POWER TO THE ROD SEQUENCE CONTROL SYSTEM. THE ROD SELECTED ON THE ROD SELECT RELAY PANEL DESELECTS AND THE BACKLIGHTING ON THE ROD SELECT RELAY PANEL GOES OUT. A ROD CAN NOT BE SELECTED UNTIL THE MALFUNCTION IS REMOVED. IF POWER IS GREATER THAN 21% AS SENSED BY MAIN TURBINE FIRST STAGE STEAM PRESSURE WHEN THIS MALFUNCTION IS INSERTED, NO EFFECTS WILL BE OBSERVED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD SEQUENCE MALFUNCTION - 205R

REMOVAL OF THE MALFUNCTION RESTORES POWER TO THE RSCS SYSTEM AND ALLOWS THE OPERATOR TO REEINITIALIZE THE RSCS SYSTEM.

REF: M-1-S-20 RMCS SYSTEM ELEMENTARY DIAGRAM, M-1-JJ-103 RMCS SYSTEM GEK.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RWM01	RWM TOTAL FAILURE	04080

TYPE:DISCRETE

CAUSE:FAILURE OF 5 VDC LOGIC POWER SUPPLY IN RWM OUTPUT BUFFER.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A RWM TOTAL FAILURE. THE RWM PROGRAM IN THE PPC ABORTS AND AN INSERT AND WITHDRAW BLOCK IS ENFORCED UNTIL THE RWM IS MANUALLY BYPASSED DUE TO THIS HARDWARE FAILURE. THE FOLLOWING INDICATORS ILLUMINATE ON THE RWM CONSOLE: INSERT BLOCK, WITHDRAW BLOCK, SELECT ERROR, RWM, COMP, PROG, AND BUFF.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD WITHDRAWAL BLOCK - 0059

REMOVAL OF THE MALFUNCTION RESTORES POWER TO THE RWM LOGIC BOARD AND ALLOWS THE OPERATOR TO REINITIALIZE THE RWM.

REF: M-1-520 SH.9 REACTOR MANUAL CONTROL SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, PEACH BOTTOM UNITS 2 AND 3 PLANT PROCESS COMPUTER GEK, M-1-512 ROD WORTH MINIMIZER SYSTEM ELECTRICAL SCHEMATIC DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RHR01	RHR PUMP TRIP	03010

TYPE:GENERIC (A-D)

CAUSE:FAULT IN RHR PUMP MOTOR CAUSES INSTANTANEOUS OVERCURRENT TRIP (150G) TO ACTUATE

PLT STA:RHR IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RHR PUMP TO TRIP. THE RHR PUMP'S AMPS INCREASES UPSCALE, THE PUMP BREAKER TRIPS, AND AMPS DECREASE TO 0. PUMP FLOW, COMBINED FLOW, AND CONTAINMENT FLOW (IF IN USE) DECREASE. IF THE OPERATOR ATTEMPTS TO START THE AFFECTED RHR PUMP WHILE THE MALFUNCTION IS INSERTED, THE PUMP'S AMPS INDICATION WILL INCREASE FULL SCALE AND THE AFFECTED PUMP'S SUPPLY BREAKER TRIPS.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A/B/C/D RHR PUMP TRIP - 203A/B/C/D
RHR PUMP OVERCURRENT - 203A/B/C/D

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RHR PUMP MOTOR TO NORMAL.

REF: M-302 RHR SYSTEM P&ID, M-1-865 RHR SYSTEM ELEMENTARY DIAGRAM, E-124 RHR PUMP 4.16KV CIRCUIT BREAKER ELECTRICAL SCHEMATIC DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RHR02 RHR HEAT EXCHANGER TUBE LEAK 03070

TYPE:GENERIC (A-D) VARIABLE 0-100%

CAUSE:TUBE RUPTURE. 100% SEVERITY IS EQUIVALENT TO 500 GPM.

PLT STA:RHR IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RHR HEAT EXCHANGER TO DEVELOP A LEAK AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO 500 GPM. AT 100% SEVERITY AND THE HPSW SYSTEM AT 20 PSIG GREATER THAN RHR PUMP DISCHARGE PRESSURE, THE HPSW SYSTEM LEAKS INTO THE RHR SYSTEM. THE HPSW/RHR DIFFERENTIAL PRESSURE INDICATOR DECREASES, RHR FLOW INCREASES, AND RWCU CONDUCTIVITY INCREASES IF IN SHUTDOWN COOLING WITH THE RWCU SYSTEM IN SERVICE. THE SYSTEM RECEIVING FLOW FROM THE RHR SYSTEM REACTS DYNAMICALLY TO THE INCREASE IN FLOW AND CONDUCTIVITY. IF THE HPCW SYSTEM IS AT A LOWER PRESSURE THAN THE RHR SYSTEM AND THE MALFUNCTION IS ACTIVE, WATER FLOWS FROM THE RHR SYSTEM TO THE HPSW SYSTEM CAUSING HPSW RAD LEVELS TO INCREASE, RHR FLOW DECREASES, AND THE SYSTEM RECEIVING FLOW FROM THE RHR SYSTEM REACTING DYNAMICALLY TO THE DECREASE IN RHR FLOW.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RHR HEAT EXCHANGER TUBE TO SHELL LO PRESS 15 PSID - 203A
B RHR HEAT EXCHANGER TUBE TO SHELL LO PRESS 15 PSID - 203B
C RHR HEAT EXCHANGER TUBE TO SHELL LO PRESS 15 PSID - 203C
D RHR HEAT EXCHANGER TUBE TO SHELL LO PRESS 15 PSID - 203D
A&C RHR HEAT EXCHANGER HIGH CONDUCTIVITY - 208L
B&D RHR HEAT EXCHANGER HIGH CONDUCTIVITY - 208L

REMOVAL OF THE MALFUNCTION RESTORES THE AFFECTED RHR HEAT EXCHANGER'S TUBES TO NORMAL.

REF: M-362 RHR SYSTEM P&ID, M-1-365 RHR SYSTEM ELEMENTARY DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RHR03	LPCI INJECTION VALVE FAILS CLOSED	C007

TYPE:GENERIC (A,B)

CAUSE:DIRECT SHORT ACROSS INJECTION VALVES CLOSING CONTRACTOR (R CONTACTS).

PLT STA:LPCI INITIATED

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED LPCI INJECTION VALVE TO FAIL CLOSED. INDICATIONS OF THIS MALFUNCTION ARE MO-25A(B) MO-25A/B POSITION INDICATES CLOSED, RHR PUMP FLOWS IN THE EFFECTED LOOP DECREASE (PANEL C03), THE AFFECTED LPCI INJECTION VALVE MOTOR OVERLOAD DEVICE WILL ACTUATE ONCE THE VALVE IS FULLY CLOSED DUE TO THE R CONTACT FAILURE.

THE MIN FLOW BYPASS VALVE WILL OPEN WHEN RHR PUMP FLOW IS LESS THAN ABOUT 500 GPM. IF THE MALFUNCTION IS INSERTED WHILE THE VALVE IS SHUT, THE SAME ALARMS WILL SOUND HOWEVER, NO OTHER SYSTEM INDICATIONS WILL BE EFFECTED. IF THE OPERATOR ATTEMPTS TO OPEN THE INJECTION VALVE AFTER THE MALFUNCTION IS INSERTED, THE VALVE WILL NOT OPEN AND NO INDICATIONS WILL CHANGE.

THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE:

SYSTEM I RHR CONTAINMENT SPRA INJ VALVES OVERCURRENT
C203A
SYSTEM II RHR CONTAINMENT SPRAY INJ VALVES OVERCURRENT
C203D

REMOVAL OF THIS MALFUNCTION WILL RETURN THE R CONTACTS IN THE LPCI INJECTION VALVE CONTROL CIRCUIT TO NORMAL OPERATION. TO RESET THE VALVE OVER-CURRENT ALARM, THE REMOTE FUNCTION MUST BE RESET.

REF: M-362 RHR SYSTEM P'ID, M-1-565 RHR SYSTEM ELEMENTARY DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RHR04	RHR PUMP DISCHARGE LINE BREAK	03070

TYPE:DISCRETE, VARIABLE 0-100%

CAUSE:RHR PIPING RUPTURES BETWEEN CV-2677A AND RHR PUMP CHECK VALVE 43A. 100% SEVERITY IS EQUIVALENT TO 10000 GPM.

PLT STA:RHR IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE A RHR PUMP DISCHARGE LINE TO RUPTURE AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO A 10000 GPM LEAK. WITH A RHR PUMP IN OPERATION AND 100% SEVERITY SELECTED, RHR WATER FLOWS FROM THE RUPTURE TO THE RHR ROOM. FLOW THROUGH A RHR PUMP INCREASES CAUSING RHR PUMP A AMPS TO INCREASE. TOTAL LOOP FLOW DECREASES 10,000 GPM AND THE SYSTEM RECEIVING FLOW FROM THE RHR SYSTEM REACTS DYNAMICALLY TO THE LOSS OF FLOW. RHR ROOM TEMPERATURE MAY INCREASE DEPENDING UPON THE TEMPERATURE OF THE WATER ENTERING THE ROOM. THE A RHR PUMP ROOM FLOODS CAUSING THE A RHR PUMP TO DEVELOP A DIRECT SHORT TO GROUND AND TRIP ON OVERCURRENT. RHR PUMP A AMPS INCREASE UPSCALE, THE PUMP BREAKER TRIPS, AND AMPS DECREASE TO 0. THE LEAKAGE FROM THE PIPING RUPTURE DECREASES BUT DOES NOT STOP (THE TORUS AND CORE SPRAY PUMP ROOMS ARE ABOVE THE LEVEL OF THE LEAK AND GRAVITY DRAIN INTO THE RHR ROOM). THE LEAK CAN BE ISOLATED AFTER THE 'A' PUMP TRIPS BY CLOSING CV-2677A.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RHR PUMP ROOM FLOOD - 203A

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-362 RHR SYSTEM P&ID, M-1-565 RHR SYSTEM ELEMENTARY DIAGRAM, E-134 RHR PUMP 4.16KV CIRCUIT BREAKER ELECTRICAL SCHEMATIC DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
ARM01	ARM CHANNEL FAILS UPSCALE	C001

TYPE:GENERIC (A-Z, AA-SS)

CAUSE:OPEN IN REFERENCE VOLTAGE IN UPSCALE TRIP UNIT

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED ARM TO FAIL UPSCALE. THE AFFECTED ARM CHANNEL HIGH INDICATOR LIGHT ILLUMINATES ON THE INSTRUMENT DRAWER, AND THE METER READING AND/OR THE RECORDER GOES UPSCALE.

THE FOLLOWING ANNUNCIATORS ARE ASSOCIATED WITH THIS MALFUNCTION:
THESE ANNUNCIATORS ARE ON THE C214 PANEL.

UNIT 2 REAC BLDG HI RADIATION
UNIT 2 TURB BLDG HI RADIATION - C210
UNIT 2 REFUELING FLOOR AREA HI RADIATION - C210
RADWASTE BLDG HI RADIATION - C210
RADWASTE SUMP AREA HI RADIATION - C210
ADMIN BLDG HI RADIATION - C210
TURB BLDG COMMON AREA HI RADIATION - C210

THE FOLLOWING ARMS ARE ASSOCIATED WITH THIS MALFUNCTION:

ARM01A	REACTOR BLDG SUMP AREA
ARM01B	TORUS COMPARTMENT
ARM01C	HPCI PUMP RM
ARM01D	RCIC PUMP RM
APM01E	RHR PUMP RM "D"
ARM01F	RHR PUMP RM "A"
ARM01G	CORE SPRAY PUMP RM "B"
ARM01H	CONDENSATE PUMP PIT
ARM01I	RECIRC PUMP INST RACK AREA
ARM01J	STEAM FLOW INST RACK AREA
ARM01K	COOLING WATER PUMP AREA
ARM01L	COND DEMIN AREA
ARM01M	COND SERVICE PUMP AREA (SOUTH)
ARM01N	HP TURBINE AREA-EL. 115
ARM01O	REACTOR BLDG EQUIPT LOCK&TIP CONTROL
ARM01P	REACTOR BLDG PERSONNEL ACCESS (SOUTH)
ARM01Q	REACTOR BLDG PERSONNEL ACCESS (NORTH)

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
ARM01R	TIP WITHDRAWAL AREA	
ARM01S	TURBINE BLDG ACCESS FL. 135	
ARM01T	T.B. MOISTURE SEPARATOR AREA	
ARM01U	REACTOR BLDG OPERATING AREA	
ARM01V	REACTOR BLDG ACCESS AREA-EL 165	
ARM01W	HEATER AND RFPT AREA (SOUTH)	
ARM01X	HEATER AND RFPT AREA (NORTH)	
ARM01Y	H.P. TURBINE AREA-EL 165	
ARM01AA	REACTOR BLDG EXHAUST FANS	
ARM01BB	STEAM SEPARATOR POOL AREA	
ARM01CC	REACTOR REFUEL SLOT AREA	
ARM01DD	FUEL POOL AREA	
ARM01EE	REFUELING BRIDGE	
ARM01FF	PIPE TUNNEL SUMP AREA	
ARM01GG	R.P. ACCESS	
ARM01HH	TURBINE BLDG ACCESS AREA-EL 135	
ARM01II	TURBINE BLDG ACCESS AREA-EL 165	
ARM01JJ	MAIN CONTROL RM	
ARM01KK	RADWASTE SUMP AREA	
ARM01LL	RADWASTE FILTER PUMP AREA	
ARM01MM	RADWASTE SAMPLE RACK AREA	
ARM01NN	CONVEYOR OPERATOR ACCESS AREA	
ARM01OO	DRUM STORAGE AREA	
ARM01PP	RADWASTE FILTER HATCH AREA	
ARM01QQ	WASTE SAMPLE TANK AREA	
ARM01RR	ADMINISTARTION BLDG	
ARM01SS	SOURCE VAULT U2 RX BLDG-EL 195 (INSTRUMENT DRAWER ONLY)	

REMOVAL OF THIS MALFUNCTION RETURNS THE OPERATION
THE EFFECTED AREA RADIATION MONITOR TO NORMAL.

-1-S-56, GEK-139588, ANNUNCIATOR PRINT, E-255-15

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
ARM02	ARM CHANNEL FAILS DOWNSCALE	C001

TYPE:GENERIC (A-Z, AA-BB)

CAUSE:OPEN IN LOGRITHMIC AMPLIFIER OUTPUT

PLT STA:100% POWER

EFFECTS: INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED ARM TO FAIL DOWNSCALE. THE AFFECTED ARM LOW INDICATOR LIGHT ILLUMINATES ON THE INSTRUMENT DRAWER, AND THE METER READING AND/OR RECORDER INDICATION GOES DOWNSCALE.

THE FOLLOWING ANNUNCIATORS ARE ASSOCIATED WITH THIS MALFUNCTION:

UNIT 2 AREA RAD MONITORS DOWNSCALE - C210
COMMON AREA RAD MONITORS DOWNSCALE - C210

THE FOLLOWING ARMS ARE ASSOCIATED WITH THIS MALFUNCTION:

ARM01A	REACTOR BLDG SUMP AREA
ARM01B	TORUS COMPARTMENT
ARM01C	HPCI PUMP ROOM
ARM01D	RCIC PUMP ROOM
ARM01E	RHR PUMP ROOM "D"
ARM01F	RHR PUMP ROOM "A"
ARM01G	CORE SPRAY PUMP ROOM "B"
ARM01H	CONDENSATE PUMP AREA
ARM01I	RECIRC PUMP INST. RACK AREA
ARM01J	STEAM FLOW INST. RACK AREA
ARM01K	COOLING WATER PUMP AREA
ARM01L	COND DEMIN AREA
ARM01M	COND SERVICE PUMP AREA (SOUTH)
ARM01N	HP TURBINE AREA-EL. 119
ARM01O	REACTOR BLDG EQUIPT LOCK & TIP CONTROL
ARM01P	REACTOR BLDG PERSONNEL ACCESS (SOUTH)
ARM01Q	REACTOR BLDG PERSONNEL ACCESS (NORTH)
ARM01R	TIP WITHDRAWAL AREA
ARM01S	TURBINE BLDG ACCESS EL.135
ARM01T	TURBINE BLDG MOISTURE SEPAR TOP AREA
ARM01U	REACTOR BLDG OPERATING AREA
ARM01V	REACTOR BLDG ACCESS AREA - L 165
ARM01W	HEATER AND RFPT AREA (SOUTH)
ARM01X	HEATER AND RFPT AREA (NORTH)

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
ARM01Y	H.P. TURBINE AREA-EL 165	
ARM01AA	REACTOR BLDG EXHAUST FAN3	
ARM01BB	STEAM SEPERATOR POOL AREA	
ARM01CC	REACTOR REFUEL SLOT AREA	
ARM01DD	FUEL POOL AREA	
ARM01EE	REFUELING BRIDG	
ARM01FF	PIPE TUNNEL SUMP AREA	
ARM01GG	R.R. ACCESS	
ARM01HH	TURBINE BLDG ACCESS AREA-EL 135	
ARM01II	TURBINE BLDG ACCESS AREA-EL 165	
ARM01JJ	MAIN CONTROL ROOM	
ARM01KK	RADWASTE SUMP AREA	
ARM01LL	RADWASTE FILTER PUMP AREA	
ARM01MM	RADWASTE SAMPLE RACK AREA	
ARM01NN	CONVEYER OPERATOR ACCESS AREA	
ARM01OO	DRUM STORAGE AREA	
ARM01PP	RADWASTE FILTER HATCH AREA	
ARM01QQ	WASTE SAMPLE TANK AREA	
ARM01RR	ADMINISTRATION BLDG	
ARM01SS	SOURCE VAULT U2 RX BLDG-EL 195 (INSTRUMENTDRAWER ONLY)	

REMOVAL OF THIS MALFUNCTION RETURNS THE OPERATION TO THE EFFECTED AREA RADIATION MONITOR TO NORMAL.

REF: M-1-S-56, GEK-13958B, ANNUNCIATOR PRINT, E-255-15

TABLE 1.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
ARM03	ARM CHANNEL FAILS INOP	C001

TYPE:GENERIC (A-Z, AA-SS)

CAUSE:OPEN IN POWER SUPPLY TO INDIVIDUAL ARM CHANNEL

PLT STA:100% POWER

EFFECTS: INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED ARM TO FAIL INOP. NO INDICATOR LIGHTS ILLUMINATE AT THE INSTRUMENT DRAWER AND THE METER READING AND/OR RECORDER INDICATION GOES DOWNSCALE. THE FOLLOWING ANNUNCIATORS ARE ASSOCIATED WITH THIS MALFUNCTION (BOTH HI AND DOWNSCALE ANN. WILL COME IN FOR FAILED MONITOR):

UNIT 2 AREA RAD MONITORS DOWNSCALE - C210
COMMON AREA RAD MONITORS DOWNSCALE - C210
UNIT 2 REACTOR BLDG HI RADIATION - C210
UNIT 2 TURB BLDG HI RADIATION - C210
UNIT 2 REFUELING FLOOR AREA HI RADIATION - C210
RADWASTE BLDG HI RADIATION - C210
RADWASTE SUMP AREA HI RADIATION - C210
ADMIN BLDG HI RADIATION - C210
TURB BLDG COMMON AREA HI RADIATION - C210

THE FOLLOWING ARMS ARE ASSOCIATED WITH THIS MALFUNCTION:

ARM01A	REACTOR BLDG SUMP AREA
ARM01B	TORUS COMPARTMENT
ARM01C	HPCI PUMP ROOM
ARM01D	RCIC PUMP ROOM
ARM01E	RHR PUMP ROOM "B"
ARM01F	RHR PUMP ROOM "A"
ARM01G	CORE SPRAY PUMP ROOM "B"
ARM01H	CONDENSATE PUMP AREA
ARM01I	RECIRC PUMP INST. RACK AREA
ARM01J	STEAM FLOW INST. RACK AREA
ARM01K	COOLING WATER PUMP AREA
ARM01L	COND DEMIN AREA
ARM01M	COND SERVICE PUMP AREA (SOUTH)
ARM01N	HP TURBINE AREA-EL. 116
ARM01O	REACTOR BLDG EQUIPT LOCK & TIP CONTROL
ARM01P	REACTOR BLDG PERSONNEL ACCESS (SOUTH)
ARM01Q	REACTOR BLDG PERSONNEL ACCESS (NORTH)
ARM01R	TIP WITHDRAWAL AREA

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
ARM01S	TURBINE BLDG ACCESS EL.135	
ARM01T	TURBINE BLDG MOISTURE SEPERATOR AREA	
ARM01U	REACTOR BLDG OPERATING AREA	
ARM01V	REACTOR BLDG ACCESS AREA - EL 165	
ARM01W	HEATER AND RFPT AREA (SOUTH)	
ARM01X	HEATER AND RFPT AREA (NORTH)	
ARM01Y	H.P. TURBINE AREA-EL 165	
ARM01AA	REACTOR BLDG EXHAUST FANS	
ARM01BB	STEAM SEPERATOR POOL AREA	
ARM01CC	REACTOR REFUEL SLOT AREA	
ARM01DD	FUEL POOL AREA	
ARM01EE	REFUELING BRIDGE	
ARM01FF	PIPE TUNNEL SUMP AREA	
ARM01GG	R.R. ACCESS	
ARM01HH	TURBINE BLDG ACCESS AREA-EL 135	
ARM01II	TURBINE BLDG ACCESS AREA-EL 165	
ARM01JJ	MAIN CONTROL ROOM	
ARM01KK	RADWASTE SUMP AREA	
ARM01LL	RADWASTE FILTER PUMP AREA	
ARM01MM	RADWASTE SAMPLE RACK AREA	
ARM01NN	CONVEYER OPERATOR ACCESS AREA	
ARM01OO	DRUM STORAGE AREA	
ARM01PP	RADWASTE FILTER HATCH AREA	
ARM01QQ	WASTE SAMPLE TANK AREA	
ARM01RR	ADMINISTRATION BLDG	
ARM01SS	SOURCE VAULT U2 RX BLDG-EL 135 (INSTRUMENTDRAWER ONLY)	

REMOVAL OF THIS MALFUNCTION RETURNS THE OPERATION TO THE EFFECTED AREA RADIATION MONITOR TO NORMAL.

REF: M-1-0-56, GEK-13488B, ANNUNCIATOR PRINT, E-255-15

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

PRM01 PRM CHANNEL FAILS UPSCALE C007

TYPE:GENERIC (A-Z, AA-FF)

CAUSE:SHORT IN DC AMPLIFIER CAUSES INCREASE IN AMPLIFIER VOLTAGE GREATER THAN UPSCALE TRIP SETPOINT.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED PRM TO FAIL UPSCALE. HI AND HI-HI RADIATION ALARMS SOUND FOR THE AFFECTED PRM. INSTRUMENT DRAWER AND/OR RECORDER READINGS INDICATE UPSCALE THE UPSCALE HIGH OR HIGH/HIGH INDICATOR LIGHTS ILLUMINATE ON THE INSTRUMENT DRAWER. PCIS/RPS/STANDBY GAS/OFF GAS/HVAC SYSTEMS RECEIVE SIGNALS FROM THEIR ASSOCIATED PRM'S IF THE PROPER COINCIDENCE IS MET: PCIS ISOLATIONS, REACTOR SCRAM, STANDBY GAS INITIATION, OFF GAS ISOLATION, AND HVAC ISOLATIONS OCCUR. THE FOLLOWING PRM'S ARE ASSOCIATED WITH THIS MALFUNCTION:

A: MAIN STEAM LINE RAD MON A RI-17-251A
B: MAIN STEAM LINE RAD MON B RI-17-251B
C: MAIN STEAM LINE RAD MON C RI-17-251C
D: MAIN STEAM LINE RAD MON D RI-17-251D
E: OFF GAS LOG RAD MON A RI-17-150A
F: OFF GAS LOG RAD MON B RI-17-150B
G: OFF GAS LINEAR RAD MON RIS-B-17-151
H: STACK GAS RAD MON A RI-17-50A
I: STACK GAS RAD MON B RI-17-50B
J: RAD WASTE EFFLUENT RAD MON RI-17-350
K: HIGH PRESSURE SERVICE WATER RAD MON DIV I RIS-8091
L: HIGH PRESSURE SERVICE WATER RAD MON DIV II RIS-8092
M: SERVICE WATER EFFLUENT RAD MON RI-17-351
N: REACTOR BLDG COOLING WATER RAD MON RI-17-352
O: FUEL STORAGE POOL RAD MON RI-17-455
P: REACTOR BLDG VENT RAD MON (REACTOR ZONE) A RI-17-452A
Q: REACTOR BLDG VENT RAD MON (REACTOR ZONE) B RI-17-452B
R: REACTOR BLDG VENT RAD MON (REACTOR ZONE) C RI-17-452C
S: REACTOR BLDG VENT RAD MON (REACTOR ZONE) D RI-17-452D
T: REACTOR BLDG VENT RAD MON (REFUELING ZONE) A RI-17-458A
U: REACTOR BLDG VENT RAD MON (REFUELING ZONE) B RI-17-458B
V: REACTOR BLDG VENT RAD MON (REFUELING ZONE) C RI-17-458C

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

W: REACTOR BLDG VENT RAD MON (REFUELING ZONE) D RI-17-458D
X: CONTROL ROOM VENT RAD MON A RIS-0760A
Y: CONTROL ROOM VENT RAD MON B RIS-0760B
Z: VENT STACK EXHAUST RAD MON A RIS-2979A
AA: VENT STACK EXHAUST RAD MON B RIS-2979B
BB: CONTAINMENT RAD MON A RI-1103A
CC: CONTAINMENT RAD MON A RI-1103B
DD: CONTAINMENT RAD MON C RI-1103C
EE: CONTAINMENT RAD MON D RI-1103D
FF: RECOMBINER VENT RAD MON RIS-6111

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE DC AMPLIFIER IN THE AFFECTED PRM TO NORMAL.

REF: M-1-3-26 PROCESS RAD MONITORING SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, E-2357 POST ACCIDENT MONITORING SYSTEMS ELECTRICAL SCHEMATIC DIAGRAM, E-2134 HIGH PRESSURE SERVICE WATER DISCHARGE RADIATION MONITORING SYSTEM INTERCONNECTION DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
PRM02	PRM CHANNEL FAILS DOWNSCALE	C307

TYPE:GENERIC (A-Z, AA-FF)

CAUSE:OPEN IN IDIVIDUAL PRM CHANNEL DC AMPLIFIER FAILS OUTPUT TO 0.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED PROCESS RADIATION MONITOR CHANNEL TO FAIL DOWNSCALE. THE PRM CHANNEL'S METER, PPC POINT, AND ASSOCIATED RECORDER INDICATE DOWNSCALE. THE DOWNSCALE LIGHTS ON THE PRM CHANNEL'S DRAWER ILLUMINATE AND THE APPROPRIATE PLANT ANNUNCIATORS ACTUATE. THE SYSTEMS THAT RECEIVE SIGNALS FROM THE FAILED PRM CHANNEL REACT DYNAMICALLY TO THE LOW SIGNAL. THE PRM CHANNELS ASSOCIATED WITH THIS MALFUNCTION ARE:

A: MAIN STEAM LINE RAD MON A RI-17-251A
B: MAIN STEAM LINE RAD MON B RI-17-251B
C: MAIN STEAM LINE RAD MON C RI-17-251C
D: MAIN STEAM LINE RAD MON D RI-17-251D
E: OFF GAS LOG RAD MON A RI-17-150A
F: OFF GAS LOG RAD MON B RI-17-150B
G: OFF GAS LINEAR RAD MON RIS-D-17-151
H: STACK GAS RAD MON A RI-17-30A
I: STACK GAS RAD MON B RI-17-30B
J: RAD WASTE EFFLUENT RAD MON RI-17-350
K: HIGH PRESSURE SERVICE WATER RAD MON DIV I RIS-8081
L: HIGH PRESSURE SERVICE WATER RAD MON DIV II RIS-8082
M: SERVICE WATER EFFLUENT RAD MON RI-17-351
N: REACTOR BLDG COOLING WATER RAD MON RI-17-352
O: FUEL STORAGE POOL RAD MON RI-17-465
P: REACTOR BLDG VENT RAD MON (REACTOR ZONE) A RI-17-452A
Q: REACTOR BLDG VENT RAD MON (REACTOR ZONE) B RI-17-452B
R: REACTOR BLDG VENT RAD MON (REACTOR ZONE) C RI-17-452C
S: REACTOR BLDG VENT RAD MON (REACTOR ZONE) D RI-17-452D
T: REACTOR BLDG VENT RAD MON (REFUELING ZONE) A RI-17-458A
U: REACTOR BLDG VENT RAD MON (REFUELING ZONE) B RI-17-458B
V: REACTOR BLDG VENT RAD MON (REFUELING ZONE) C RI-17-458C
W: REACTOR BLDG VENT RAD MON (REFUELING ZONE) D RI-17-458D
X: CONTROL ROOM VENT RAD MON A RIS-0760A
Y: CONTROL ROOM VENT RAD MON B RIS-0760B
Z: VENT STACK EXHAUST RAD MON A RIS-2979A
AA: VENT STACK EXHAUST RAD MON B RIS-2979B

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

BB: CONTAINMENT RAD MON A RI-R103A
CC: CONTAINMENT RAD MON A RI-R103B
DD: CONTAINMENT RAD MON C RI-R103C
EE: CONTAINMENT RAD MON D RI-R103D
FF: RECOMBINER VENT RAD MON RTS-R111

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE DC AMPLIFIER IN THE AFFECTED PRM TO NORMAL.

REF: M-1-S-26 PROCESS RAD MONITORING SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, E-2357 POST ACCIDENT MONITORING SYSTEMS ELECTRICAL SCHEMATIC DIAGRAM, E-2134 HIGH PRESSURE SERVICE WATER DISCHARGE RADIATION MONITORING SYSTEM INTERCONNECTION DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
PRM03	PRM CHANNEL FAILS INOP	C007

TYPE:GENERIC (A-V)

CAUSE:OPEN IN HIGH VOLTAGE POWER SUPPLY TO INDIVIDUAL PRM

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED PROCESS RADIATION MONITOR CHANNEL TO FAIL INOPERATIVE. THE PRM CHANNEL'S METER, PPC POINT, AND ASSOCIATED RECORDER INDICATE DOWNSCALE. THE DOWNSCALE LIGHTS ON THE PRM CHANNEL'S DRAWER ILLUMINATE AND THE APPROPRIATE PLANT ANNUNCIATORS ACTUATE. THE SYSTEMS THAT RECEIVE SIGNALS FROM THE FAILED PRM CHANNELS ASSOCIATED WITH THIS MALFUNCTION ARE:

A: MAIN STEAM LINE RAD MON A RI-17-251A
B: MAIN STEAM LINE RAD MON B RI-17-251B
C: MAIN STEAM LINE RAD MON C RI-17-251C
D: MAIN STEAM LINE RAD MON D RI-17-251D
E: OFF GAS LOG RAD MON A RI-17-150A
F: OFF GAS LOG RAD MON B RI-17-150B
G: OFF GAS LINEAR RAD MON RIS-D-17-151
H: STACK GAS RAD MON A RI-17-50A
I: STACK GAS RAD MON B RI-17-50B
J: RAD WASTE EFFLUENT RAD MON RI-17-350
K: HIGH PRESSURE SERVICE WATER RAD MON DIV I RIS-8081
L: HIGH PRESSURE SERVICE WATER RAD MON DIV II RIS-8082
M: SERVICE WATER EFFLUENT RAD MON RI-17-351
N: REACTOR BLDG COOLING WATER RAD MON RI-17-352
O: FUEL STORAGE POOL RAD MON RI-17-465
P: REACTOR BLDG VENT RAD MON (REACTOR ZONE) A RI-17-452A
Q: REACTOR BLDG VENT RAD MON (REACTOR ZONE) B RI-17-452B
R: REACTOR BLDG VENT RAD MON (REACTOR ZONE) C RI-17-452C
S: REACTOR BLDG VENT RAD MON (REACTOR ZONE) D RI-17-452D
T: REACTOR BLDG VENT RAD MON (REFUELING ZONE) A RI-17-458A
U: REACTOR BLDG VENT RAD MON (REFUELING ZONE) B RI-17-458B
V: REACTOR BLDG VENT RAD MON (REFUELING ZONE) C RI-17-458C
W: REACTOR BLDG VENT RAD MON (REFUELING ZONE) D RI-17-458D
X: CONTROL ROOM VENT RAD MON A RIS-0760A
Y: CONTROL ROOM VENT RAD MON B RIS-0760B
Z: VENT STACK EXHAUST RAD MON A RIS-29799A
AA: VENT STACK EXHAUST RAD MON B RIS-29799B

TABLE 3.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

BB: CONTAINMENT RAD MON A RI-R103A
CC: CONTAINMENT RAD MON A RI-R103B
DD: CONTAINMENT RAD MON C RI-R103C
EE: CONTAINMENT RAD MON D RI-R103D
FF: RECOMBINER VENT RAD MON RIS-R111

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE DC AMPLIFIER IN THE AFFECTED PRM TO NORMAL.

REF: M-1-S-26 PROCESS RAD MONITORING SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, E-2357 POST ACCIDENT MONITORING SYSTEMS ELECTRICAL SCHEMATIC DIAGRAM, E-2134 HIGH PRESSURE SERVICE WATER DISCHARGE RADIATION MONITORING SYSTEM INTERCONNECTION DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
CRH13	CONTROL ROD GROUP FAILS TO SCRAM	02230

TYPE:GENERIC (A-D)

CAUSE:AUTOMATIC SCRAM CONTACTS (5A-K13) FOR INDIVIDUAL GROUP FAIL TO DEENERGIZE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED GROUP TO FAIL TO SCRAM ON AN AUTOMATIC SCRAM SIGNAL. THE EFFECTED GROUP SOLONOID INDICATING LIGHTS ON PANEL C15 DO NOT GO OUT. THE BLUE SCRAM LIGHTS ON THE FULL CORE DISPLAY FOR THE SELECTED GROUPS RODS DO NOT ILLUMINATE. THE ROD POSITION INDICATION ON THE FULL CORE DISPLAY AND THE FOUR ROD DISPLAY WILL INDICATE THAT THE ROD POSITION HAS NOT CHANGED FOR THE SELECTED GROUPS RODS. THE LPRM'S AND PLANT NEUTRON MONITORING CHANNELS INDICATE HIGHER FLUX LEVELS THAN WOULD USUALLY BE EXPECTED ON A SCRAM. THE FLUX LEVEL DEPENDS UPON THE AMOUNT OF REACTIVITY WORTH OF THE EFFECTED GROUPS RODS AND THE CORE POWER HISTORY. THE BACK-UP SCRAM VALVES ENERGIZE CAUSING THE SCRAM VALVE PILOT AIR HEADER TO DEPRESSURIZE. AT 60 PSI, THE SELECTED GROUPS INLET AND OUTLET SCRAM VALVES OPEN SCRAMMING THE FAILED GROUPS RODS. THE BLUE SCRAM LITES ON THE FULL CORE DISPLAY ILLUMINATE, THE NEUTRON MONITORING SYSTEM INSTRUMENTS INDICATION DECREASE, HOWEVER THE GROUP SCRAM SOLONOID INDICATION ON PANEL C15 REMAINS ON. DEPRESSING THE ASSOCIATED MANUAL SCRAM PUSHBUTTON OR DEENERGIZING THE ASSOCIATED 120 VAC POWER SUPPLY WILL DEENERGIZE THE AFFECTED GROUP'S SOLONOID VALVES, IF THIS IS DONE, THE AFFECTED GROUP'S SOLONOID VALVES INDICATION WILL GO OUT ON PANEL C15/C17.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE INDIVIDUAL GROUP AUTOMATIC SCRAM CONTACTS.

REFERENCES: M-1-3-34 RPS SYSTEM ELEM DIAGRAM, M-356 CRD SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
IPM03	ANTICIPATED TRANSIENT WITHOUT SCRAM (ATWS)	02150

TYPE:DISCRETE

CAUSE:ALL THE REACTOR PROTECTION SYSTEM K14 RELAYS STICK SHUT, AND THE SIMULTANEOUS ACTIVATION OF MALFUNCTIONS MTA04 MAIN TURBINE TRIPS, AND RPS05 REACTOR FAILS TO AUTO SCRAM.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES ALL THE RPS SYSTEM K14 RELAYS CONTACTS TO STICK SHUT, A MAIN TURBINE TRIP, AND REACTOR FAILS TO AUTO SCRAM. THE MAIN TURBINE TRIPS, AND RECIRC PUMPS TRIP AS THE AUX SWITCHGEAR BUSSES FAST TRANSFER TO THE STARTUP SOURCES.
1) IF ARI IS OVERRIDDEN:
THE BYPASS VALVES OPEN TO MAINTAIN RECORD PRESSURE. REACTOR POWER DECREASES TO ABOUT 45-50% AFTER THE RECIRC PUMPS TRIP; REACTOR PRESSURE INCREASES TO THE RELIEF VALVE'S SETPOINT AND THE RELIEF VALVES OPEN AND CLOSE, MAINTAINING REACTOR PRESSURE. THE RESULTANT LEVEL SWELL TRIPS THE RFPTS ON HI LEVEL. TORUS AVERAGE AND LOCAL TEMPERATURES INCREASE DUE TO RELIEF VALVE ACTUATION. TORUS PRESSURE SLOWLY INCREASES AND THE TORUS/DRYWELL VACUUM BREAKERS OPERATE TO VENT THE TORUS TO THE DRYWELL. VESSEL LEVEL WILL DECREASE, AT -48" HPCI AND RCIC WILL INITATE. LEVEL WILL CONTINUE TO DECREASE, WITH A CORRESPONDING DECREASE IN POWER. LEVEL AND POWER WILL STABILIZE AT -145 TO -130 AND 15-25% POWER RESPECTIVELY, WITH SRV CONTROLLING PRESSURE. THE REACTOR WILL NOT SCRAM IF THE MODE SWITCH IS PLACED IN STARTUP/REFUEL/ OR SHUTDOWN, AND ALSO WILL NOT SCRAM IF THE MANUAL SCRAM PUSHBUTTONS ARE USED. THE OPERATOR MAY SCRAM THE RODS USING THE INDIVIDUAL SCRAM TEST SWITCHES OR BY DEENERGIZING THE RPS BUSSES.

2) IF ARI IS NOT OVERRIDDEN, THE REACTOR WILL SCRAM AS ARI DEPRESSURIZING THE SCRAM AIR HEADER SHORTLY AFTER THE FIRST SRV LEFT.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

MAINSTEAM LINE BYPASS VALVE OPEN - 20AP
SAFETY RELIEF VALVES OPEN - 20BL
SYSTEM 2 TORUS WATER HI TEMP./FAILURE - 23AL

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RPS K14 RELAYS TO NORMAL AND REMOVES MALFUNCTIONS MTA04 AND RPS05.

REF: M-1-S-54 RPS ELECTRICAL SCHEMATIC DIAGRAM, S-2399
MAIN CONTROL ROOM ANNUNCIATORS ACCIDENT MONITORING UNIT 2.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
PCI01	GROUP ISOLATION VALVE ISOLATION FAILURE	01310

TYPE:GENERIC (A-Z, AA-NN)

CAUSE:ASSOCIATED PCIS CONTACT FAILS TO CHANGE STATE (OPEN OR CLOSE) IN INDIVIDUAL VALVE CONTROL CIRCUIT.

PLT STA:PCIS ISOLATION SIGNAL PRESENT

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED GROUP ISOLATION VALVE TO FAIL TO CLOSE/OPEN WHEN A PCIS ISOLATION SIGNAL IS RECIEVED. THE OPERATOR MAY CLOSE THE ISOLATION VALVE USING IT'S HAND SWITCH, IF DESIRED.

THE FOLLOWING VALVES ARE ASSOCIATED WITH THIS MALFUNCTION:

GROUP I ISOLATION VALVES

A: AO-2-80A A MAIN STEAM LINE INBOARD MSIV, CONTACT 3-4 OF RELAY 16A-K14.
B: AO-2-80B B MAIN STEAM LINE INBOARD MSIV, CONTACT 5-6 OF RELAY 16A-K14.
C: AO-2-80C C MAIN STEAM LINE INBOARD MSIV, CONTACT 7-8 OF RELAY 16A-K14.
D: AO-2-80D D MAIN STEAM LINE INBOARD MSIV, CONTACT 11-12 OF RELAY 16A-K14.
E: AO-2-86A A MAIN STEAM LINE OUTBOARD MSIV, CONTACT 3-4 OF RELAY 16A-K16.
F: AO-2-86B B MAIN STEAM KINE OUTBOARD MSIV, CONTACT 5-6 OF RELAY 16A-K16.
G: AO-2-86C C MAIN STEAM LINE OUTBOARD MSIV, CONTACT 7-8 OF RELAY 16A-K16.
H: AO-2-86D D MAIN STEAM LINE OUTBOARD MSIV, CONTACT 11-12 OF RELAY 16A-K16.
I: AO-2-39 RECIRC LOOP INBD SAMPLE VALVE, CONTACT 3-4 OF RELAY 16A-K13.
J: AO-2-40 RECIRC LOOP OTBD SAMPLE VALVE, CONTACT 3-4 OF RELAY 16A-K15.
K: AO-2-316 MAIN STM LINE INBD SAMPLE VALVE, CONTACT 7-8 OF RELAY 16A-K13.
L: AO-2-317 MAIN STM LINE OTBD SAMPLE VALVE, CONTACT 7-8 OF RELAY 16A-K15.
M: AO-2-74 MAIN STM LINE INBD DRAIN VALVE, CONTACT 3-4 OF RELAY 16A-K5B.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

N: AO-2-77 MAIN STM LINE OTBD DRAIN VALVE, CONTACT 3-4 OF RELAY 16A-K57.
O: AO-2255 COND OFFGAS TO MECH VACUUM PUMP ISOLATION VALVE, CONTACT 3-4 OF RELAY 16A-K46. (NOTE THAT THIS ALSO PREVENTS THE TRIP OF THE VACUUM PUMP ON HIGH STM LINE RADIATION).
P: AO-8098A/B/C/D RHR INBD SAMPLE ISO VALVES, CONTACT 9-10 OF RELAY 16A-K13.
Q: AO-8099A/B/C/D RHR OTBD SAMPLE ISO VALVES, CONTACT 9-10 OF RELAY 16A-K13.

GROUP II ISOLATION VALVES

R: MO-10-17 RHR S/D COOLING OTBD ISO VALVE, CONTACT 3-4 OF RELAY 16A-K30.
S: MO-10-18 RHR S/D COOLING INBD ISO VALVE, CONTACT 3-4 OF RELAY 16A-K29.
T: MO-10-32 RHR HEAD SPRAY INBD ISO VALVE, CONTACT 1-12 OF RELAY 16A-K29.
U: MO-10-33 RHR HEAD SPRAY OTBD ISO VALVE, CONTACT 11-12 OF RELAY 16A-K30.
V: MO-12-15 RWCU INBD ISO VALVE, CONTACT 3-4 OF RELAY 16A-K26.
W: MO-12-18 RWCU OTBD ISO VALVE, CONTACT 3-4 OF RELAY 16A-K27.
X: MO-12-68 RWCU OTBD ISO VALVE, CONTACT 7-8 OF RELAY 16A-K27.
Y: MO-14-70 TORUS WATER CLEANUP VALVE, CONTACT 3-4 OF RELAY 16A-K17.
Z: MO-14-71 TORUS WATER CLEANUP VALVE, CONTACT 3-4 OF RELAY 16A-K16.
AA: AO-2969A DRYWELL INST NITROGEN ISO VALVE, CONTACT 1-2 OF RELAY 16A-K52.
BB: AO-2969B DRYWELL INST NITROGEN ISO VALVE, CONTACT 1-2 OF RELAY 16A-K18.

GROUP III ISOLATION VALVES

CC: AO-2519 DRYWELL PURGE INLET VALVE, AO-2507 VENT TO SGT, AO-4235 NITROGEN COMP SUCTION VALVE, AO-2505 AIR PURGE SUPPLY INLET VALVE, AO-2512 TORUS VENT VALVE, AO-2521A TORUS AIR PURGE VALVE, CONTACT 3-4 OF RELAY 16A-K24.
DD: AO-2506 DRYWELL VENT VALVE, AO-2520 AIR PURGE SUPPLY INLET VALVE, AO-2521B TORUS AIR PURGE VALVE, AO-2511 TORUS VENT VALVE, SW-3100 NITROGEN COMP SUCTION VALVE,

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

CONTACT 3-4 OF RELAY 16A-K23.

EE: AO-2513 TORUS 2" VENT RELIEF VALVE, CONTACT 5-6 OF RELAY 16A-K23A.

FF: AO-2514 TORUS 2" VENT RELIEF VALVE, CONTACT 1-2 OF RELAY 16A-K24A.

GG: AO-2509 DRYWELL 2" VENT RELIEF VALVE, CONTACT 1-2 OF RELAY 16A-K23A.

HH: AO-2510 DRYWELL 2" VENT RELIEF VALVE, CONTACT 5-6 OF RELAY 16A-K24A.

II: SV-2671A/B/C/D/E/F/G DRYWELL OXYGEN ANALYZER ISO VALVES, CONTACT 11-12 OF RELAY 16A-K23.

JJ: SV-2978A/B/C/D/E/F/G DRYWELL OXYGEN ANALYZER ISO VALVES, AND SV-2980 OXYGEN ANALYZER RETURN VALVE, CONTACT 11-12 OF RELAY 16A-K24.

KK: SV-4966A/B/C/D/E/F RAD GAS SAMPLER ISO VALVES, CONTACT 7-8 OF RELAY 16A-K23A.

LL: SV-8101 RAD GAS SAMPLE LINE ISO VALVE, CONTACT 13-14 OF RELAY 16A-K24.

MM: THE FOLLOWING DAMPERS ARE ASSOCIATED WITH THIS GENERIC COMPONENT, CONTACT 3-4 OF RELAY 16A-K83:

AO-20453 REFUELING FLOOR SUPPLY DAMPER
AO-20458 REACT BLDG SUPPLY DAMPER
AO-20461 REFUELING FLOOR EXH DAMPER
AO-20463 REACT BLDG EXH DAMPER
AO-20467 EQUIPT CELL EXH DAMPER
AO-20469-1 DRYWELL AND REACT BLDG EQUIPT CELL EXHAUST TO THE SGT SYSTEM.
AO-20470-1 REFUELING FLOOR EXH VALVE
PD-20465 EQUIPT CELL EXH TO SGT SYSTEM
SGT FAN OAV-20
AO-00475-1 SGTS A INLET VALVE
AO-00475-2 SGTS A OUTLET VALVE

NN: THE FOLLOWING DAMPERS ARE ASSOCIATED WITH THIS GENERIC COMPONENT, CONTACT 3-4 OF RELAY 16A-K84:

AO-20452 REFUELING FLOOR SUPPLY DAMPER
AO-20457 REACT BLDG SUPPLY DAMPER
AO-20462 REFUELING FLOOR EXHAUST DAMPER
AO-20464 REACT BLDG EXH DAMPER
AO-20468 EQUIPT CELL EXH DAMPER
AO-20469-2 DRYWELL AND REACT BLDG EQUIPT CELL EXH TO SGT SYSTEM
AO-20470-2 REFUELING FLOOR EXH VALVE
SGT FAN OHV-20 AUTO START ON A SGT FAN FAILURE CIRCUIT

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

PD-20466 GENERAL AREA EXH TO SGT SYSTEM
AO-00476-1 SGTS B INLET VALVE
AO-00476-2 SGTS B OUTLET VALVE

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE FAILED CONTACT TO NORMAL.
REMOVAL OF THIS MALFUNCTION RETURNS THE OPERATION OF THE AFFECTED RELAY TO NORMAL

REF: M-1-823 PCIS ELEMENTARY DIAGRAM, E-141 CONDENSER MECH VACUUM PUMP SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, E-324 DRYWELL OXYGEN ANALYZER SOLONOID VALVES ELECTRICAL SCHEMATIC DIAGRAM, E-377 SHEET 2 REACTOR BLDG AREA VENTILLATION AND REFUELING FLOOR SUPPLY FANS ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

PCI02 PCIS VENT TRIP COIL FAILURE 01277

TYPE:GENERIC (A-D)

CAUSE:FAILURE OF RELAYS 16A-K23/K23A/K24/K24A

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A FAILURE OF THE PRIMARY CONTAINMENT ATMOSPHERE CONTROL SYSTEM VENT TRIP COILS WHICH CLOSES THE ASSOCAITED CONTAINMENT VENT VALVES. THE VALVE POSITION INDICATION ON THEIR RESPECTIVE PANELS INDICATE CLOSED, ALL SYSTEMS REACT DYNAMICALLY TO THE CHANGE IN VALVE POSITION. THE FOLLOWING VALVES ARE ASSOCIATED WITH THIS MALFUNCTION:

A:RELAY 16A-K23
AO-2520 DRYWELL AIR PURGE VALVE
AO-2521B TORUS AIR PURGE VALVE
AO-2506 DRYWELL VENT VALVE
AO-2511 TORUS VENT VALVE
SV-8100 NITROGEN COMPRESSOR SUCTION VALVE
SV-2671 A/B/C/D/E/F/G DRYWELL OXYGEN ANALYZER ISO VALVES

B:RELAY 16A-K23A
AO-2513 TORUS VENT RELIEF
AO-2509 DRYWELL VENT RELIEF
SV-4956A/B/C/D/E/F RAD GAS SAMPLER ISO VALVES

C:RELAY 16A-K24
AO-2507 VENT TO EMERGENCY GAS TREATMENT SYSTEM
AO-4235 NITROGEN COMPRESSOR SUCTION VALVE
AO-2505 AIR PURGE SUPPLY INLET VALVE
AO-2512 TORUS VENT VALVE
AO-2521A TORUS AIR PURGE VALVE
AO-2519 DRYWELL PURGE INLET VALVE
SV-2975A/B/C/D/E/F/G DRYWELL OXYGEN ANALYZER ISO VALVES
SV-2930,02 ANALYZER RETURN VALVE

D:RELAY 16A-K24A
AO-2523 DRYWELL AND TORUS NITROGEN MAKEUP INLET VALVE
AO-2510 DRYWELL VENT RELIEF
AO-2514 TORUS VENT RELIEF
SV-8101 RAD GAS SAMPLER VALVE

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

THE FOLLOWING ALARMS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION:

ALARM	PANEL
GROUP II/III INBOARD ISOLATION RELAYS NOT RESET	C203
GROUP II/III OUTBOARD ISOLATION RELAYS NOT RESET	C203

REMOVAL OF THIS MALFUNCTION RETURNS THE OPERATION OF THE AFFECTED RELAYS TO NORMAL

REF: M-1-S-23, M-367, E-277, E-203, E-1663

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RPS02	RPS MG OUTPUT BREAKER TRIP	03010

TYPE:GENERIC(A,B)

CAUSE:OVERVOLTAGE CONTACT 52-AC757A IN BREAKER SHUNT TRIP COIL CIRCUIT FAILS CLOSED.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RPS MG OUTPUT BREAKER TO TRIP. THE RPS NORM POWER AVAILTABLE LIGHT GOES OUT ON PANEL C15 (C17 FOR B RPS MG). IF A RPS MG IS FAILED, A PCIS GROUP II/III INBOARD ISOLATION OCCURS, A CHANNEL A RPS HALF SCRAM OCCURS AND ALL RPS RELAYS POWERED FROM THE A MG SET TRIP CAUSING THEIR ASSOCIATED ANNUNCIATORS TO ACTUATE, THE PCIS SYSTEM I RELAYS LOSE POWER CAUSING THE ASSOCIATED RELAYS TO TRIP AND ANNUNCIATORS TO ACTUATE. THE OFFGAS LOG RAD MONITOR CHANNEL A, MAIN STEAM LINE RAD MONITOR CHANNELS A/C, APRM CHANNELS A/C/E AND ALL LPRM'S ASSOCIATED WITH APRM CHANNELS A/C/E, LPRM CHANNEL A, AND RBM CHANNEL A LOSES POWER AND A ROD WITHDRAWAL BLOCK OCCURS. THE SCRAM DISCHARGE VOLUME INBOARD VENT ISOLATIONS AND INBOARD DRAIN ISOLATION VALVES CLOSE.

IF B RPS MG IS FAILED, A PCIS GROUP II/III OUTBOARD ISOLATION OCCURS, A CHANNEL B RPS HALF SCRAM OCCURS AND ALL RPS RELAYS POWERED FROM THE B MG SET TRIP CAUSING THEIR ASSOCIATED ANNUNCIATORS TO ACTUATE, THE PCIS SYSTEM II RELAYS LOSE POWER CAUSING THE ASSOCIATED RELAYS TO TRIP AND ANNUNCIATORS TO ACTUATE. THE OFFGAS LOG RAD MONITOR CHANNEL B, MAIN STEAM LINE RAD MONITOR CHANNELS B/D, APRM CHANNELS B/D/F AND ALL LPRM'S ASSOCIATED WITH APRM CHANNELS B/D/F, LPRM CHANNEL B, AND RBM CHANNEL B LOSES POWER, AND A ROD WITHDRAWAL BLOCK OCCURS. THE SCRAM DISCHARGE VOLUME OUTBOARD VENT ISOLATIONS AND OUTBOARD DRAIN ISOLATION VALVES CLOSE. THE COMPONENTS AFFECTED BY THE LOSS OF POWER REACT DYNAMICALLY TO THE LOSS OF POWER. THE OPERATOR MAY REENERGIZE THE AFFECTED RPS BUS USING THE ALTERNATE POWER SUPPLY.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

REACTOR AUTO SCRAM CHANNEL A - 205R
REACTOR MANUAL SCRAM CHANNEL A - 205R
REACTOR AUTO SCRAM CHANNEL B - 205R
REACTOR MANUAL SCRAM CHANNEL B - 205R

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
	RPS/PCIS TRIP UNITS CARD OUT OF FILE OR POWER FAILURE - 205L GROUP II/III INBOARD ISOLATION RELAYS NOT RESET - 204M GROUP II/III OUTBOARD ISOLATION RELAYS NOT RESET - 204M CHANNEL A GROUP I ISOLATION RELAYS NOT RESET - 205R CHANNEL B GROUP I ISOLATION RELAYS NOT RESET - 205R OFF-GAS RAD MONITOR DOWNSCALE - 210 MAIN STEAM LINE RAD MONITOR DOWNSCALE - 210 REM HIGH INOPERATIVE - 205R LPRM DOWNSCALE - 205R ROD WITHDRAWAL BLOCK - 205R	

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE OVERVOLTAGE CONTACT 52-AC757A IN BREAKER SHUNT TRIP COIL CIRCUIT TO NORMAL AND ALLOWS THE OPERATOR TO RESET AND START THE AFFECTED RPS MG SET USING REMOTE FUNCTIONS.

REF: M-1-054 SYSTEM ELEMENTARY DIAGRAM, M-1-523 PCIS SYSTEM ELEMENTARY DIAGRAM, M-1-570 RPS MG SET CONTROLS ELEMENTARY DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RPS03 SPURIOUS SCRAM 02170

TYPE:DISCRETE

CAUSE:FAILURE OF REACTOR MODE SWITCH (5A-S1) SHUTDOWN CONTACTS IN REACTOR PROTECTION CIRCUIT.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A REACTOR SCRAM. THE RED LAMPS BEHIND THE MANUAL SCRAM PUSHBUTTONS ILLUMINATE, ALL RODS SCRAM, THE GROUP 1 THROUGH 4 SCRAM GROUP SOLENOID LIGHTS ON PANELS C15 AND C17 GO OUT, ALL ROD'S GREEN BACK-LIGHTING ILLUMINATES AND ALL DIGITAL INDICATORS GO BLANK ON THE FULL CORE DISPLAY. THE BLUE SCRAM LIGHTS, AMBER ACCUM LIGHTS, AND RED ROD DRIFT LIGHTS ILLUMINATES ON THE FULL CORE DISPLAY. THE SCRAM DISCHARGE VOLUME INBOARD AND OUTBOARD ISOLATION VALVES CLOSE. THE ACCUMULATOR CHARGING FLOW INCREASES ATTEMPTING TO RECHARGE THE CRD HCU'S REACTOR PRESSURE DECREASES AND THE CONTROL VALVES CLOSE TO MAINTAIN PRESSURE. THE MAIN GENERATOR TRIPS DUE TO REVERSE POWER CAUSING THE MAIN TURBINE TO TRIP. THE AUX BUSSES FAST TRANSFER TO THEIR STARTUP SOURCES AND THE RECIRC PUMP'S TRIP. REACTOR WATER LEVEL DECREASES RAPIDLY AND THE FEED PUMPS OPERATE TO RAISE LEVEL. REACTOR WATER LEVEL INCREASES TO 45 INCHES AND THE FEED PUMPS TRIP.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A CHANNEL REACTOR MANUAL SCRAM - 205R
B CHANNEL REACTOR MANUAL SCRAM - 205P
MODE SWITCH SHUTDOWN SCRAM BYPASS - 205R
ROD DRIFT - 205R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE MODE SWITCH SHUTDOWN CONTACTS TO NORMAL.

REF: M-1-S54 RPS SYSTEM ELEMENTARY DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RPS04 CONTROL ROD GROUP POWER FUSE FAILURE

TYPE:GENERIC (A-D)

CAUSE:BLOWN FUSE (5A-F18A/B, 18C/D, 18E/F, 18G/H).

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE CONTROL ROD GROUP POWER FUSES TO BLOW. THE FUSES ASSOCIATED WITH THIS MALFUNCTION ARE:

A: F18A/B GROUP 1 SCRAM SOLENOIDS
B: 18E/F GROUP 2 SCRAM SOLENOIDS
C: 18C/D GROUP 3 SCRAM SOLENOIDS
D: 18G/H GROUP 4 SCRAM SOLENOIDS

THE SELECTED GROUP SCRAMS AS INDICATED BY ALL THE RODS IN THAT GROUP INSERTING FULLY INTO THE CORE. THE GROUP 1(2/3/4) SCRAM GROUP SOLENOID LIGHTS ON PANELS C15/C17 GO OUT, ALL THE AFFECTED ROD'S GREEN BACKLIGHTING ILLUMINATES AND THEIR DIGITAL INDICATORS GO BLANK ON THE FULL CORE DISPLAY. THE BLUE SCRAM LIGHTS, AMBER ACCUM LIGHTS, AND RED ROD DRIFT LIGHTS ILLUMINATE ON THE FULL CORE DISPLAY FOR THE SCRAMMED RODS. APRM FLUX AND LPRM FLUX INDICATIONS DECREASE RAPIDLY. REACTOR PRESSURE AND LEVEL DECREASE RAPIDLY AND THE CONTROL VALVES CLOSE TO MAINTAIN REACTOR PRESSURE CAUSING GENERATOR OUTPUT TO DECREASE. MAIN FEED PUMP SPEED INCREASES TO MAINTAIN WATER LEVEL CRD CHARGING FLOW AS INDICATED ON FI-310 INCREASES FULL UPSCALE. THE SCRAM DISCHARGE VOLUME FILLS AND CAUSES AN AUTOMATIC REACTOR SCRAM. THE REMAINDER OF THE RODS SCRAM WITH THE OTHER GROUP SCRAM SOLENOID LIGHTS GOING OUT. THE PLANT REACTS DYNAMICALLY TO THE SCRAM.

THE ACCUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

SCRAM DISCHARGE VOLUME NOT DRAINED - 205L
ROD WITHDRAWAL BLOCK - 205R
SCRAM DISCHARGE VOLUME HIGH LEVEL TRIP - 205L
REACTOR AUTO SCRAM CHANNEL A - 205R
REACTOR AUTO SCRAM CHANNEL B - 205R

REMOVAL OF THE MALFUNCTION REPLACES THE FAILED CONTROL ROD GROUP POWER FUSES.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REF: M-1-S54 RPS SYSTEM ELEMENTARY DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RPS05 RPS AUTOMATIC SCRAM CIRCUIT FAILURE 02150

TYPE:DISCRETE

CAUSE:SCRAM RELAYS (5A-K13A THRU 5A-K13H) FAIL TO DEENERGIZE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A FAILURE OF THE REACTOR TO AUTO SCRAM. WHEN AN RPS AUTO SCRAM SIGNAL IS RECEIVED, THE ASSOCIATED RPS RELAY TRIPS, PPC POINT PRINTS OUT ON THE ALARM TYPER, AND ANNUNCIATOR ACTUATES, HOWEVER AN AUTO SCRAM DOES NOT OCCUR. THE OPERATOR MAY MANUALLY SCRAM THE REACTOR USING THE SCRAM PUSHBUTTONS, MODE SWITCH, INDIVIDUAL SCRAM TEST SWITCHES, OR DEENERGIZING THE RPS BUSES IF DESIRED.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF RELAYS 5A-K13A-H TO NORMAL.

REF: M-1-554 RPS SYSTEM ELEMENTARY DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RFC01	RECIRC MG FLOW CONTROLLER FAILS UPSCALE	12030

TYPE:GENERIC (A,B)

CAUSE:ELECTRONIC FAILURE CAUSES M/A STATION OUTPUT TO FAIL TO MAXIMUM.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC MG FLOW CONTROLLER M/A STATION OUTPUT TO FAIL HIGH. THE AFFECTED RECIRC PUMP'S SPEED INCREASES TO THE HIGH SPEED LIMITER OR #1/#2 SPEED LIMITER'S SETPOINT, WHICHEVER IS THE CONTROLLING LIMITER. RECIRC LOOP AND TOTAL FLOW INCREASES AS PUMP SPEED INCREASES. REACTOR POWER INCREASES, REACTOR WATER LEVEL DECREASES AND THE FEED SYSTEM INCREASES THE SPEED OF THE FEED PUMPS TO MAINTAIN WATER LEVEL. REACTOR PRESSURE INCREASES AND THE CONTROL AND/OR BYPASS VALVES OPEN TO MAINTAIN REACTOR PRESSURE. ROD WITHDRAWAL BLOCKS MAY OCCUR DUE TO HIGH POWER. PLACING THE INDIVIDUAL M/A STATION IN MANUAL HAS NO EFFECTS ON THE RECIRC PUMP SPEED.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC FLOW CONTROLLER TO NORMAL.

REF: M-1-T-15 RECIRCULATION FLOW CONTROL DIAGRAM FED, OPERATIONS AND MAINTENANCE INSTRUCTIONS FOR THE REACTOR RECIRCULATION SYSTEM FOR PEACH BOTTOM UNITS 2 AND 3.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RFC02	RECIRC MG FLOW CONTROLLER FAILS DOWNSCALE	12030

TYPE:GENERIC (A/S)

CAUSE:ELECTRONIC FAILURE CAUSES SELECTED M/A STATION OUTPUT TO FAIL TO MINIMUM.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC MG FLOW CONTROLLER M/A STATION OUTPUT TO FAIL LOW. THE AFFECTED RECIRC PUMP'S SPEED DECREASES TO 50% OR TO WHEREVER THE M/G SET LOCKS UP DUE TO CONTROL SIGNAL FAILURE. RECIRC LOOP AND TOTAL FLOW DECREASES AS PUMP SPEED DECREASES. REACTOR POWER DECREASES, REACTOR WATER LEVEL INCREASES AND THE FEED PUMP'S SPEED DECREASES TO MAINTAIN WATER LEVEL. REACTOR PRESSURE DECREASES AND THE CONTROL VALVES CLOSE TO MAINTAIN PRESSURE. FINAL REACTOR POWER WILL BE APPROXIMATELY 80%. PLACING THE INDIVIDUAL M/A STATION IN MANUAL HAS NO EFFECT ON THE RECIRC PUMPS SPEED.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC FLOW CONTROLLER TO NORMAL.

REF: M-1-T-25 RECIRCULATION FLOW CONTROL DIAGRAM IED, OPERATIONS AND MAINTENANCE INSTRUCTIONS FOR THE REACTOR RECIRCULATION SYSTEM FOR PEACH BOTTOM UNITS 2 AND 3.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RF003	RECIRC MG FLOW CONTROLLER FAILS AS IS	12030

TYPE:GENERIC (A,B)

CAUSE:ELECTRONIC FAILURE CAUSES M/A STATION OUTPUT TO REMAIN AT IT'S PRESENT VALUE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC MG FLOW CONTROLLER M/A STATION OUTPUT TO FAIL AS IS. THE AFFECTED RECIRC PUMP'S SPEED WILL REMAIN CONSTANT. IF A RECIRC PUMP RUNBACK CONDITION OCCURS, THE RECIRC PUMP'S SPEED WILL DECREASE TO THE APPROPRIATE VALUE, HOWEVER THE OPERATOR WILL BE UNABLE TO LOWER THE M/A STATION OUTPUT TO CLEAR THE RECIRC PUMP RUNBACK SIGNAL. PLACING THE INDIVIDUAL M/A STATION IN MANUAL HAS NO EFFECTS ON THE RECIRC PUMP SPEED.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC FLOW CONTROLLER TO NORMAL.

REF: M-1-T-25 RECIRCULATION FLOW CONTROL DIAGRAM IED, OPERATIONS AND MAINTENANCE INSTRUCTIONS FOR THE REACTOR RECIRCULATION SYSTEM FOR PEACH BOTTOM UNITS 2 AND 3.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RFC04	RECIRC MG FLOW CONTROLLER OSCILLATION	12030

TYPE:GENERIC (A,B)

CAUSE:ELECTRONIC FAILURE CAUSES THE AUTOMATIC OUTPUT OF THE M/A STATION TO OSCILLATE WITH A 30 SECOND PERIOD. 100% SEVERITY IS EQUIVALENT TO 10% OF CONTROLLER OUTPUT OR A 20% PEAK TO PEAK OSCILLATION.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC MG FLOW CONTROLLER M/A STATION OUTPUT TO OSCILLATE WITH A 30 SECOND PERIOD 0-100%, WHERE 100% IS EQUIVALENT TO 10% OF CONTROLLER OUTPUT OR A 20% PEAK TO PEAK OSCILLATION. THE AFFECTED RECIRC PUMP'S SPEED OSCILLATES. RECIRC LOOP AND TOTAL FLOW OSCILLATES AS PUMP SPEED OSCILLATES. REACTOR POWER INCREASES AND DECREASES, REACTOR WATER LEVEL INCREASES AND DECREASES AND THE FEED PUMP'S SPEED DECREASES OR INCREASES TO MAINTAIN WATER LEVEL. REACTOR PRESSURE OSCILLATES AND THE CONTROL VALVES OPEN/CLOSE TO MAINTAIN REACTOR PRESSURE. PLACING THE M/A STATION IN MANUAL HAS NO EFFECT ON THE RECIRC PUMP SPEED.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC FLOW CONTROLLER TO NORMAL.

REF: M-1-T-25 RECIRCULATION FLOW CONTROL DIAGRAM IRD/ OPERATIONS AND MAINTENANCE INSTRUCTIONS FOR THE REACTOR RECIRCULATION SYSTEM FOR PEACH BOTTOM UNITS 2 AND 3.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RFC05	RECIRC MASTER CONTROLLER FAILURE	12010

TYPE:DISCRETE, VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE OF MASTER CONTROLLER CAUSES OUTPUT TO FAIL.
SEVERITY 1 EQUIVALENT TO 100% OF CONTROLLER OUTPUT.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE RECIRC MASTER CONTROLLER TO FAIL TO THE INSTRUCTORS SPECIFIED VALUE 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO 100% OF CONTROLLER OUTPUT. AT 100% SEVERITY AND WITH BOTH RECIRC M/A STATIONS IN AUTO, RECIRC PUMP SPEEDS INCREASES TO APPROX 102%. BOTH RECIRC LOOP FLOWS AND TOTAL FLOW INCREASE AS THE SPEED OF THE RECIRC PUMPS INCREASE. REACTOR POWER INCREASES, REACTOR WATER LEVEL DECREASES AND THE FEED PUMPS SPEED INCREASES TO MAINTAIN WATER LEVEL. REACTOR PRESSURE INCREASES AND THE CONTROL AND/OR BYPASS VALVES OPEN TO MAINTAIN REACTOR PRESSURE. THE REACTOR SCRAMS ON HI APRM FLUX. THE OPERATOR MAY PLACE THE INDIVIDUAL RECIRC LOOP M/A CONTROLLER IN MANUAL AND CONTROL THE SPEED OF THE RECIRC PUMPS TO MITIGATE THE EFFECTS OF THE MALFUNCTION.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC FLOW CONTROLLER TO NORMAL.

REV. M-1-T-25 RECIRCULATION FLOW CONTROL DIAGRAM IED, OPERATIONS AND MAINTENANCE INSTRUCTIONS FOR THE REACTOR RECIRCULATION SYSTEM FOR BEACH BOTTOM UNITS 2 AND 3.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RRS01	RECIRC PUMP DISCHARGE VALVE FAILURE	11210

TYPE:GENERIC (A/B)

CAUSE:MECHANICAL FAILURE CAUSES VALVE DISC TO SEPARATE FROM VALVE STEM.

PLT STA:100%

EFFECTS:INSERTION OF THE MALFUNCTION CAUSES THE SELECTED RECIRC PUMP'S DISCHARGE VALVE TO CLOSE. AT 100% FLOW, THE DISCHARGE VALVE CLOSES IN APPROXIMATELY 24 SECONDS. THE VALVE'S POSITION INDICATOR INDICATES OPEN AND RECIRC PUMP D/P INCREASES. LOOP FLOW AND CORE D/P DECREASES. THE JET PUMP FLOW IN THE AFFECTED LOOP AND TOTAL FLOW INDICATIONS DECREASE, THEN INCREASE DUE TO REVERSE FLOW THRU THE JET PUMP. RECIRC PUMP POWER AND MG AMPS DECREASE FOR THE AFFECTED RECIRC MG AND INCREASE FOR THE NON-EFFECTED RECIRC MG. THE UNAFFECTED LOOP'S FLOW AND JET PUMP FLOW INCREASE AND PUMP D/P DECREASES. REACTOR POWER DECREASES TO ABOUT 65%. REACTOR WATER LEVEL INCREASED, THE REACTOR FEED PUMPS DECREASE SPEED TO MAINTAIN LEVEL, AND REACTOR WATER LEVEL RECOVERS TO NORMAL. REACTOR PRESSURE DECREASES AND THE CONTROL VALVES CLOSE TO MAINTAIN PRESSURE. GENERATOR OUTPUT DECREASES AS THE CONTROL VALVES CLOSE.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC PUMP'S DISCHARGE VALVE TO NORMAL AND OPENS THE VALVE IF THE VALVES HAND SWITCH IS IN NORMAL AFTER OPEN.

REF: E-359 SHEET 4 RECIRCULATION PUMP SUCTION AND DISCHARGE VALVE ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RRS02	RECIRC FLOW UNIT FAILS UPSCALE	130*0

TYPE:GENERIC (A/B)

CAUSE:ELECTRONIC FAILURE OF RECIRC FLOW SUMMER 153A/B CAUSES OUTPUT TO FAIL TO MAXIMUM.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC FLOW UNIT TO FAIL UPSCALE. THE AFFECTED FLOW CONVERTERS INDICATION INCREASES FULL SCALE AND THE FLOW CONVERTER UPSCALE/INOP LIGHT ILLUMINATES ON PANEL C37. THE COMPARITOR LIGHT FOR BOTH CONVERTERS ALSO ILLUNATE ON PANEL C37 DUE TO A GREATER THAN 10% DIFFERENCE BETWEEN FLOW UNIT OUTPUTS. A ROD WITHDRAWAL BLOCK SIGNAL IS GENERATED WITH THE WHITE ROD WITHDRAWAL PERMISSIVE LIGHT ON PANEL C05A GOING OUT. IF THE ASSOCIATED APRM/RBM ROD BLOCK RECORD PUSHBUTTON IS PRESSED WHILE THE MALFUNCTION IS ACTIVE, A HIGH SETPOINT FOR THE ROD BLOCK WILL BE INDICATED ON THE RESPECTIVE RECORDER. THE FLOW INDICATIONS ON THE ASSOCIATED APRM/RBM CHANNELS WILL INDICATE THE FAILED VALUE FROM RRS02DTHE FLOW UNIT.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

APRM FLOW BIAS OFF NORMAL - 205R
ROD WITHDRAWAL BLOCK - 205R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC FLOW SUMMER TO NORMAL.

REF: M-1-520 REACTOR MANUAL CONTROL SYSTEM ELEMENTARY DIAGRAM, M-1-534 AVERAGE POWER RANGE NEUTRON MONITORING SYSTEM ELEMENTARY DIAGRAM, M-351 NUCLEAR BOILER SYSTEM P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RRS03	RECIRC FLOW UNIT FAILS DOWNSCALE	13030

TYPE:GENERIC (A/B)

CAUSE:ELECTRONIC FAILURE OF RECIRC FLOW SUMMER 153A/B CAUSES OUTPUT TO FAIL TO MINIMUM.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC FLOW UNIT TO FAIL DOWNSCALE. THE AFFECTED FLOW CONVERTER'S INDICATION DECREASES DOWNSCALE AND THE COMPARITOR LIGHTS FOR BOTH CONVERTERS ILLUMINATES ON PANEL C37 DUE TO GREATER THAN A 10% DIFFERENCE BETWEEN FLOW UNIT OUTPUTS. A ROD WITHDRAWAL BLOCK SIGNAL IS GENERATED WITH THE WHITE ROD WITHDRAWAL PERMISSIVE LIGHT ON PANEL C05A GOING OUT. THE ASSOCIATED APRM CHANNELS GENERATE A HIGH AND HIGH-HIGH TRIP SIGNAL WITH THE APRM HIGH AND HIGH-HIGH LITES AT THEIR RESPECTIVE CABINETS AND PANEL C05A ILLUMINATING. A REACTOR HALF SCRAM OCCURS DUE TO THE APRM HI-HI TRIP SIGNAL. THE RBM CHANNEL ASSOCIATED WITH THE FAILED FLOW UNIT GENERATES A HIGH TRIP SIGNAL AS INDICATED BY IT'S RBM CHANNEL A/B HIGH LIGHT ILLUMINATING ON THE INSTRUMENT CABINET. THE RBM A (B) HIGH LIGHT ILLUMINATES ON PANEL C05A IF A ROD IS SELECTED AT THE ROD SELECT RELAY PANEL. IF THE ASSOCIATED APRM/RBM ROD BLOCK RECORD PUSHBUTTON IS PRESSED WHILE THE MALFUNCTION IS ACTIVE, A LOW SETPOINT FOR THE ROD BLOCK WILL BE INDICATED ON THE RESPECTIVE RECORDER. THE FLOW INDICATIONS ON THE ASSOCIATED APRM/RBM CHANNEL WILL INDICATE THE FAILED VALUE FROM THE FLOW UNIT.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

APRM FLOW BIAS OFF NORMAL - 205R
ROD WITHDRAWAL BLOCK - 205R
RBM HIGH INOPERATIVE - 205R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC FLOW SUMMER TO NORMAL.

REF: M-1-S20 REACTOR MANUAL CONTROL SYSTEM ELEMENTARY DIAGRAM, M-1-S34 AVERAGE POWER RANGE NEUTRON MONITORING SYSTEM ELEMENTARY DIAGRAM, M-351 NUCLEAR BOILER SYSTEM P&ID.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RRS06	RECIRC FLOW UNIT OSCILLATION	13030

TYPE:GENERIC (A/B), VARIABLE (0-100%)

CAUSE:ELECTRONIC FAILURE OF INDIVIDUAL FLOW SUMMER (153-A/B) CAUSES OUTPUT TO OSCILLATE WITH A 30 SECOND PERIOD. 100% SEVERITY IS EQUIVALENT TO 100% OF CONTROLLER OUTPUT OR A 20% PEAK TO PEAK OSCILLATION.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED FLOW UNIT'S SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO 10% OF CONTROLLER OUTPUT OR A 20% PEAK TO PEAK OSCILLATION. THE FLOW INDICATIONS ON THE AFFECTED FLOW CONVERTER AND THE ASSOCIATED APRM'S AND RBM CHANNEL OSCILLATE. THE FLOW UNIT COMPARATOR TRIPS AND CAUSES A ROD WITHDRAWAL BLOCK WHEN THE DIFFERENCE BETWEEN FLOW UNIT OUTPUTS EXCEEDS 10%. IF THE FLOW UNIT OUTPUT REACHES 103%, THE UPSCALE/INOP LIGHT ILLUMINATES ON PANEL C37. THE ASSOCIATED APRM CHANNELS WILL GENERATE A HIGH TRIP SIGNAL AND ASSOCIATED ROD BLOCK IF THE .58W + 50 SETPOINT IS REACHED. A REACTOR HALF SCRAM OCCURS IF THE ASSOCIATED APRM CHANNELS REACH .58W + 62. IF THE ASSOCIATED APRM/RBM ROD BLOCK RECORD PUSHBUTTON IS PRESSED WHILE THE MALFUNCTION IS ACTIVE, A OSCILLATING SETPOINT FOR THE ROD BLOCK WILL BE INDICATED ON THE RESPECTIVE RECORDER.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

APRM FLOW BIAS OFF NORMAL - 205R
ROD WITHDRAWAL BLOCK - 205R
RBM HIGH INOPERATIVE 205R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC FLOW SUMMER TO NORMAL.

REF: M-1-520 REACTOR MANUAL CONTROL SYSTEM ELEMENTARY DIAGRAM, M-1-534 AVERAGE POWER RANGE NEUTRON MONITORING SYSTEM ELEMENTARY DIAGRAM, M-331 NUCLEAR BOILER SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RRS07 RECIRC PUMP SHAFT SEIZURE 01050

TYPE:GENERIC (A/B)

CAUSE:MECHANICAL SEIZURE OF RECIRC PUMP SHAFT

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC PUMP'S SHAFT TO SEIZE. JET PUMP FLOW IN THE AFFECTED LOOP DECREASES RAPIDLY, THEN INCREASES DUE TO REVERSE FLOW THROUGH THE JET PUMPS. TOTAL FLOW, CORE FLOW, THE AFFECTED RECIRC PUMP'S D/P INDICATION, CORE D/P, AND CORE PLATE D/P DECREASED RAPIDLY. FLOW IN THE UNEFFECTED RECIRC LOOP INCREASES. THE AFFECTED RECIRC MG SET'S GENERATOR AMPS AND WATTS INCREASE UPSCALE CAUSING THE OVERCURRENT LOCKOUT - RELAY TO TRIP. THE RECIRC DRIVE MOTOR AMPS INCREASE WHEN THE GENERATOR AMPS INCREASE. WHEN THE GENERATOR LOCKOUT RELAY TRIPS ON OVERCURRENT, THE DRIVE MOTOR BREAKER TRIPS AND THE RECIRC GENERATOR'S FIELD BREAKER TRIPS. AMPS, WATTS, AND SPEED INDICATIONS FOR THE AFFECTED RECIRC PUMP'S DRIVE MOTOR AND GENERATOR DECREASE TO 0. AMPS, WATTS, AND SPEED INDICATIONS FOR THE UNEFFECTED RECIRC PUMP'S DRIVE MOTOR AND GENERATOR INCREASE. REACTOR WATER LEVEL INCREASES RAPIDLY AND THE FEED PUMP'S SPEED DECREASES TO MAINTAIN LEVEL. REACTOR PRESSURE DECREASES AND THE CONTROL VALVES CLOSE TO MAINTAIN PRESSURE. REACTOR POWER DECREASES RAPIDLY AND STABILIZES AT APPROXIMATELY 65%.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RECIRC PUMP LOW DIFF PRESS - 204M
B RECIRC PUMP LOW DIFF PRESS - 204M
A RECIRC DRIVE MOTOR BREAKER TRIP - 204M
A RECIRC GENERATOR LOCKOUT TRIP - 204M
A RECIRC GENERATOR AUX LOCKOUT TRIP - 204M
A RECIRC PUMP LOCKED ROTOR TRIP - 204M
B RECIRC DRIVE MOTOR BREAKER TRIP - 204M
B RECIRC GENERATOR LOCKOUT TRIP - 204M
B RECIRC GENERATOR AUX LOCKOUT TRIP - 204M
B RECIRC PUMP LOCKED ROTOR TRIP - 204M

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC PUMP'S SHAFT TO NORMAL AND ALLOWS THE OPERATOR TO RESET THE RECIRC GENERATOR LOCKOUT RELAY USING THE REMOTE

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

FUNCTION (RFC01).

REF: E-171 RECIRC MG SET DRIVE MOTOR 13.8 KV CKT BREAKER ELECTRICAL SCHEMATIC DIAGRAM, M-1-51 VARIABLE SPEED RECIRC PUMP MG SET ELEMENTARY DIAGRAM, M-1-54 RECIRC FLOW CONTROL SYSTEM ELEMENTARY DIAGRAM, M-351 NUCLEAR BOILER SYSTEM P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RRS08	RECIRC MG DRIVE MOTOR BREAKER TRIP	01060

TYPE:GENERIC (A/B)

CAUSE:INSTANTANEOUS OVERCURRENT TRIP.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC PUMP'S DRIVE MOTOR BREAKER TO TRIP. DRIVE MOTOR AMPS INCREASE SHARPLY FULL SCALE, THE DRIVE MOTOR BREAKER TRIPS, AND AMP'S DECREASE TO 0. THE ASSOCIATED RECIRC GENERATOR AMPS AND WATTS INDICATION INCREASES WHEN THE DRIVE MOTOR AMPS INCREASE. THE RECIRC MG LOCKOUT RELAY TRIPS CAUSING THE GENERATOR FIELD BREAKER TO TRIP. JET PUMP FLOW IN THE AFFECTED LOOP DECREASES THEN INCREASES DUE TO REVERSE FLOW THROUGH THE JET PUMPS. TOTAL FLOW, CORE FLOW THE AFFECTED RECIRC PUMP'S D/P INDICATION, CORE D/P, AND CORE PLATE D/P DECREASES RAPIDLY. FLOWS IN THE UNEFFECTED RECIRC LOOP INCREASES. AMPS, WATTS, AND SPEED INDICATIONS FOR THE UNEFFECTED RECIRC PUMP'S DRIVE MOTOR AND GENERATOR INCREASE. REACTOR WATER LEVEL INCREASES RAPIDLY AND THE FEED PUMP'S SPEED DECREASES TO MAINTAIN LEVEL. REACTOR PRESSURE DECREASES AND THE CONTROL VALVES CLOSE TO MAINTAIN PRESSURE. REACTOR POWER DECREASES RAPIDLY AND STABILIZES AT APPROXIMATELY 65%.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RECIRC PUMP LOW DIFF PRESS - 204M
B RECIRC PUMP LOW DIFF PRESS - 204M
A RECIRC DRIVE MOTOR BREAKER TRIP - 204M
A RECIRC GENERATOR LOCKOUT TRIP - 204M
A RECIRC GENERATOR AUX LOCKOUT TRIP - 204M
B RECIRC DRIVE MOTOR BREAKER TRIP - 204M
B RECIRC GENERATOR LOCKOUT TRIP - 204M
B RECIRC GENERATOR AUX LOCKOUT TRIP - 204M

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC PUMP'S DRIVE MOTOR AND BREAKER TO NORMAL AND ALLOWS THE OPERATOR TO RESET THE RECIRC GENERATOR LOCKOUT RELAY USING A REMOTE FUNCTION.

REF: E-171 RECIRC MG SET DRIVE MOTOR 13.8 KV CKT BREAKER ELECTRICAL SCHEMATIC DIAGRAM, M-1-33 VARIABLE SPEED

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
	RECIRC PUMP MG SET ELEMENTARY DIAGRAM, M-1-54 RECIRC FLOW CONTROL SYSTEM ELEMENTARY DIAGRAM, M-351 NUCLEAR BOILER SYSTEM P&ID.	
	REV. 1	

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RRS09 RECIRC MG FIELD BREAKER TRIP 11090

TYPE:GENERIC (A/B)

CAUSE:CONTACTS 2-2C OF RELAY K1A IN SELECTED FIELD BREAKER TRIP CIRCUIT FAIL CLOSED.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC MG FIELD BREAKER TO TRIP THIS TRANSIENT WILL HAVE THE SAME EFFECTS AS MALFUNCTION RRS08, EXCEPT IT WILL BE MORE SEVERE DUE TO THE RECIRC PUMP MOTOR BEING ELECTRICALLY DISCONNECTED AS SOON AS THE MALFUNCTION IS INSERTED WITH THE INERTIA OF THE MG SET NOT CONTRIBUTING TO THE COASTDOWN TIME OF THE RECIRC PUMP. JET PUMP FLOW IN THE AFFECTED LOOP DECREASES THEN INCREASES DUE TO REVERSE FLOW THROUGH THE JET PUMPS. TOTAL FLOW, CORE FLOW, THE AFFECTED RECIRC PUMP'S D/P INDICATION, CORE D/P, AND CORE PLATE D/P DECREASES. FLOWS IN THE UNEFFECTED RECIRC LOOP INCREASES. AMPS, WATTS, AND SPEED INDICATIONS FOR THE UNEFFECTED RECIRC PUMP'S DRIVE MOTOR AND GENERATOR INCREASE. REACTOR WATER LEVEL INCREASES RAPIDLY AND THE FEED PUMP'S SPEED DECREASES TO MAINTAIN LEVEL. REACTOR PRESSURE DECREASES AND THE CONTROL VALVES CLOSE TO MAINTAIN PRESSURE. REACTOR POWER DECREASES THEN STABILIZES AT APPROXIMATELY 65%.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RECIRC PUMP LOW DIFF PRESS - 204M
B RECIRC PUMP LOW DIFF PRESS - 204M

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC PUMP'S 2-2C CONTACTS OF RELAY K1A IN SELECTED FIELD BREAKER TRIP CIRCUIT TO NORMAL.

REF: E-171 RECIRC MG SET DRIVE MOTOR 13.8 KV CKT BREAKER ELECTRICAL SCHEMATIC DIAGRAM, M-1-53 VARIABLE SPEED RECIRC PUMP MG SET ELEMENTARY DIAGRAM, M-1-54 RECIRC FLOW CONTROL SYSTEM ELEMENTARY DIAGRAM, M-151 NUCLEAR BOILER SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RRS10	RECIRC MG INCOMPLETE START SEQUENCE	11090

TYPE:GENERIC (A/B)

CAUSE:CONTACTS 4-6 OF RELAY 21K-16A/B FAIL TO CLOSE, PREVENTING FIELD BREAKER FROM CLOSING.

PLT STA:PLANT STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC PUMP'S FIELD BREAKER TO FAIL TO CLOSE. WHEN THE DRIVE MOTOR BREAKER FOR THE SELECTED RECIRC PUMP IS PLACED IN START, RECIRC GENERATOR SPEED INCREASES, 21 SECONDS LATER THE FIELD BREAKER DOES NOT CLOSE, 14 SECONDS LATER THE RECIRC PUMP'S LOCKOUT RELAY TRIPS CAUSING THE DRIVE MOTOR BREAKER TO TRIP. THE OPERATOR MAY RESET THE GENERATOR LOCKOUT USING A REMOTE FUNCTION. IF THE FIELD BREAKER IS CLOSED WHEN THE MALFUNCTION IS INSERTED, NO EFFECTS WILL BE OBSERVED.

THE ANNUNCIATOR DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RECIRC INCOMPLETE STARTUP SEQUENCE - 204M
B RECIRC INCOMPLETE STARTUP SEQUENCE - 204N
A RECIRC DRIVE MOTOR BREAKER TRIP - 204M
A RECIRC GENERATOR LOCKOUT TRIP - 204M
A RECIRC GENERATOR AUX LOCKOUT TRIP - 204M
B RECIRC DRIVE MOTOR BREAKER TRIP - 204M
B RECIRC GENERATOR LOCKOUT TRIP - 204M
B RECIRC GENERATOR AUX LOCKOUT TRIP - 204M

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC PUMP'S 4-6 CONTACT OF RELAY 21K-16A/B IN THE GENERATOR FIELD BREAKER CLOSE CIRCUIT TO NORMAL AND ALLOWS THE FIELD BREAKER TO CLOSE.

REF. E-171 RECIRC MG SET DRIVE MOTOR 13.8 KV CKT BREAKER ELECTRICAL SCHEMATIC DIAGRAM, M- -ST VARIABLE SPEED RECIRC PUMP MG SET ELEMENTARY DIAGRAM, M-1-94 RECIRC FLOW CONTROL SYSTEM ELEMENTARY DIAGRAM, M-351 NUCLEAR BOILER SYSTEM P&ID.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RRS11	RECIRC PUMP HIGH VIBRATION	11010

TYPE:GENERIC (A/B) VARIABLE 0-100%

CAUSE:PUMP SHAFT MISALIGNMENT. 100% IS EQUIVALENT TO A 20 MIL INCREASE IN RECIRC PUMP VIBRATION.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC PUMPS VIBRATION TO INCREASE 0-100%, WHERE 100% IS EQUIVALENT TO A 20 MIL INCREASE IN RECIRC PUMP VIBRATION. THE RECIRC PUMP'S VIBRATION MONITORING EQUIPMENT WILL INDICATE INCREASING VIBRATION FOR ALL PUMP SHAFT AND MOTOR HOUSING INDICATORS AS THE MALFUNCTION SEVERITY INCREASES.
IF MOTOR VIBRATION INCREASES TO GREATER THAN 5 MILS, THE MOTOR VIBRATION CHANNEL AUTOMATICALLY SHUTS DOWN WITH THE GREEN OK STATUS LAMP GOING OUT AND THE VIBRATION METER INDICATION CLAMPED AT 0. OPERATOR ACTION TO DECREASE THE SPEED OF THE RECIRC PUMP WILL DECREASE THE VIBRATION A PROPORTIONAL AMOUNT. IF MOTOR VIBRATION DECREASES TO LESS THAN 5 MILS, THE INSTRUMENT WILL DELAY 50 SECONDS AND THEN RETURN TO SERVICE. NO EFFECTS ON RECIRC FLOW WILL BE OBSERVED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RECIRC PUMP MOTOR HIGH VIBRATION - 204A
B RECIRC PUMP MOTOR HIGH VIBRATION - 204M

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC PUMP'S SHAFT TO NORMAL AND ALLOWS THE OPERATOR TO RESET THE HIGH VIBRATION ALARM USING THE COMMON VIBRATION RESET SWITCH ON PANEL C05B.

REF: PBAPS PROCEDURE S.2.3.1.D OPERATION OF THE RECIRC PUMP MOTOR VIBRATION INSTRUMENTATION, E-2382 RECIRC PUMP MOTOR VIBRATION MONITOR ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RRS12 RECIRC PUMP SPEED FEEDBACK SIGNAL FAILURE 12030

TYPE:GENERIC (A/B)

CAUSE:ELECTRONIC FAILURE OF MG SET TACH GENERATOR

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE RECIRC MG SPEED REFERENCE SIGNAL TO THE RECIRC PUMP SPEED CONTROL SYSTEM TO FAIL LOW. THE ERROR SIGNAL LIMITING NETWORK WILL LIMIT THE ERROR SIGNAL TO 8%. GENERATOR SPEED INDICATION DECREASES TO 0, GENERATOR SPEED DEMAND INDICATION INCREASES FULL SCALE, RECIRC PUMP SPEED INCREASES TO THE SETPOINT OF THE SCOOP TUBE POSITION HIGH LIMIT REMOTE FUNCTION. THE RECIRC LOOP FLOW, AND TOTAL CORE FLOW INCREASES WITH REACTOR WATER LEVEL INITIALLY LOWERING DUE TO VOIDS COLLAPSING, REACTOR PRESSURE INCREASING, REACTOR POWER INCREASING, THE MAIN TURBINE CONTROL VALVES AND/OR BYPASS VALVES OPENING TO MAINTAIN PRESSURE, AND FEED PUMP SPEED INCREASING TO MAINTAIN REACTOR WATER LEVEL. MANUAL OR AUTO OPERATION OF THE RECIRC FLOW CONTROLLER WILL NOT AFFECT THE SPEED OF THE RECIRC PUMP. THE OPERATOR MAY CONTROL THE SPEED OF THE FAILED RECIRC PUMP BY DEENERGIZING THE SCOOP TUBE AUTO POSITIONER AND MANUALLY POSITIONING THE SCOOP TUBE (BOTH ARE PERFORMED USING REMOTE FUNCTIONS). A RECIRC PUMP RUNBACK SIGNAL WILL HAVE NO EFFECT ON THE FAILED RECIRC PUMP'S SPEED WHILE THIS MALFUNCTION IS ACTIVE.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE TACHOMETER GENERATOR TO NORMAL.

REF: M-1-83 VARIABLE SPEED RECIRC PUMP MG SET ELEMENTARY DIAGRAM, M-1-84 RECIRC FLOW CONTROL SYSTEM ELEMENTARY DIAGRAM, M-351 NUCLEAR BOILER SYSTEM P&ID.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RRS13	RECIRC PUMP #1 SEAL FAILURE	03010

TYPE:GENERIC (A/B)

CAUSE:WORN SEAL

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC PUMP'S #1 SEAL TO FAIL. #1 SEAL PRESSURE INDICATION ON THE AFFECTED PUMP INCREASES, #1 AND #2 SEAL CAVITY TEMPERATURES INCREASE, RBCCW TEMPERATURES OUT OF THE RECIRC PUMP'S SEAL CAVITY INCREASES, AND DRYWELL EQUIPMENT DRAIN SUMP DISCHARGE FLOW INCREASES ABOUT 1.25 GPM, AND DRYWELL EQUIPMENT SUMP TEMPERATURES INCREASE SLIGHTLY.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RECIRC PUMP SEAL STAGE #2 HI-LO FLOW - 203M
B RECIRC PUMP SEAL STAGE #2 HI-LO FLOW - 204M

REMOVAL OF THE MALFUNCTION REQUIRES RESET OF THE SIMULATOR.

REF: M-351 NUCLEAR BOILER SYSTEM P&ID, M-353 REACTOR RECIRCULATION PUMP SYSTEM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RRS14 RECIRC PUMP #2 SEAL FAILURE 08020

TYPE:GENERIC (A/B)

CAUSE:WORN SEAL

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC PUMP'S #2 SEAL TO FAIL. RECIRC PUMP #2 SEAL PRESSURE DECREASES, #1 AND #2 SEAL CAVITY TEMPERATURES INCREASE, RBCCW TEMPERATURES OUT OF THE RECIRC PUMP'S SEAL CAVITY INCREASES, AND DRYWELL EQUIPMENT DRAIN SUMP TEMPERATURES AND DISCHARGE FLOW INCREASES ABOUT 1.25 GPM. IF MALFUNCTION RRS13 IS ACTIVE WHEN THIS MALFUNCTION IS INSERTED, DRYWELL EQUIPMENT DRAIN FLOW INCREASES TO ABOUT 50 GPM AND DRYWELL TEMPERATURE AND PRESSURE INCREASES. WHEN DRYWELL PRESSURE REACHES 2 PSIG, THE REACTOR SCRAMS AND THE APPROPRIATE ECCS SYSTEMS AUTO START. THE MAIN TURBINE TRIPS, THE RECIRC PUMPS TRIP AND THE AUX BUSSES FAST TRANSFER TO THEIR STARTUP SOURCES.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RECIRC PUMP SEAL STAGE #2 HI-LO FLOW - 204M
B RECIRC PUMP SEAL STAGE #2 HI-LO FLOW - 204M
A RECIRC PUMP HI SEAL LEAKAGE
B RECIRC PUMP HI SEAL LEAKAGE

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE WORN RECIRC PUMP #2 SEAL TO NORMAL.

REF: M-151 NUCLEAR BOILER SYSTEM P&ID, M-353 REACTOR RECIRCULATION PUMP SYSTEM.

TABLE I.C-1
SYSTEMS MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECTS	EQU NO.

RRS17 RECIRC MG CONTROL SIGNAL FAI'

TYPE: GENERIC (A-B)

CAUSE: OUTPUT OF ERROR SIGNAL LIMITING NETWORK 2-184-30 A/B FAILS TO 0.

PLT STA: 100%

EFFECTS: INSERTION OF THIS MALFUNCTION CAUSES A RECIRC MG CONTROL SIGNAL FAILURE. THE SPEED DEMAND INDICATION DECREASES TO 0 (2-184-16A/B-1 ON PANEL C04A), A RECIRC PUMP SCOOP TUBE LOCK OCCURS CAUSING RECIRC PUMP SPEED TO REMAIN NEAR NORMAL. OPERATION OF THE MASTER CONTROLLER OR THE M/A TRANSFER STATIONS WILL HAVE NO EFFECT ON RECIRC PUMP SPEED. THE OPERATOR CAN CONTROL THE SPEED OF THE AFFECTED PUMP BY DEENERGIZING THE SCOOP TUBE AUTO POSITIONER AND MANUALLY SETTING THE POSITION OF THE SCOOP TUBE USING REMOVE FUNCTIONS.

THE ANNUNCIATOR DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RECIRC SPEED CONTROL SIGNAL FAILURE - 204M
B RECIRC SPEED CONTROL SIGNAL FAILURE - 204M
A RECIRC FLUID DRIVE SCOOP TUBE LOCK - 204L
B RECIRC FLUID DRIVE SCOOP TUBE LOCK - 204L
A RECIRC FLUID DRIVE SCOOP TUBE BRAKE ON - 204M
B RECIRC FLUID DRIVE SCOOP TUBE BRAKE ON - 204M

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE ERROR SIGNAL LIMITING NETWORK TO NORMAL. THE SPEED DEMAND INDICATION INCREASES TO THE DEMANDED SPEED OF THE RESPECTIVE RECIRC FLOW CONTROLLER AND THE OPERATOR MAY RESET THE SCOOP TUBE LOCK.

REF: PBAPS PROCEDURE S.2.3.1.G RESETTING A SCOOP TUBE LOCK, M-1-S3 VARIABLE SPEED RECIRC PUMP MG SET ELEMENTARY DIAGRAM, M-1-S4 RECIRC FLOW CONTROL SYSTEM ELEMENTARY DIAGRAM, M-351 NUCLEAR BOILER SYSTEM P&ID, M-1-T-25 RECIRCULATION FLOW CONTROL SYSTEM IED.

REV. 1

TABLE I.C-1
SYSTEMS MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECTS	EQU NO.

RRS18 RECIRC LOOP FLOW TRANSMITTER FAILURE

TYPE: GENERIC (A-B), VARIABLE 0-100%

CAUSE: LOOP FLOW TRANSMITTER AMPLIFIER FAILURE (FT-110A/B/C/D). 100% SEVERITY IS EQUIVALENT TO FULL OUTPUT.

FLT STA: 100%

EFFECTS: INSERTION OF THIS MALFUNCTION CAUSES A FAILURE OF THE SELECTED RECIRC LOOP FLOW TRANSMITTER TO THE INSTRUCTOR'S SPECIFIED VALUE 0-100%, WHERE 100% IS EQUIVALENT TO FULL OUTPUT. THE RECIRC LOOP FLOW INDICATION ON FR-154 OR FR-159 AND THE PPC INDICATES THE FAILED VALUE. THE RECIRC FLOW UNIT INDICATES THE FAILED VALUE OF RECIRC LOOP FLOW SIGNAL IS SENT TO THE RESPECTIVE RBM CHANNEL AND APRM CHANNELS. IF GREATER THAN 10% DIFFERENCE IN FLOW UNIT OUTPUT EXISTS AT ANY TIME, A FLOW UNIT COMPARITOR TRIP OCCURS CAUSING A ROD BLOCK SIGNAL TO BF GENERATED. IF THE FLOW UNIT OUTPUT INCREASES TO GREATER THAN 100%, A FLOW UNIT UPSCALE TRIP OCCURS CAUSING A ROD WITHDRAWAL BLOCK. IF A ROD IS SELECTED ON THE ROD SELECTED RELAY PANEL AND THE RBM ROD BLOCK SETPOINT IS REACHED (.66w + 41%) A RBM HIGH TRIP OCCURS WITH A RESULTANT ROD BLOCK SIGNAL GENERATED. IF THE APRM HIGH SETPOINT IS REACHED (.58w + 50%) A APRM HIGH TRIP OCCURS WITH A RESULTANT ROD BLOCK SIGNAL GENERATED. IF THE APRM HIGH-HIGH SETPOINT IS REACHED (.58W + 62) AN APRM HIGH-HIGH TRIP OCCURS WITH A RESULTANT REACTOR HALF SCRAM.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD WITHDRAWAL BLOCK - 205R
APRM FLOW BIAS OFF NORMAL - 205R
APRM HIGH .58W + 50 - 205R
APRM HIGH-HIGH INOPERATIVE .58W + 62 - 205R
RBM HIGH INOPERATIVE - 205R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE LOOP FLOW TRANSMITTER AMPLIFIER TO NORMAL.

REF: M-1-S20 REACTOR MANUAL CONTROL SYSTEM ELEMENTARY DIAGRAM, M-1-S34 AVERAGE POWER RANGE NEUTRON MONITORING SYSTEM ELEMENTARY DIAGRAM, M-351 NUCLEAR BOILER SYSTEM P&ID.

TABLE I.C-1
SYSTEMS MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECTS	EQU NO.

RRS19 RECIRC JET PUMP RISER FAILURE

TYPE: GENERIC (A-J), VARIABLE 0-100%. LIMITED TO FAILURE OF ONE JET PUMP RISER AT A TIME, BUT NOT LIMITED TO WHICH JET PUMP CAN BE FAILED.

CAUSE: CRACK IN JET PUMP RISER. 100% IS EQUIVALENT TO A COMPLETE SHEER OF THE RISER OR 0 FLOW.

PLT STA: 100%

EFFECTS: INSERTION OF THIS MALFUNCTION CAUSES A CRACK TO DEVELOP IN THE INSTRUCTOR'S SPECIFIED JET PUMP RISER. ONLY 1 JET PUMP RISER FAILURE CAN BE ACTIVE AT A TIME. AT 100% SEVERITY WITH A FULLY INSTRUMENTED JET PUMP FAILED, FLOW INDICATION FOR THE FAILED JET PUMP DECREASES TO 0, THEN INCREASES DUE TO REVERSE FLOW. THE FLOW THROUGH THE OTHER JET PUMP'S IN THE SAME LOOP DECREASES SLIGHTLY DUE TO MORE RECIRC FLOW THROUGH THE FAILED RISER. TOTAL JET PUMP FLOW INDICATION FOR THE AFFECTED LOOP DECREASES. CORE PLATE D/P INDICATIONS DECREASE, REACTOR POWER DECREASES, REACTOR PRESSURE DECREASES, AND THE CONTROL VALVES CLOSE TO MAINTAIN REACTOR PRESSURE. GENERATOR OUTPUT DECREASES AS THE CONTROL VALVES CLOSE. TOTAL CORE FLOW INDICATION INCREASES DUE TO INCREASE IN UNAFFECTED JET PUMP LOOP FLOW AND SUMMING OF REVERSE FLOW.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION REQUIRES REINITIATION OF THE TRAINER.

REF: M-351 NUCLEAR BOILER SYSTEM P&ID, M-352 NUCLEAR BOILER VESSEL INSTRUMENTATION SYSTEM P&ID.

REV. 2

TABLE I -1
SYSTEMS MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECTS	EQU NO.

RRS20 RECIRCULATION LOOP LINE BREAK

TYPE: DISCRETE - VARIABLE (NON-LINEAR 0-100%)

CAUSE: A BREAK OCCURS JUST DOWNSTREAM OF RHR SHUTDOWN COOLING SUPPLY AND UPSTREAM OF RECIRC PUMP 'A' SUCTION VALVE 2-43A.

PLT STA: 100%

EFFECTS: INSERTION OF THIS MALFUNCTION CAUSES A BREAK AT THE INSTRUCTORS SPECIFIED SEVERITY OF THE 'A' RECIRC LOOP PIPING DOWNSTREAM OF THE RHR SHUTDOWN COOLING SUPPLY AND UPSTREAM OF SUCTION VALVE 2-43A. AT SEVERITIES 25 TO 100% THE ONLY SIGNIFICANT DIFFERENCE IS IN THE REFLOOD LEVEL, OTHER REACTOR AND CONTAINMENT PARAMETERS WILL RESPOND ESSENTIALLY THE SAME. AT 100% SEVERITY REACTOR WATER LEVEL WILL DECREASE TO TAF IN APPROXIMATELY 10 SECONDS, REACTOR PRESSURE WILL REMAIN HIGH UNTIL THE WATER INVENTORY IS EXPELLED AND THEN DROP RAPIDLY TO APPROXIMATELY 300 PSIG. REACTOR PRESSURE WILL BE LESS THAN 100 PSIG IN APPROXIMATELY 100 SECONDS. DRYWELL PRESSURE INCREASES RAPIDLY TO ABOUT 40 PSIG IN 10 SECONDS, THEN DECREASES AND STABILIZES AT 27 PSIG IN THE NEXT 15 SECONDS, AFTER APPROXIMATELY 2 MINUTES DRYWELL PRESSURE WILL BEGIN TO TREND DOWNWARD.

A REACTOR SCRAM OCCURS DUE TO HIGH DRYWELL PRESSURE AND A PCIS GROUP I, II & III ISOLATIONS OCCUR. THE RECIRC PUMPS WILL TRIP DUE TO LOW WATER LEVEL (-48" ATWS TRIP). TORUS WATER TEMPERATURE WILL INCREASE TO 130 DEGREES F IN APPROXIMATELY 2 MINUTES AND WILL CONTINUE TO TREND UPWARD REACHING 175 DEGREES F IN 10 MINUTES. THE DIESEL GENERATORS AND ECCS SYSTEMS AUTO START ON 2 PSIG DRYWELL PRESSURE. HPCI AND RCIC WILL INJECT INTO THE VESSEL UNTIL THEY ISOLATE ON LOW STEAM PRESSURE IN APPROXIMATELY 2 MINUTES. CORE WATER LEVEL IS RESTORED TO 2/3 CORE HEIGHT IN APPROXIMATELY 135 SECONDS, PEAKS NEAR ZERO INCHES IN APPROXIMATELY 3 MINUTES THEN SLOWLY DROPS TO APPROXIMATELY -75 INCHES WHERE LEVEL WILL BE MAINTAINED WITH ALL LOW PRESSURE ECCS INJECTING. AT 50% SEVERITY A REFLOOD LEVEL OF _75 INCHES IS MAINTAINABLE. SEVERITIES MAY BE INSERTED AS SMALL AS .05%.

THE ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION ARE TOO NUMEROUS TO LIST.

REMOVAL OF THIS MALFUNCTION REQUIRES RE-INITIALIZATION OF THE TRAINER.

REF: M-1-S-23, M-1-S-54, M-1-S-36, M-1-S-42, M-1-S-C

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RV101	REACTOR LEVEL TRANSMITTER LT-72 FAILURE	13030

TYPE:GENERIC (A-D), VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE IN LEVEL TRANSMITTER LT-72 CIRCUIT
100% SEVERITY IS EQUIVALENT TO 100% OF SCALE OR OUTPUT.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES AN ELECTRONIC FAILURE OF THE LT-72A/B/C/D AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS EQUIVALENT TO 100% OF SCALE OR OUTPUT.

IF LT-72A IS FAILED AT 0% THE FOLLOWING OCCURS:
-LI-85A/AX INDICATES -165 INCHES
-LR-404A WILL NOW INDICATE THE LT-72A VALUE
-HPCI/RCIC RECEIVE PARTIAL LO-LO LEVEL INITIATION SIGNALS
-CORE SPRAY/RHR/ADS AND D/G RECEIVE PARTIAL LO-LO-LO LEVEL INITIAION SIGNALS
-RCIC HI LEVEL TRIP WILL NOT OCCUR
-A CHANNEL OF ARI WILL TRIP

IF LT-72A IS FAILED AT 100% THE FOLLOWING OCCURS:
-LI-85A/AX INDICATES +60 INCHES
-LR-404A WILL INDICATE +60 INCHES AND WILL NOT AUTO SWAP TO THE LT-73A IF REACTOR LEVEL DROPS <-100 INCHES
-RCIC AND THE MAIN TURBINE RECEIVE A PARTIAL HI LEVEL TRIP
HPCI/RCIC/ARI/CORE SPRAY/RHR/ADS AND D/G WILL NOT RECEIVE AN "A" CHANNEL LO-LO OR LO-LO-LO LEVEL INITIATION.

IF LT-72B IS FAILED AT 0% THE FOLLOWING OCCURS:
-LT-85B/BX INDICATES -165 INCHES
-LI-91 WILL NOW INDICATE THE LT-72B VALUE
-HPCI/RCIC RECEIVE PARTIAL LO-LO LEVEL INITIATION SIGNALS
CORE SPRAY/RHR/ADS AND D/G RECEIVE PARTIAL LO-LO-LO LEVEL INITIATION SIGNALS.
-RCIC HI LEVEL TRIP WILL NOT OCCUR
-B CHANNEL OF ARI WILL TRIP

IF LT-72B IS FAILED AT 100% THE FOLLOWING OCCURS:
-LI-85B/BX INDICATES +60 INCHES
-LI-91 WILL INDICATE +60 INCHES AND WILL NOT AUTO SWAP TO THE LT-73B IF REACTOR LEVEL DROPS < -100 INCHES
-RCIC AND THE MAIN TURBINE RECEIVE A PARTIAL HI LEVEL TRIP
HPCI/RCIC/ARI/CORE SPRAY/RHR/ADS AND D/G WILL NOT RECEIVE

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

A "B" CHANNEL LO-LO OR LO-LO-LO LEVEL INITIATION.

IF LT-72C IS FAILED AT 0% THE FOLLOWING OCCURS:
-LR-110A GREEN PEN INDICATES -166 INCHES
-LR-110A BLUE PEN WILL NOW INDICATE THE LT-73 VALUE
-HPCI,RCIC RECEIVE PARTIAL LO-LO LEVEL INITIATION SIGNALS
CORE SPRAY,RHR,ADS AND D/G RECEIVE PARTIAL LO-LO-LO LEVEL
INITIATION SIGNALS
HPCI HI LEVEL TRIP WILL NOT OCCUR
-A CHANNEL OF ARI WILL TRIP

IF LT-72C IS FAILED AT 100% THE FOLLOWING OCCURS:
-LR-110A GREEN PEN INDICATES +60 INCHES
-LR-110A BLUE PEN WILL INDICATE +60 INCHES AND WILL NOT
AUTO SWAP TO LT-73C IF REACTOR LEVEL DROPS < -100 INCHES
-HPCI AND A,B,C RPT'S RECEIVE PARTIAL HI LEVEL TRIPS
-HPCI,RCIC,ARI,CORE SPRAY,RHR,ADS AND D/G WILL NOT RECEIVE
A "C" CHANNEL LO-LO OR LO-LO-LO LEVEL INITIATION.

IF LT-72D IS FAILED AT 0% THE FOLLOWING OCCURS:
-LR-110B GREEN PEN INDICATES -166 INCHES
-LR-110B BLUE PEN WILL NOW INDICATE THE LT-73D VALUE
-HPCI,RCIC RECEIVE PARTIAL LO-LO LEVEL SIGNALS
-CORE SPRAY,RHR,ADS AND D/G RECEIVE PARTIAL LO-LO-LO LEVEL
INTIATION SIGNALS
-HPCI HI LEVEL TRIP WILL NOT OCCUR
-B CHANNEL OF ARI WILL TRIP

IF LT-72D IS FAILED AT 100% THE FOLLOWING WILL OCCUR:
-LR-110B GREEN PEN INDICATES +60 INCHES
-LR-110B BLUE PEN INDICATES +60 INCHES AND WILL NOT AUTO SWAP
TO LT-73D IF REACTOR LEVEL DROPS <-100 INCHES
-HPCI AND A,B,C RPT'S RECEIVE PARTIAL HI LEVEL TRIPS
HPCI,RCIC,ARI,CORE SPRAY,RHR,ADS AND D/G WILL NOT RECEIVE A
"D" CHANNEL LO-LO OR LO-LO-LO LEVEL INITIATION.
THE SYSTEMS RECEIVING SIGNALS FROM THE FAILED TRANSMITTERS
REACT DYNAMICALLY TO THE TRANSMITTER FAILURE AND AUTO START
(OR TRIP) IF THE CORRECT COINCIDENCE IS MET.

THE FOLLOWING ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS
MALFUNCTION:
-A CHANNEL ARI TRIP
-B CHANNEL ARI TRIP
-REACTOR LOW WATER LEVEL
-SYSTEM I ECCS REAC VESSEL WATER LO-LO-LO

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

-SYSTEM II ECCS REAC VESSEL WATER LO-LO-LO

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE LEVEL TRANSMITTERS TO NORMAL.

REF: M-1-S65,M-352,M-1-S36,M-1-S40,M-1-S42,M-1-S-52

REV: 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RVI02 REACTOR LEVEL TRANSMITTER LT-6-52 FAILURE 13110

TYPE:GENERIC (A-C), VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE IN LEVEL TRANSMITTER LT-6-52 CIRCUIT.
100% IS EQUIVALENT TO 100% OF SCALE OR RANGE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES AN ELECTRONIC FAILURE OF LT-6-52A/B/C AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS EQUIVALENT TO 100% OF SCALE OR RANGE. IF LT-6-52A IS FAILED, REACTOR LEVEL A AS INDICATED ON LI-2-06-94A INDICATES THE FAILED VALUE. IF THE REACTOR LEVEL SELECTOR SWITCH IS IN THE B POSITION, NO OTHER EFFECTS WILL BE OBSERVED. IF THE REACTOR LEVEL SELECTOR SWITCH IS IN A, LR-2-06-96 INDICATES THE FAILED VALUE OF LT-6-52A AND THE FEEDWATER CONTROL SYSTEM RECEIVES THE OUTPUT AND RESPONDS TO THE FAILED VALUE BY RAISING OR LOWERING THE SPEED OF THE FEED PUMPS. REACTOR WATER LEVEL INCREASES OR DECREASES AND THE PLANT RESPONDS DYNAMICALLY TO THE CHANGES IN WATER LEVEL. THE RECIRC PUMP RUNBACK CIRCUIT RECEIVES THE FAILED VALUE OF LT-6-52A IF THE LEVEL SELECTOR SWITCH IS IN A AND A RUNBACK SIGNAL WILL BE GENERATED IF LT-6-52A IS FAILED LESS THAN 17" AND AN INDIVIDUAL FEED PUMP FLOW DECREASES TO LESS THAN 20%. THE SAME EFFECTS ARE OBSERVED IF LT-6-52B IS FAILED AND THE LEVEL SELECTOR SWITCH IS IN THE B POSITION, EXCEPT THE FAILED VALUES OF THE LT-6-52B CAN BE OBSERVED ON LI-2-06-94B VERSES LI-2-06-94A. ALSO, A MAIN TURBINE HIGH LEVEL TRIP SIGNAL IS PROCESSED AND A REACTOR FEED PUMP HIGH LEVEL TRIP SIGNAL IS PROCESSED, REGARDLESS OF THE POSITION OF THE LEVEL SELECTOR SWITCH. IF LT-6-52B IS FAILED TO +45 INCHES, THE MAIN TURBINE AND THE RFP'S WILL RECEIVE A TRIP SIGNAL. A MAIN TURBINE TRIP AND A REACTOR FEED PUMP TRIP WILL NOT OCCUR UNLESS LT-6-52C ALSO IS GREATER THAN THE TRIP SETPOINTS.

IF LT-6-52C IS FAILED, LI-6-94C WILL INDICATE THE FAILED VALUE. STARTUP FEED PUMP BYPASS VALVE LEVEL CONTROLLER LC-3558 AND STARTUP LEVEL CONTROLLER LIC-3091 RECEIVES THE FAILED VALUE AND REACTS ACCORDINGLY IF IN SERVICE. A MAIN TURBINE HIGH LEVEL TRIP SIGNAL IS PROCESSED AND A REACTOR FEED PUMP HIGH LEVEL TRIP SIGNAL IS PROCESSED IF LT-6-52C IS FAILED TO +45 INCHES.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REACTOR HI-LO WATER LEVEL - 205L

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE LEVEL TRANSMITTERS TO NORMAL.

REF: M-352 NUCLEAR BOILER VESSEL INSTRUMENTATION P&ID, M-1-325 FEEDWATER SYSTEM ELEMENTARY DIAGRAM, M-1-T-8 FEEDWATER CONTROL SYSTEM IED.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RVI03	REACTOR LEVEL TRANSMITTER LT-73 FAILURE	15071

TYPE:GENERIC (A,B,C,D), VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE IN LEVEL TRANSMITTER LT-73 CIRCUIT.
100% SEVERITY IS EQUIVALENT TO 100% OF SCALE OR RANGE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES AN ELECTRONIC FAILURE OF LT-73A,B,C OR D AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100%, IS EQUIVALENT TO WHERE 100% OF SCALE OR RANGE. INSERTION OF THIS MALFUNCTION AT 0% WILL CAUSE THE ASSOCIATED RHR 2/3 CORE COVERAGE LOGIC TO "SEE" REACTOR LEVEL AT <-226 INCHES, REGUARDLESS OF ACTUAL REACTOR LEVEL.
INSERTION OF THIS MALFUNCTION AT 100% WILL CAUSE THE ASSOCIATED RHR 2/3 CORE AVERAGE LOGIC TO "SEE" REACTOR LEVEL AT >-226 INCHES, REGUARDLESS OF ACTUAL REACTOR LEVEL.
THE CORRESPONDING INDICATOR/RECORDER WILL NOT DISPLAY THE FAILED VALUE UNLESS IT'S ASSOCIATED WIDE RANGE (72) TRANSMITTER IS <-100 INCHES.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION:

REF: M-1-363 RHR SYSTEM ELEMENTARY DIAGRAM, M-352 NUCLEAR BOILER VESSEL INSTRUMENTATION P&ID.

REV. 4

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RVI04	RPV PRESSURE TRANSMITTER PT-6-53 FAILURE	13120

TYPE:GENERIC (A,B,C), VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE IN PRESSURE TRANSMITTER PT-6-53 CIRCUIT. 100% SEVERITY IS EQUIVALENT TO 100% OF SCALE OR RANGE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES AN ELECTRONIC FAILURE OF PT-6-53A/B/C AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, IS EQUIVALENT TO 100% OF SCALE OR RANGE. THESE PRESSURE TRANSMITERS SUPPLY DENSITY COMPENSATION FOR THE FEEDWATER CONTROL SYSTEM. IF PT-6-53A IS FAILED, REACTOR PRESSURE AS INDICATED ON PI-2-04-90 ON PANEL C05 OR PI-6-90AX ON PANEL C43 INDICATES THE FAILED VALUE. IF THE REACTOR LEVEL SELECTOR SWITCH IS IN THE B POSITION, NO OTHER EFFECTS WILL BE OBSERVED. IF THE REACTOR LEVEL SELECTOR SWITCH IS IN A, LR-2-06-R6 INDICATES A LOWER LEVEL IF PT-6-53A IS FAILED LESS THAN THE ACTUAL PRESSURE, INDICATED LEVEL ON LI-6-94A DECREASES AND THE FEEDWATER CONTROL SYSTEM RESPONDS TO THE FAILED VALUE BY RAISING THE SPEED OF THE FEED PUMPS. REACTOR WATER LEVEL INCREASES AND THE PLANT RESPONDS DYNAMICALLY TO THE CHANGES IN WATER LEVEL. IF PT-6-53A IS FAILED GREATER THAN THE ACTUAL PRESSURE, INDICATED LEVEL ON LI-6-94A INCREASES AND THE FEEDWATER CONTROL SYSTEM RESPONDS TO THE FAILED VALUE BY LOWERING THE SPEED OF THE FEED PUMPS CAUSING ACTUAL REACTOR WATER LEVEL TO DECREASE. THE ACTUAL CHANGES IN REACTOR WATER LEVEL WILL BE APPROXIMATELY 5-7 INCHES AT 100% AND 0% SEVERITYS. A FAILURE OF PT-6-53B WILL HAVE SIMILAR EFFECTS EXCEPT THE FAILED VALUE CAN OF PT-6-53B CAN BE OBSERVED ON PI-06-94B VERSES PI-06-94A. IF PT-6-53C IS FAILED, PI-6-90C WILL INDICATE THE FAILED VALUE AND THE STARTUP FEED PUMP BYPASS VALVE LEVEL CONTROLLER LC-2558 AND STARTUP LEVEL CONTROLLER LIC-3091 RECEIVE THE FAILED VALUE AND REACT ACCORDINGLY (IF IN SERVICE).

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE PRESSURE TRANSMITTERS TO NORMAL.

REF: M-352 NUCLEAR BOILER VESSEL INSTRUMENTATION P&ID, M-1-525 FEEDWATER SYSTEM ELEMENTARY DIAGRAM, M-1-T-8 FEEDWATER

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
	CONTROL SYSTEM IED.	
	REV. 2	

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RV105	RPV PRESSURE TRANSMITTER PT-55 FAILURE	13VA

TYPE:GENERIC (A-D), VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE IN PRESSURE TRANSMITTER PT-55 CIRCUIT
100% IS EQUIVALENT TO 100% OF SCALE OR RANGE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED PRESSURE TRANSMITTER, PT-55A/B/C/D, TO FAIL TO THE INSTRUCTORS SPECIFIED VALUE 0-100%, WHERE 100% IS EQUIVALENT TO 100% OF SCALE OR RANGE. PT-55A THROUGH D SUPPLY PRESSURE SIGNALS TO THE RPS SYSTEM AND PCIS SYSTEM. IF PT-55B (B/C/D) IS FAILED HIGHER THAN THE VALUE EQUIVALENT TO 1045 PSIG, A REACTOR HIGH PRESSURE SCRAM SIGNAL WILL BE GENERATED IN THE RPS SYSTEM AND A HALF SCRAM OCCURS. ALSO THE APPROPRIATE RPS RELAY 5AK55A-D PICKS UP. IF PT-55A IS FAILED GREATER THAN THE VALUE EQUIVALENT TO 600 PSIG, THE FEEDWATER FLUSH ISOLATION VALVES, MO-38A AND MO-38B WILL AUTO CLOSE IF THE PROPER COINCIDENCE IS MET. ALSO THE APPROPRIATE RPS RELAY 16AK51A-D PICKS UP.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

REACTOR VESSEL HIGH PRESSURE TRIP - C2/5L
A CHANNEL OR B CHANNEL REACTOR AUTO SCRAM 2/5R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE PRESSURE TRANSMITTER TO NORMAL.

REF. M-352 NUCLEAR BOILER VESSEL INSTRUMENTATION P&ID, M-1-323 PCIS SYSTEM ELEMENTARY DIAGRAM, M-1-554 RPS SYSTEM ELEMENTARY DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RVI06	RPV PRESSURE TRANSMITTER PT-404 FAILURE	13150

TYPE:GENERIC (A-D), VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE IN PRESSURE TRANSMITTER PT-404 CIRCUIT.
100% SEVERITY IS EQUIVALENT TO 100% OF SCALE OR RANGE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED PRESSURE TRANSMITTER TO FAIL TO THE INSTRUCTORS SPECIFIED VALUE 0-100%, WHERE 100% IS EQUIVALENT TO 100% OF SCALE OR RANGE. PT-404A THROUGH D SUPPLY PRESSURE SIGNALS TO THEIR RESPECTIVE ECCS REACTOR WATER LEVEL INSTRUMENTATION PROCESSOR, FOR THE FOLLOWING FUNCTIONS:
-RX LOW PRESSURE PERMISSIVE (<450 PSIG)
-RECIRC. DISCHARGE VALVE CLOSURE (<225 PSIG)
-ATWS, TRIP OF THE RECIRC. PUMP AS AND ACTIVATION OF ARI (1120 PSIG
-DENSITY COMPENSATION OF THE WIDE RANGE (72) AND ACTIVE CORE RANGE (73) LEVEL TRANSMITTERS.
-REACTOR PRESSURE INDICATION ON PR-404 A/B (0-1500 PSIG)
INSERTION OF THIS MALFUNCTION AT 0% WILL RESULT IN ALL ASSOCIATED LOGIC AND RECORDERS TO "SEE" A REACTOR PRESSURE OF 0 PSIG, REGUARDLESS OF ACTUAL REACTOR PRESSURE. ALSO, THE ASSSOCIATED LEVEL TRANSMITTERS WILL SUPPLY A LOWER THAN ACTUAL LEVEL SIGNAL TO ALL ASSOCIATED LOGIC AND INDICATORS/ RECORDERS DUE TO DENSITY COMPENSATION.
INSERTION OF THIS MALFUNCTION AT 100% WILL RESULT IN ALL ASSOCIATED LOGIC AND RECORDERS TO "SEE" A REACTOR PRESSURE OF 1500 PSIG, REGUARDLESS OF ACTUAL REACTOR PRESSURE. ALSO THE ASSOCIATED LEVEL TRANMITTERS WILL SUPPLY A HIGHER THAN ACTUAL LEVEL SIGNAL TO ALL ASSOCIATED LOGIC AND INDICATORS/ RECORDERS DUE TO DENSITY COMPENSATION.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:
-A CHANNEL ARI TRIP
-B CHANNEL ARI TRIP
-SYSTEM I REAC VESSEL LO PRESSURE 500 PSIG
-SYSTEM II REAC VESSEL LO PRESSURE 500 PSIG

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE PRESSURE TRANSMITTER TO NORMAL.

REF: M-352, M-1-B-55, M-1-S-40, M-1-B-38 SH.226-245, E-359

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REV: 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RVI07	RPV PRESSURE TRANSMITTER PT-6-105 FAILURE	13140

TYPE:DISCRETE, VARIABLE 0-100%

CAUSE:ELECTRONIC FAILURE IN PRESSURE TRANSMITTER PT-6-105 CIRCUIT. 100% SEVERITY IS EQUIVALENT TO 100% OF SCALE OR RANGE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES PT-6-105 TO FAIL TO THE INSTRUCTORS SPECIFIED VALUE 0-100%, WHERE 100% IS EQUIVALENT TO 100% OF SCALE OR RANGE. REACTOR PRESSURE AS INDICATED ON PR-2-06-96 WILL INDICATE THE FAILED VALUE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

REACTOR HIGH PRESSURESURE 1040 PT-105

REMOVAL OF THIS MALFUNCTION RESTORES THE OPERATION OF THE PRESSURE TRANSMITTER TO NORMAL.

REF: M-352 NUCLEAR BOILER VESSEL INSTRUMENTATION P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
F 108	REFERENCE LINE BREAK-WIDE RANGE LEVEL DOWNSTREAM OF EXCESS FLOW CHECK VALVE I.7.	13060

TYPE:GENERIC (A-B), VARIABLE (0-100%)

CAUSE:PIPE RUPTURE DOWNSTREAM OF EXCESS FLOW CHECK VALVES 37A A OR B. 100% SEVERITY IS EQUIVALENT TO FULL SEVERANCE OF THE LINE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED REACTOR PRESSURE VESSEL REFERENCE LEG TO BREAK DOWNSTREAM OF EXCESS FLOW CHECK VALVE 37A/B AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO FULL SEVERANCE OF THE LINE. AT MALFUNCTION SEVERITIES LESS THAN 5% AT NORMAL OPERATING PRESSURE, THE PRESSURE IN THE REFERENCE LEG DECREASES CAUSING THE LEVEL TRANSMITTERS TO SENSE A HIGH LEVEL AND THE PRESSURE INSTRUMENTS TO SENSE A LOWER PRESSURE. AT MALFUNCTION SEVERITIES GREATER THAN 5% AT NORMAL OPERATING PRESSURE, LEAKAGE FROM REFERENCE LEG CAUSES REVERSE FLOW THROUGH THE LINE TO SEAT THE EXCESS FLOW CHECK VALVE. LEAKAGE CONTINUES FROM THE WATER TRAPPED IN THE REFERENCE LEG, CAUSING REFERENCE LEG PRESSURE TO DECREASE RAPIDLY WITH THE EXCESS FLOW CHECK VALVE SEATED. A FAILURE OF 37A REFERENCE LEG CAUSES THE FOLLOWING LEVEL TRANSMITTERS TO INCREASE UPSCALE IF THE EXCESS FLOW CHECK VALVE IS SEATED.

LT-72A CAUSES THE FOLLOWING TO OCCUR:
-LI-85A/AX INDICATES +60 INCHES
-LR-404A WILL INDICATE +60 INCHES AND WILL NOT AUTO SWAP TO LT-73A IF REACTOR LEVEL DROPS <-100 INCHES.
-RCIC AND THE MAIN TURBINE RECEIVE A PARTIAL HI LEVEL TRIP
-HPCI,RCIC,ARI,CORE SPRAY,RHR,ADS AND D/G WILL NOT RECEIVE AN "A" CHANNEL LO-LO OR LO-LO-LO LEVEL INITIATION.

LT-72C CAUSES THE FOLLOWING TO OCCUR:
-LR-110A GREEN PEN INDICATES +60 INCHES
-LR-110A BLUE PEN WILL INDICATE +60 INCHES AND WILL NOT AUTO SWAP TO LT-73C IF REACTOR LEVEL DROPS <-100 INCHES.
-HPCI AND A-B,C RPPT'S RECEIVE PARTIAL HI LEVEL TRIP
-HPCI,RCIC,ARI,CORE SPRAY,RHR,ADS AND D/G WILL NOT RECEIVE A "C" CHANNEL LO-LO OR LO-LO-LO LEVEL INITIATION.

LT-73A CAUSES THE "A" RHR 2/3 CORE COVERAGE LOGIC TO "SEE"

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REACTOR LEVEL AT >-226 INCHES. REGUARDLESS OF ACTUAL REACTOR LEVEL.

LT-73C WILL SENSE A REACTOR LEVEL >+60 INCHES.

LT-99A AND LT-99B WILL ALSO BE INHIBITED WHICH WILL INHIBIT THE "A" LOGIC OF THE LOW REACTOR WATER LEVEL CLOSURE OF THE MSIV'S.

LT-113 CAUSES LI-113 TO INDICATE +60 INCHES.

THE FOLLOWING PRESSURE INSTRUMENTS ARE ALSO EFFECTED BY THIS MALFUNCTION:

PT-404A WILL CAUSE PR-404A TO INDICATE "0" PSIG AND CORE SPRAY RHR AND RECIRC DISCHARGE VALVE WILL RECEIVE THE "A" CHANNEL LO PRESSURE PERMISSIVE.

PT-55A AND PT-55B CAUSED THE "A" AND "B" LOGIC INPUTS TO THE RPS HIGH PRESSURE SCRAM WILL BE INHIBITED. THE FEED-WATER FLUSH ISOLATION VALVES, MO-38A AND MO-38B, WILL ALSO RECEIVE A REACTOR PRESSURE PERMISSIVE SIGNAL FROM THE "A" AND "B" LOGIC PRESSURE INPUTS.

PT-105 SENSES ZERO PSIG REACTOR PRESSURE WHICH INHIBITS THE REACTOR HI PRESSURE ALARM AT 1040 PSIG. ALSO THE PR96 INDICATES DOWNSCALE.

A FAILURE OF 37B REFERENCE LEG CAUSES THE FOLLOWING LEVEL INSTRUMENTS TO INCREASE UPSCALE.

LT-72B CAUSES THE FOLLOWING TO OCCUR:
-LI-85 B/BX INDICATES +60 INCHES
-LI-91 WILL INDICATE +60 INCHES AND WILL NOT AUTO SWAP TO LT-73B IF REACTOR LEVEL DROPS <-100 INCHES.
-RCIC AND THE MAIN TURBINE RECEIVE A PARTIAL HI LEVEL TRIP
-HPCI,RCIC,ARI,CORE SPRAY,RHR,ADS AND D/G WILL NOT RECEIVE A "B" CHANNEL LO-LO OR LO-LO-LO LEVEL INITIATION.

LT-72D CAUSES THE FOLLOWING TO OCCUR:
-LR-110B GREEN PEN INDICATES +60 INCHES
-LR-110B BLUE PEN INDICATES +60 INCHES AND WILL NOT AUTO SWAP TO LT-73D IF REACTOR LEVEL DROPS <-100 INCHES.
-HPCI AND A,B,C RPT'S RECEIVE PARTIAL HI LEVEL TRIPS
-HPCI,RCIC,ARI,CORE SPRAY,RHR,ADS AND D/G WILL NOT RECEIVE

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

A "D" CHANNEL LO-LO OR LO-LO-LO LEVEL INITIATION.

LT-73B CAUSES THE "B" RHR 2/3 CORE COVERAGE LOGIC TO "SEE" REACTOR LEVEL AT >-226 INCHES, REGUARDLESS OF ACTUAL REACTOR LEVEL.

LT-73D WILL SENSE A REACTOR LEVEL >+60 INCHES.

LT-70 WILL CAUSE LR-97 TO INDICATE >-78 INCHES.

PT-58 WILL CAUSE PR-97 TO READ DOWNSCALE.

LT-99C AND LT-99D WILL INHIBIT THE LOW REACTOR WATER LEVEL CLOSURE OF THE MISV'S.

THE FOLLOWING PRESSURE INSTRUMENTS ARE ALSO AFFECTED BY THIS MALFUNCTION:

PT-404B WILL CAUSE PR-404B TO INDICATE "0" PSIG AND CORE SPRAY RHR, AND RECIRC DISCHARGE VALVE WILL RECEIVE THE "B" CHANNEL LOW PRESSURE PERMISSIVE.
PT-55C AND PT-55D WHICH CAUSES THE "C" AND "D" LOGIC INPUTS TO THE RPS HIGH PRESSURE SCRAM TO BE INHIBITED.
THE FEEDWATER FLUSH ISOLATION VALVES, MO-39A AND MO-39B, WILL ALSO RECEIVE A REACTOR PRESSURE PERMISSIVE SIGNAL FROM THE "C" AND "D" LOGIC PRESSURE INPUTS.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:
SYSTEM I REACTOR VESSEL LO PRESS 500 PSIG.
EXCESS FLOW CHECK VALVE OPERATED PANEL 221 TROUBLE - 2038B
SYSTEM II REACTOR VESSEL LO PRESS 500 PSIG.
REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-352 NUCLEAR BOILER VESSEL INSTRUMENTATION P&ID, M-1-S25 FEEDWATER SYSTEM ELEMENTARY DIAGRAM, M-1-T-8 TION FEEDWATER CONTROL SYSTEM IED, M-1-S23 PCIS SYSTEM ELEMENTARY DIAGRAM, M-1-S54 RPS SYSTEM ELEMENTARY DIAGRAM, M-1-S55 RHR SYSTEM ELEMENTARY DIAGRAM, M-1-S40 CORE SPRAY SYSTEM ELEMENTARY DIAGRAM, E-359 RECIRCULATION PUMP SUCTION AND DISCHARGE VALVE ELECTRICAL SCHEMATIC DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RVI09	REFERENCE LINE BREAK-NARROW RANGE LEVEL, DOWNSTREAM OF EXCESS FLOW CHECK, 19.	13040

TYPE:GENERIC (A-B), VARIABLE (0-100%)

CAUSE:PIPE RUPTURE DOWNSTREAM OF EXCESS FLOW CHECK VALVE 19 A/B. 100% SEVERITY IS EQUIVALENT TO FULL SEVERANCE OF THE LINE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED REACTOR PRESSURE VESSEL REFERENCE LEG TO BREAK DOWNSTREAM OF EXCESS FLOW CHECK VALVE 19A/B AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO FULL SEVERANCE OF THE LINE. AT MALFUNCTION SEVERITIES LESS THAN 5% AT NORMAL OPERATING PRESSURE, THE PRESSURE IN THE REFERENCE LEG DECREASES CAUSING THE LEVEL TRANSMITTERS TO SENSE A HIGH LEVEL AND THE PRESSURE INSTRUMENTS TO SENSE A LOWER PRESSURE. AT MALFUNCTION SEVERITIES GREATER THAN 5% AT NORMAL OPERATING PRESSURE, LEAKAGE FROM THE REFERENCE LEG CAUSES REVERSE FLOW THROUGH THE LINE TO SEAT THE EXCESS FLOW CHECK VALVE. LEAKAGE CONTINUES FROM THE WATER TRAPPED IN THE REFERENCE LEG, CAUSING REFERENCE LEG PRESSURE TO DECREASE RAPIDLY WITH THE EXCESS FLOW CHECK VALVE SEATED. A FAILURE OF 19A REFERENCE LEG CAUSES THE FOLLOWING LEVEL TRANSMITTERS TO INCREASE UPSCALE IF THE EXCESS FLOW CHECK VALVE IS SEATED.

LT-83A, WHICH SUPPLIES THE 6" REACTOR WATER LEVEL CONFIRMATORY SIGNAL TO THE "A" LOGIC FOR THE ADS SYSTEM. THIS CAUSES THE ADS "A" CHANNEL TO NOT RECEIVE THE 6" CONFIRMATORY LEVEL SIGNAL FROM LT-83A.

LT-6-52A WHICH SUPPLIES THE REACTOR LEVEL A INPUT TO THE FEEDWATER CONTROL SYSTEM. THE INCREASING LEVEL IS INDICATED ON LI-2-06-94A ON PANEL C05A. IF THE REACTOR LEVEL SELECTOR SWITCH IS IN THE B POSITION, NO OTHER EFFECTS WILL BE OBSERVED. IF THE REACTOR LEVEL SELECTOR SWITCH IS IN A, LR-2-06-94 INDICATES THE ABNORMALLY HIGH LEVEL OF LT-6-52A AND THE FEEDWATER CONTROL SYSTEM RECEIVES THE OUTPUT AND RESPONDS TO THE FAILED VALUE BY LOWERING THE SPEED OF THE FEED PUMPS. ACTUAL REACTOR WATER LEVEL WILL THEN DECREASE AND THE REACTOR WILL SCRAM DUE TO LOW WATER LEVEL.

LT-6-52C CAUSES THE HIGHER LEVEL TO BE INDICATED ON LT-6-94C. LT-6-52 SUPPLIES A LEVEL SIGNAL TO THE STARTUP FEED PUMP

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

BYPASS VALVE LEVEL CONTROLLER LC-2558 AND STARTUP LEVEL CONTROLLER LIC-8091 AND THEY WILL REACT ACCORDINGLY (IF IN SERVICE). A MAIN TURBINE HIGH LEVEL TRIP SIGNAL IS PROCESSED AND A REACTOR FEED PUMP HIGH LEVEL TRIP SIGNAL IS PROCESSED WHEN LT-6-52C INCREASES TO +45 INCHES.

LT-101A SUPPLIES LIS-101A. THE ABNORMALLY HIGH OUTPUT OF LT-101A CAUSES LIS-101A TO INHIBIT THE RPS LOW REACTOR WATER LEVEL "A" LOGIC SIGNAL AND THE PCIS LOW WATER LEVEL (THIS DOES NOT EFFECT THE MSIV LOW WATER LEVEL CLOSURE SIGNAL).

LT-101B WHICH SUPPLIES LIS-101B.
THE ABNORMALLY HIGH OUTPUT OF LT-101A CAUSES LIS-101B TO INHIBIT THE RPS LOW REACTOR WATER LEVEL "A" LOGIC SIGNAL AND THE PCIS LOW WATER LEVEL ISOLATION "A" LOGIC SIGNAL (THIS DOES NOT EFFECT THE MSIV LOW WATER LEVEL CLOSURE SIGNAL).

THE FOLLOWING PRESSURE TRANSMITTERS OUTPUT DECREASE DUE TO THEIR SENSED PRESSURE DECREASING.

PT-6-53C WHICH SUPPLIES THE DENSITY COMPENSATION INPUT TO THE REACTOR LEVEL C INSTRUMENT. THIS PRESSURE GOING LOW WILL HAVE MINIMAL EFFECT ON THE FEEDWATER CONTROL SYSTEM BECAUSE LI-6-94C IS MUCH HIGHER THAN NORMAL WHEN THE MALFUNCTION IS ACTIVE. THE DECREASE IN SENSED PRESSURE BY PT-6-53A WILL BE INDICATED ON PI-6-50A ON PANEL C05A.

A FAILURE OF 192 REFERENCE LEG CAUSES THE FOLLOWING LEVEL TRANSMITTERS TO INCREASE UPSCALE IF THE EXCESS FLOW CHECK VALVE IS SEATED.

LT-83B SUPPLIES THE 6" REACTOR WATER LEVEL CONFIRMATORY SIGNAL TO THE "B" LOGIC FOR THE ADS SYSTEM. THIS CAUSES THE ADS "B" CHANNEL TO NOT RECEIVE THE 6" CONFIRMATORY LEVEL SIGNAL FROM LT-83A.

LT-6-52B WHICH SUPPLIES THE REACTOR LEVEL B INPUT TO THE FEEDWATER CONTROL SYSTEM. THE INCREASING LEVEL IS INDICATED ON LI-2-06-94B ON PANEL C05A. IF THE REACTOR LEVEL SELECTOR SWITCH IS IN THE A POSITION, NO OTHER EFFECTS WILL BE OBSERVED. IF THE REACTOR LEVEL SELECTOR SWITCH IS IN B, LR-2-06-96 INDICATES THE ABNORMALLY HIGH LEVEL OF LT-6-52B AND THE FEED-WATER CONTROL SYSTEM RECEIVES THE OUTPUT AND RESPONDS TO THE FAILED VALUE BY LOWERING THE SPEED OF THE FEED PUMPS. ACTUAL

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REACTOR WATER LEVEL DECREASES CAUSING THE REACTOR TO SCRAM DUE TO LOW WATER LEVEL.

LT-101C WHICH SUPPLIES LIS-101C. THE ABNORMALLY HIGH OUTPUT OF LT-101C CAUSES LIS-101C TO INHIBIT THE RPS LOW REACTOR WATER LEVEL "B" LOGIC SIGNAL AND THE PCIS LOW WATER LEVEL ISOLATION "B" LOGIC SIGNAL (THIS DOES NOT EFFECT THE MSIV LOW WATER LEVEL CLOSURE SIGNAL).

LT-101D WHICH SUPPLIES LIS-101D. THE ABNORMALLY HIGH OUTPUT OF LT-101D CAUSES LIS-101D TO INHIBIT THE RPS LOW REACTOR WATER LEVEL "B" LOGIC SIGNAL AND THE PCIS LOW WATER LEVEL ISOLATION "B" LOGIC SIGNAL (THIS DOES NOT EFFECT THE MSIV LOW WATER LVEL CLOSURE SIGNAL).

THE FOLLOWING PRESSURE TRANSMITTERS OUTPUTS DECREASE DUE TO THEIR SENSED PRESSURE DECREASING.

PT-6-53B SUPPLIES THE DENSITY COMPENSATION INPUT TO THE REACTOR LEVEL B INSTRUMENT. THIS PRESSURE GOING LOW WILL HAVE MINIMAL EFFECT ON THE FEEDWATER CONTROL SYSTEM BECAUSE LI-6-94B IS MUCH HIGHER THAN NORMAL WHEN THE MALFUNCTION IS ACTIVE. THE DECREASE IN SENSED PRESSURE BY PT-6-53B WILL BE INDICATED ON PI-6-90B ON PANEL C05A.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

EXCESS FLOW CHECK VALVE OPERATED PANEL 221 TROUBLE - 203BB

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-352 NUCLEAR BOILER VESSEL INSTRUMENTATION P&ID, M-1-325 FEEDWATER SYSTEM ELEMENTARY DIAGRAM, M-1-1-8 FEEDWATER CONTROL SYSTEM IED, M-1-323 PCIS SYSTEM ELEMENTARY DIAGRAM, M-1-354 RPS SYSTEM ELEMENTARY DIAGRAM, M-1-365 RHR SYSTEM ELEMENTARY DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RVI10	REFERENCE LINE BREAK-REFUEL RANGE LEVEL DOWNSTREAM OF EXCESS FLOW CHECK VALVE 11.	13050

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:PIPE RUPTURE DOWNSTREAM OF EXCESS FLOW CHECK VALVE 11. 100% SEVERITY IS EQUIVALENT TO FULL SEVERANCE OF THE LINE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE REFUEL RANGE REFERENCE LINE BREAK DOWNSTREAM OF EXCESS FLOW CHECK VALVE 11 AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO FULL SEVERANCE OF THE LINE. AT MALFUNCTION SEVERITIES LESS THAN 5% AT NORMAL OPERATING PRESSURE, THE PRESSURE IN THE REFERENCE LEG DECREASES CAUSING THE LEVEL TRANSMITTER TO SENSE A HIGH LEVEL. AT MALFUNCTION SEVERITIES GREATER THAN 5% AT NORMAL OPERATING PRESSURE LEAKAGE FROM THE REFERENCE LEG CAUSES REVERSE FLOW THROUGH THE LINE TO SEAT THE EXCESS FLOW CHECK VALVE. LEAKAGE CONTINUES FROM THE WATER TRAPPED IN THE REFERENCE LEG, CAUSING REFERENCE LEG PRESSURE TO DECREASE RAPIDLY WITH THE EXCESS FLOW CHECK VALVE SEATED. A FAILURE OF 11 REFERENCE LEG CAUSES LT-41 OUTPUT TO INCREASE UPSCALE IF THE EXCESS FLOW CHECK VALVE IS SEATED. THIS CAUSES THE LEVEL AS INDICATED ON LI-84 ON PANEL C03 TO INCREASE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

EXCESS FLOW CHECK VALVE OPERATED PANEL 221 TROUBLE - 20388

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-352 NUCLEAR BOILER VESSEL INSTRUMENTATION P&ID.

REV. 2

TABLE 1.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RVI11	SENSING LINE BREAK-NARROWARANGE LEVEL DOWNSTREAM OF EXCESS FLOW CHECK VALVE 17A/B.	13020

TYPE:GENERIC (A/B), VARIABLE (0-100%)

CAUSE:PIPE RUPTURE DOWNSTREAM OF EXCESS FLOW CHECK VALVE 17 A OR B. 100% SEVERITY IS EQUIVALENT TO FULL SEVERANCE OF THE LINE.

PLT STA:100% POWER.

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED NARROW RANGE LEVEL SENSING LINE TO BREAK DOWNSTREAM OF EXCESS FLOW CHECK VALVE 17A/B AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO FULL SEVERANCE OF THE LINE. AT MALFUNCTION SEVERITIES LESS THAN 5% AT NORMAL OPERATING PRESSURE, THE PRESSURE IN THE VARIABLE LEG DECREASES CAUSING THE LEVEL TRANSMITTER TO SENSE A LOW LEVEL. AT MALFUNCTION SEVERITIES GREATER THAN 5% AT NORMAL OPERATING PRESSURE, LEAKAGE FROM THE VARIABLE LEG CAUSES REVERSE FLOW THROUGH THE LINE TO SEAT THE EXCESS FLOW CHECK VALVE. LEAKAGE CONTINUES FROM THE WATER TRAPPED IN THE VARIABLE LEG, CAUSING VARIABLE LEG PRESSURE TO DECREASE RAPIDLY WITH THE EXCESS FLOW CHECK VALVE SEATED.

A FAILURE OF 15A VARIABLE LEG CAUSES THE FOLLOWING LEVEL TRANSMITTERS TO DECREASE DOWNSCALE IF THE EXCESS FLOW CHECK VALVE IS SEATED. NOTE THAT ALL OF THE ACTIONS LISTED BELOW REQUIRE EITHER 2 OUT OF 2 COINCIDENSE, OR 1 OUT OF 2 TAKEN TWICE COINCIDENCE SO THAT INSERTION OF THIS MALFUNCTION ALONE WILL NOT TOTALLY DISABLE OR INHIBIT ANY AUTOMATIC FUNCTIONS.

LT-101A WHICH SUPPLIES THE RPS AND PCIS SYSTEM. THE ABNORMALLY LOW OUTPUT OF LT-101A TRIPS LIS-101A WHICH CAUSES THE RPS LOW REACTOR WATER LEVEL 'A' LOGIC SIGNAL AND THE PCIS LOW WATER LEVEL ISOLATION 'A' LOGIC SIGNAL TO TRIP CAUSING A HALF SCRAM AND PCIS ISOLATION RELAYS NOT RESET ANNUNCIATOR TO ACTUATE.

LT-101B SUPPLIES LIS-101B. THE ABNORMALLY LOW OUTPUT OF LIS-101B CAUSES 'B' RPS LOW REACTOR WATER LEVEL 'B' LOGIC TRIP AND THE PCIS LOW WATER LEVEL ISOLATION 'B' LOGIC TRIP CAUSING HALF SCRAM AND PCIS ISOLATION RELAYS NOT RESET ANNUNCIATOR TO ACTUATE.

THE 'A' AND 'B' RPS INPUTS WILL CAUSE A REACTOR SCRAM ON LOW WATER LEVEL.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

LT-83A SUPPLIES LIS-83A WHICH PROVIDES THE 6" REACTOR WATER LEVEL CONFIRMATORY "A" LOGIC FOR THE ADS SYSTEM. THIS WILL CAUSE THE 6" CONFIRMATORY WATER LEVEL SIGNAL TO BE ESTABLISED IN THE "A" ADS LOGIC CIRCUIT.

LT-6-52A SUPPLIES THE REACTOR LEVEL A INPUT TO THE FEEDWATER CONTROL SYSTEM. THE DECREASING LEVEL IS INDICATED ON LI-2-06-94A ON PANEL C05A. IF THE REACTOR LEVEL SELECTOR SWITCH IS IN THE B POSITION, NO OTHER FWC EFFECTS WILL BE OBSERVED. IF THE REACTOR LEVEL SELECTOR SWITCH IS IN A, LR-2-06-94 INDICATES THE ABNORMALLY LOW LEVEL OF LT-6-52A AND THE FEEDWATER CONTROL SYSTEM RECEIVES THE OUTPUT AND RESPONDS TO THE FAILED VALUE BY RAISING THE SPEED OF THE FEED PUMPS.

LT-6-52C SUPPLIES THE FEEDWATER CONTROL SYSTEM CAUSING THE LOWER LEVEL TO BE INDICATED ON LI-6-94C. STARTUP FEED PUMP BYPASS VALVE LEVEL CONTROLLER LC-2558 AND STARTUP LEVEL CONTROLLER LIC-3091 RECEIVES THE LOW LEVEL SIGNAL AND REACTS ACCORDINGLY (IF IN SERVICE). A MAIN TURBINE RFPT, HPCI AND RCIC HIGH LEVEL TRIP SIGNALS ('A' LOGIC) ARE PROCESSED WHEN ACTUAL LEVEL REACHES +45".

DPT-65 OUTPUT INCREASES CAUSING CORE AND CORE D/P INDICATION ON DPI-93 ON PANEL C03 TO INCREASE.

LT-61 OUTPUT DECREASES CAUSING LI-85 TO DECREASE.

A FAILURE OF 178 VARIABLE LEG CAUSES THE FOLLOWING LEVEL TRANSMITTERS TO DECREASE DOWNSCALE IF THE EXCESS FLOW CHECK VALVE IS SEATED.

LT-101C SUPPLIES LIS-101C. THE ABNORMALLY LOW OUTPUT OF LIS-101C CAUSES A RPS LOW REACTOR WATER LEVEL 'A' LOGIC TRIP AND PCIS LOW WATER LEVEL ISOLATION 'A' LOGIC TRIP CAUSING A HALF SCRAM AND PCIS ISOLATION RELAY NOT RESET ANNUNCIATOR TO ACTUATE.

LT-101D SUPPLIES LIS-101D. THE ABNORMALLY LOW OUTPUT LIS-101B CAUSES A RPS LOW REACTOR WATER LEVEL 'B' LOGIC TRIP THE A PCIS LOW WATER LEVEL ISOLATION 'B' LOGIC TRIP CAUSING A HALF SCRAM AND PCIS ISOLATION RELAYS NOT RESET ANNUNCIATOR TO ACTUATE.

THE 'A' AND 'B' RPS INPUTS WILL CAUSE A REACTOR SCRAM ON LOW WATER LEVEL.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

LT-83B WHICH SUPPLIES LIS-83B WHICH PROVIDES THE 6" REACTOR WATER LEVEL CONFIRMATORY SIGNAL TO THE "B" LOGIC FOR THE ADS SYSTEM. THIS WILL CAUSE THE 6" CONFIRMATORY WATER LEVEL SIGNAL TO BE ESTABLISHED IN THE "B" ADS LOGIC CIRCUIT.

LT-6-52B SUPPLIES THE REACTOR LEVEL B INPUT TO THE FEED-WATER CONTROL SYSTEM. THE DECREASING LEVEL IS INDICATED ON LI-2-06-94B ON PANEL C05A. IF THE REACTOR LEVEL SELECTOR SWITCH IS IN THE A POSITION, NO OTHER EFFECTS WILL BE OBSERVED. IF THE REACTOR LEVEL SELECTOR SWITCH IS IN B, LR-2-06-94 INDICATES THE ABNORMALLY LOW LEVEL OF LT-6-52B AND THE FEEDWATER CONTROL SYSTEM RECEIVES THE OUTPUT AND RESPONDS TO THE FAILED VALUE BY RAISING THE SPEED OF THE FEED PUMPS. THE MAIN TURBINE, RFPT, HPCI AND RCIC TRIP DUE TO HIGH WATER LEVEL WHEN ACTUAL LEVEL REACHES +45".

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

EXCESS FLOW CHECK VALVE OPERATED PANEL 221 TROUBLE - 2039B

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-358 NUCLEAR BOILER VESSEL INSTRUMENTATION P&ID, M-1-325 FEEDWATER SYSTEM ELEMENTARY DIAGRAM, M-1-T-9 FEEDWATER CONTROL SYSTEM IED, M-1-S21 SYSTEM ELEMENTARY DIAGRAM, M-1-S54 RPS SYSTEM ELEMENTARY DIAGRAM, M-1-S65 RHR SYSTEM ELEMENTARY DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RVI12	SENSING LINE BREAK-WIDE RANGE LEVEL DOWNSTREAM OF EXCESS FLOW CHECK 15.	13060

TYPE:GENERIC (A/B), VARIABLE (0-100%)

CAUSE:PIPE RUPTURE DOWNSTREAM OF EXCESS FLOW CHECK VALVE 15 A OR B. 100% SEVERITY IS EQUIVALENT TO FULL SEVERANCE OF THE LINE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED WIDE RANGE LEVEL SENSING LINE TO BREAK DOWNSTREAM OF EXCESS FLOW CHECK VALVE 15A/B AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO FULL SEVERANCE OF THE LINE. AT MALFUNCTION SEVERITIES LESS THAN 5% AT NORMAL OPERATING PRESSURE, THE PRESSURE IN THE VARIABLE LEG DECREASES CAUSING THE LEVEL TRANSMITTERS TO SENSE A LOW LEVEL. AT MALFUNCTION SEVERITIES GREATER THAN 5% AT NORMAL OPERATING PRESSURE, LEAKAGE FROM THE VARIABLE LEG CAUSES REVERSE FLOW THROUGH THE LINE TO SEAT THE EXCESS FLOW CHECK VALVE. LEAKAGE CONTINUES FROM THE VARIABLE LEG, CAUSING VARIABLE LEG PRESSURE TO DECREASE RAPIDLY WITH THE EXCESS FLOW CHECK VALVE SEATED. A FAILURE OF 15A VARIABLE LEG CAUSES THE FOLLOWING LEVEL TRANSMITTERS TO DECREASE DOWNSCALE IF THE EXCESS FLOW CHECK VALVE IS SEATED.

LT-99A/B WILL CAUSE A GROUP I ISOLATION ON -LO-LO LEVEL

LT-72A CAUSES THE FOLLOWING INDICATION CHANGES:
-LI-85A/AX INDICATES -165 INCHES
-LR-404A WILL NOW INDICATE THE LT-73A VALUE

LT-72C CAUSES THE FOLLOWING INDICATION CHANGES:
-LR-110A GREEN PEN INDICATES -165 INCHES
-LR-110A BLUE PEN NOW INDICATES THE LT-73C VALUE

LT-72A/C CAUSE HPCI, RCIC, CORE SPRAY AND RHR TO INITIATE, THE D/G'S WILL START AND "A" CHANNEL OF ARI WILL TRIP. ALSO HPCI AND RCIC WILL NOT TRIP ON HIGH WATER LEVEL.

A FAILURE OF 15B VARIABLE LEG CAUSES THE FOLLOWING LEVEL INSTRUMENTS TO INCREASE UPSCALE.

LT-99 C/D WILL CAUSE A GROUP I ISOLATION ON LO-LO-LO LEVEL.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

LT-72B CAUSES THE FOLLOWING INDICATION CHANGES:
-LI-85B/5K INDICATES -165 INCHES
-LI-91 WILL NOW INDICATE THE LT-72B VALUE

LT-72D CAUSES THE FOLLOWING INDICATION CHANGES:
-LR-110B GREEN PEN INDICATES -165 INCHES
-LR-110B BLUE PEN NOW INDICATES THE LT-72D VALUE

LT-72B/D CAUSE HPCI, RCIC, CORE SPRAY AND RHR TO INITIATE, THE D/G'S WILL START AND "A" CHANNEL OF ARI WILL TRIP. ALSO HPCI AND RCIC WILL NOT TRIP ON HIGH WATER LEVEL.

EXCESS FLOW CHECK VALVE OPERATED PANEL 221 TROUBLE 203BB

REACTOR LOW WATER LEVEL -46 INCHES 204B
SYSTEM I GROUP I ISO REAC VESSEL WATER LO-LO-LO LEVEL 203AA
SYSTEM II GROUP I ISO REAC VESSEL WATER LO-LO-LO LEVEL 203BB
SYSTEM I ECCS REAC VESSEL WATER LO-LO-LO LEVEL 203AA
SYSTEM II ECCS REAC VESSEL WATER LO-LO-LO LEVEL 203BB
HIGH DRYWELL PRESSURE BYPASS TIMERS INITIATED 203AA
REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-350 NUCLEAR BOILER VESSEL INSTRUMENTATION P&ID, M-1-S23 FEEDWATER SYSTEM ELEMENTARY DIAGRAM, M-1-T-3 FEEDWATER CONTROL SYSTEM IED, M-1-S23 RCIS SYSTEM ELEMENTARY DIAGRAM, M-1-S54 RPS SYSTEM ELEMENTARY DIAGRAM, M-1-S25 RHR SYSTEM ELEMENTARY DIAGRAM, M-1-S40 CORE SPRAY SYSTEM ELEMENTARY DIAGRAM, E-35, RECIRCULATION PUMP SUCTION AND DISCHARGE VALVE ELECTRICAL SCHEMATIC DIAGRAM, E-171 RECIRC MG SET DRIVE MOTOR 13.8KV BREAKER ELECTRICAL SCHEMATIC DIAGRAM.

REV. 4

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RVI13	SENSING LINE BREAK-ACTIVE CORE LEVEL DOWNSTREAM OF EXCESS FLOW CHECK VALVE 21.	13040

TYPE:GENERIC (A,B), VARIABLE (0-100%)

CAUSE:PIPE RUPTURE DOWNSTREAM OF EXCESS FLOW CHECK VALVE 21 B OR D. 100% SEVERITY IS EQUIVALENT TO FULL SEVERANCE OF THE LINE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED ACTIVE CORE LEVEL SENSING LINE TO BREAK DOWNSTREAM OF EXCESS FLOW CHECK VALVE 21B/D AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO FULL SEVERANCE OF THE LINE. AT MALFUNCTION SEVERITIES LESS THAN 5% AT NORMAL OPERATING PRESSURE, THE PRESSURE IN THE VARIABLE LEG DECREASES CAUSING THE LEVEL TRANSMITTERS TO SENSE A LOW LEVEL. AT MALFUNCTION SEVERITIES GREATER THAN 5% AT NORMAL OPERATING PRESSURE, LEAKAGE FROM THE VARIABLE LEG CAUSES REVERSE FLOW THROUGH THE LINE TO SEAT THE EXCESS FLOW CHECK VALVE. LEAKAGE CONTINUES FROM IN THE VARIABLE LEG, CAUSING VARIABLE LEG PRESSURE TO DECREASE RAPIDLY WITH THE EXCESS FLOW CHECK VALVE SEATED. A FAILURE OF 21B VARIABLE LEG CAUSES THE FOLLOWING LEVEL TRANSMITTERS TO DECREASE DOWNSCALE IF THE EXCESS FLOW CHECK VALVE IS SEATED.

LT-73A WILL CAUSE LR-404A TO INDICATE -325 INCHES IF LT-72A SENSES LEVEL LESS THAN -100 INCHES. ALSO THE "A" LOOP OF RHR "SEES" LEVEL AT LESS THAN -226 INCHES.

LT-73C WILL CAUSE LR-110A BLUE PEN TO INDICATE -325 INCHES IF LT-72C SENSES LEVEL LESS THAN -100 INCHES.

LT-113 WILL CAUSE LI-113 TO INDICATE -325 IINCHES.

FT-83B WILL FI-57B TO INDICATE "0" FLOW (No CALIBRATED JET PUMPS)

PT-404C WILL CAUSE A LOSS OF PRESSURE/TEMPERATURE COMPENSATION TO THE "C" ECCS LEVEL PROCESSOR, CAUSING LR-110A TO INDICATE A LOWER THAN ACTUAL REACTOR LEVEL. ALSO A PARTIAL LOW PRESSURE PERMISSIVE TO THE CORE SPRAY, RHR AND RECIRC LOGICS.

A FAILURE OF VARIABLE LEG 21D CAUSES THE FOLLOWING LEVEL TRANSMITTERS OUTPUT TO DECREASE.

LT-73B CAUSE LI-91 TO INDICATE -325 INCHES IF LT-72B SENSES

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

LEVEL LESS THAN -100 INCHES. ALSO THE "B" LOOP OF RHR "SEES" LEVEL AT LESS THAN -226 INCHES.

LT-73D WILL CAUSE LR-110B BLUE PEN TO INDICATE -.25 INCHES IF LT-72D SENSES LEVEL LESS THEN -100 INCHES.

FT-63D WILL CAUSE FI-87D TO INDICATE "0" FLOW (# CALIBRATED JET PUMP)

PT-404D WILL CAUSE A LOSS OF PRESSURE/TEMPERATURE COMPENSATION TO THE "D" ECCS LEVEL PROCESSOR, CAUSING LR-110B TO INDICATE A LOWER THAN ACTUAL REACTOR LEVEL. ALSO A PARTIAL LOW PRESSURE PERMISSIVE TO THE CORE SPRAY, RHR AND RECIRC LOGICS.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

EXCESS FLOW CHECK VALVES OPERATED PANEL 221 TROUBLE - 203BB

SYSTEM I REAC VESSEL LO PRESS 500 PSIG 203AA

SYSTEM II REAC VESSEL LO PRESS 500 PSIG 203BB

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-352 NUCLEAR BOILER VESSEL INSTRUMENTATION P&ID, M-1-565 RHR SYSTEM ELEMENTARY DIAGRAM, M-1-540 CORE SPRAY SYSTEM ELEMENTARY DIAGRAM, E-339 RECIRCULATION PUMP SUCTION AND DISCHARGE VALVE ELECTRICAL SCHEMATIC DIAGRAM.

REV. 4

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
FCR01	FUEL CLADDING FAILURE	13010

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:FUEL PINS RUPTURE. 100% SEVERITY IS EQUIVALENT TO 100 FUEL BUNDLES BREAKING IN THE CORE

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A FUEL CLADDING FAILURE AT THE INSTRUCTORS SPECIFIED SEVERITY. AT 100% SEVERITY, THE MAIN STEAM LINE, OFFGAS, AREA RADIATION MONITOR LEVELS IN THE VICINITY OF FLUID CARRYING SYSTEMS WHICH MAY BE CONTAMINATED, AND CONTAINMENT RAD MONITORS RADIATION INDICATIONS WILL INCREASE. PROPAGATION OF CONTAMINATION OCCURS IN THOSE SYSTEMS THAT ARE CONNECTED TO THE CORE (STEAM AND WATER), WITH THEIR RESPECTIVE PROCESS RADIATION MONITOR RAD LEVELS INCREASING. THE MAIN STEAM LINE RADIATION MONITOR INDICATIONS INCREASE TO THE HI-HI TRIP SETPOINT (10XNORMAL) AND A REACTOR SCRAM OCCURS. A PCIS GROUP I ISOLATION ALSO OCCURS, CAUSING THE MSIV'S TO CLOSE. THE FEED PUMPS OPERATE INITIALLY ON RESIDUAL STEAM AND INCREASE REACTOR WATER LEVEL. REACTOR PRESSURE INCREASES DUE TO DECAY HEAT CAUSING THE RELIEF VALVES TO OPERATE TO LOWER PRESSURE. REACTOR WATER LEVEL DECREASES DUE TO MASS LOST FROM RELIEF VALVE ACTUATION AND THE HPCI/RCIC SYSTEMS OPERATE TO MAINTAIN REACTOR WATER LEVEL.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

MAIN STEAM LINE HI RADIATION - 210
MAIN STEAM LINE HI-HI RADIATION - 210
OFF GAS HI RADIATION - 210
OFF GAS HI-HI RADIATION - 210
UNIT 2 CONTAIN. RADIATION MONITOR HI-RAD - 226R
SYSTEM I MAIN STEAM LINE HI RAD 3X - 203AA
SYSTEM II MAIN STEAM LINE HI RAD 3X - 203BB
CHANNEL A GROUP I ISOL. RELAYS NOT RESET - 205R
CHANNEL B GROUP I ISOL. RELAYS NOT RESET - 205R
MAIN STEAM LINE HI RADIATION TRIP - 205L
A CHANNEL REACTOR AUTO SCRAM - 205R
B CHANNEL REACTOR AUTO SCRAM - 205R

REMOVAL OF THIS MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REF: M-1-523 PRIMARY CONTAINMENT ISOLATION SYSTEM ELEMENTARY DIAGRAM, M-1-554 REACTOR PROTECTION SYSTEM ELEMENTARY DIAGRAM, PBAPS FSAR SECTION 3.7. THERMAL AND HYDRAULIC DESIGN, PBAPS FSAR SECTION 14.6 ANALYSIS OF DESIGN BASIS ACCIDENTS.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

FCR02 INCREASED CONTROL ROD WORTH 02030

TYPE:GENERIC (XX/YY), VARIABLE (0-100%)

CAUSE:SELECTED CONTROL ROD WORTH INEXPLICABLY INCREASES. 100% SEVERITY IS EQUIVALENT TO AN INCREASE OF 10 TIMES THE WORTH OF THE CONTROL ROD IN THE CURRENT PLANT CONDITION.

PLT STA:REACTOR STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED ROD TO HAVE AN INCREASE IN ROD WORTH 0-100%, WHERE 100% IS 10 TIMES THE WORTH OF THE ROD AT THE PRESENT PLANT CONDITIONS. APRM, LPRM, AND RBM CHANNELS WILL INDICATE HIGHER VALUES FOR FLUX LEVELS ADJACENT TO THE SELECTED ROD WHEN THAT ROD IS DRIVEN OUT OF THE CORE. A RBM ROD BLOCK MAY OCCUR DUE TO THE HIGHER FLUX LEVELS AROUND THE SELECTED ROD IF THE FAILED ROD IS SELECTED ON THE ROD SELECT RELAY PANEL. ABNORMALLY HIGH REACTOR PERIOD INDICATIONS WILL BE INCURRED WHILE THE ROD IS WITHDRAWN FROM THE CORE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

SRM PERIOD 20 SEC. - 205L
SRM HIGH INOP - 205L
IRM HIGH - 205L
A IRM HI-HI INOP - 205L
B IRM HI-HI INOP - 205L

REMOVAL OF THIS MALFUNCTION RETURNS THE ROD WORTH OF THE FAILED ROD TO NORMAL.

REF: M-1-02J REACTOR MANUAL CONTROL SYSTEM ELEMENTARY DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
SLC01	STANDBY LIQUID PUMP TRIP	C001

TYPE:GENERIC (A-B)

CAUSE:CONTACT 42 FAILS CAUSING SELECTED PUMP TO STOP.

PLT STA:SLC IN SERVICE

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED STANDBY LIQUID PUMP TO TRIP OR TO FAIL TO START IF SWITCH IS PLACED TO START FOR FAILED PUMP. THE SLC PUMP INDICATING LIGHTS INDICATE THAT THE PUMP HAS STOPPED, SLC PUMP DISCHARGE PRESSURE GOES TO REACTOR PRESSURE, SLC TANK LEVEL STOPS DECREASING, AND THE RATE AT WHICH NEGATIVE REACTIVITY IS ADDED TO THE CORE DECREASES TO 0. REACTOR POWER DECREASES AT A DECREASING RATE AND WILL EVENTUALLY STABILIZE.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE 42 CONTACTS IN THE SLC PUMP TO NORMAL AND STARTS THE PUMP IF IT'S HAND SWITCH IS IN THE APPROPRIATE POSITION.

REF: M-1-S46 STANDBY LIQUID CONTROL ELEMENTARY DIAGRAM,
M-353 STANDBY LIQUID CONTROL P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
SLC02	SQUIB VALVE LOSS OF CONTINUITY	C001

TYPE:GENERIC (A-B)

CAUSE:OPEN IN IGNITOR ELEMENTS

PLT STA:SLC INITIATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED SQUIB VALVE TO DEVELOP AN OPEN IN IT'S IGNITOR ELEMENTS. THE STANDBY LIQUID SQUIB VALVE LOSS OF CONTINUITY ANNUNCIATOR ACTUATES AND THE READY LAMP ASSOCIATED WITH THE FAILED SQUIB VALVE GOES OUT.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

STANDBY LIQUID SQUIB VALVE LOSS OF CONTINUITY - 205R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE SQUIB VALVE TO NORMAL AND CAUSES IT TO FIRE IF THE SLC SYSTEM HAND SWITCH IS IN A OR B.

REF: M-1-546 STANDBY LIQUID CONTROL ELEMENTARY DIAGRAM,
M-358 STANDBY LIQUID CONTROL P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
ECWD1	ECW PUMP TRIP	01140

TYPE:DISCRETE

CAUSE:CONTACT 2-2C (CS152-1809) IN ECW PUMP BREAKER TRIP CIRCUIT FAILS CLOSED.

PLT STA:EMERGENCY COOLING WATER PUMP RUNNING

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE ECW PUMP TO TRIP. PUMP AMPS DECREASE TO 0, DISCHARGE PRESSURE DECREASES TO 0, AND THE TEMPERATURES OF THE COMPONENTS COOLED BY THE ECW SYSTEM INCREASE. THE ECW PUMP DISCHARGE VALVE REMAINS OPEN UNTIL THE OPERATOR PLACES THE ECW PUMP HAND SWITCH IN THE TRIP POSITION. IF THE MALFUNCTION IS INSERTED WHILE THE ECW PUMP IS STOPPED, NO EFFECTS WILL BE OBSERVED UNTIL THE OPERATOR STARTS THE ECW PUMP OR AN AUTO START SIGNAL IS RECIEVED AT WHICH TIME THE ECW PUMP DOES NOT START.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF CONTACT 2-2C (CS152-1809) IN ECW PUMP BREAKER TRIP CIRCUIT TO NORMAL AND ALLOWS THE OPERATOR TO START THE ECW PUMP. IF AN ECW PUMP AUTO START SIGNAL IS STILL PRESENT WHEN THE MALFUNCTION IS REMOVED, THE ECW PUMP WILL AUTO START.

REF: E-349 ECW PUMP AND DISCHARGE VALVE ELECTRICAL SCHEMATIC DIAGRAM, M-330 EMERGENCY COOLING SYSTEM P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

ECW02 ECW COOLING FAN TRIP 01200

TYPE:GENRIC (A-C)

CAUSE:FAILURE OF VIBRATION SWITCH CAUSES HI VIBRATION TRIP OF FAN.

PLT STA:EMERGENCY COOLING WATER IN SERVICE

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED ECW COOLING TOWER FAN TO TRIP. THE APPROPRIATE FANS TROUBLE ANNUNCIATOR ACTUATES, AND THE FAILED FAN'S TOWER INLET VALVES AUTO CLOSE AS INDICATED ON PANEL C123. ECW TEMPERATURES MAY INCREASE WITH A RESULTANT INCREASE IN THE TEMPERATURES OF THE COMPONENTS COOLED BY THE ECW SYSTEM, THE AMOUNT OF INCREASE IS DEPENDENT UPON THE INITIAL PLANT CONDITIONS AND THE HEAT LOAD PRESENT ON THE SYSTEM.

ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE AS FOLLOWS:

EMERGENCY COOLING TOWER FAN A TROUBLE - C205RR
EMERGENCY COOLING TOWER FAN B TROUBLE - C205RR
EMERGENCY COOLING TOWER FAN C TROUBLE - C205RR

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF COOLING TOWER FAN'S VIBRATION SWITCHES TO NORMAL AND ALLOWS THE OPERATOR TO START THE EFFECTED FAN.

REF: E-346 EMERGENCY COOLING SYSTEM COOLING TOWER FAN INLET VALVES ELECTRICAL SCHEMATIC DIAGRAM, E-347 EMERGENCY COOLING SYSTEM COOLING TOWER FANS ELECTRICAL SCHEMATIC DIAGRAM, M-330 EMERGENCY COOLING SYSTEM PRID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
ESW01	ESW PUMP TRIP	01090

TYPE:DISCRETE

CAUSE:CONTACT 4-4C (OF 152-1503 CST) IN ESW PUMP BREAKER TRIP CIRCUIT FAILS CLOSED.

PLT STA:ESW IN OPERATION.

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED ESW PUMP TO TRIP. ESW PUMP DISCHARGE PRESSURE AND AMPS DECREASE TO 0 AS INDICATED ON PANEL C26 (OR C49). 25 SECONDS AFTER THE RUNNING ESW PUMP TRIPS THE STANDBY ESW PUMP STARTS WITH IT'S DISCHARGE PRESSURE AND AMPS INCREASING. NO EFFECTS ON THE TEMPERATURES OF THE COMPONENTS COOLED BY THE ESW SYSTEM WILL BE OBSERVED. IF THE MALFUNCTION IS INSERTED WHEN NO ESW PUMPS ARE OPERATING, NO EFFECTS WILL BE OBSERVED UNTIL THE EFFECTED PUMP IS STARTED USING IT'S HAND SWITCH, AT WHICH TIME THE ABOVE EFFECTS ARE OBSERVED, OR A DIESEL GENERATOR STARTS (EITHER AUTOMATICALLY, BY HAND SWITCH, OR BY MCA RELAY). IF A DG STARTS, THE FOLLOWING OCCURS: 22 SECONDS AFTER THE DIESEL GENERATOR STARTS, THE UNAFFECTED ESW PUMP AND THE ECW PUMP STARTS WITH THE DISCHARGE PRESSURE AND AMPS OF THE FAILED ESW PUMP REMAINING AT 0. THE REDUNDANT ESW PUMP SUPPLIES THE SYSTEM WITH COOLING WATER. 45 SECONDS AFTER THE DIESEL GENERATOR STARTS, THE ECW PUMP TRIPS IF NORMAL ESW PRESSURE IS ESTABLISHED. IF BOTH ESW PUMPS ARE FAILED, THE ECW PUMP DOES NOT TRIP AND THE ECW DISCHARGE VALVE AUTO OPENS TO SUPPLY THE DIESEL AND EMERGENCY EQUIPTMENT WITH COOLING WATER.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A/B ESW PUMP TRIP - 2269/C
A/B HEADER LOW PRESSURE - 2208/C
EMERGENCY SERVICE WATER PUMP AUTO-START - 2249

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF CONTACT 4-4C TO NORMAL AND ALLOWS THE OPERATOR TO START THE ESW PUMP. IF NORMAL ESW HEADER PRESSURE IS NOT ESTABLISHED AND A DIESEL GENERATOR IS OPERATING OR THE MCA RELAY IS ENERGIZED, THE ESW PUMP AUTO STARTS AND SUPPLIES THE ESW SYSTEM.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REF: E-137 ESW PUMPS 4.16 KV BKR ELECTRICAL SCHEMATIC DIAGRAM, M-315 ESW AND HPSW SYSTEMS P&ID, E-349 ECW PUMP AND DISCHARGE VALVE ELECTRICAL SCHEMATIC DIAGRAM, M-330 EMERGENCY COOLING SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
HPW01	HPSW PUMP TRIP	01170

TYPE:GENERIC (A-D)

CAUSE:INTERNAL SHORT CAUSES PUMP TO TRIP ON OVERCURRENT.

PLT STA:HPSW IN OPERATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED HPSW PUMP TO TRIP DUE TO OVERCURRENT. HPSW CURRENT INDICATION INCREASES UPSCALE, THEN DECREASES TO 0 WHEN THE BREAKER OVERCURRENT TRIP OCCURS. THE EFFECTED HPSW PUMPS DISCHARGE PRESSURE DECREASES AND INDICATES THE COMPANION HPSW PUMP'S DISCHARGE PRESSURE, IF OPERATING. IF HPSW HEADER PRESSURE DECREASES TO LESS THAN 250 PSIG, THE HPSW LO PRESSURE ANNUNCIATOR ACTUATES. RHR/HPSW HEAT EXCHANGER DIFFERENTIAL PRESSURE INCREASES FOR THE HEAT EXCHANGERS AFFECTED BY THIS MALFUNCTION. RHR SYSTEM TEMPERATURE REACTS DYNAMICALLY TO THE DECREASE IN COOLING WATER FLOW THRU THE AFFECTED HEAT EXCHANGERS. IF THE OPERATOR ATTEMPTS TO RESTART THE PUMP, THE CURRENT INCREASES AGAIN, THEN DECREASES AFTER THE BREAKER TRIPS.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A HIGH PRESSURE SERVICE WATER PUMP TRIP - 203A
A HIGH PRESSURE SERVICE WATER PUMP OVERCURRENT - 203A
SYSTEM I HIGH PRESSURE SERVICE WATER LO PRESSURE - 203A
B HIGH PRESSURE SERVICE WATER PUMP TRIP - 203B
B HIGH PRESSURE SERVICE WATER PUMP OVERCURRENT - 203B
C HIGH PRESSURE SERVICE WATER PUMP TRIP - 203C
C HIGH PRESSURE SERVICE WATER PUMP OVERCURRENT - 203C
D HIGH PRESSURE SERVICE WATER PUMP TRIP - 203D
D HIGH PRESSURE SERVICE WATER PUMP OVERCURRENT - 203D
SYSTEM II HIGH PRESSURE SERVICE WATER LO PRESSURE - 203D

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE HPSW PUMP TO NORMAL.

REF: M-315 ESW AND HPSW SYSTEMS P&ID, E-1,5 HPSW PUMP 4.16 KV BKR ELECTRICAL SCHEMATIC DIAGRAM, M-361 RHR SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RBW01	RBCCW PUMP TRIP	0.030

TYPE:GENERIC (A,B)

CAUSE:FAILURE OF 42 RELAY IN RBCCW PUMP MOTOR CIRCUIT

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE RUNNING RBCCW PUMP TO TRIP. RBCCW SUPPLY PRESSURE DECREASES, THE RBCCW SYSTEM LO PRESSURE ANNUNCIATOR ACTUATES, AND THE STANDBY RBCCW PUMP AUTO STARTS 20 SECONDS AFTER SUPPLY PRESSURE REACHES 90 PSIG. RBCCW SYSTEM PRESSURE INCREASES TO NORMAL AND THE COMPONENTS COOLED BY THE RBCCW SYSTEM RECEIVE FLOW.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

REACT BLDG COOLING WATER SUPPLY LO PRESS - 212R
A RECIRC PUMP MOTOR COOLING WATER LO FLOW - 204M
B RECIRC PUMP MOTOR COOLING WATER LO FLOW - 204M

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE 42 RELAY TO NORMAL AND STARTS THE AFFECTED RBCCW PUMP IF IT'S HAND SWITCH IS IN RUN.

REF: E-213 TBCCW/RBCCW PUMPS 480V STARTER ELECTRICAL SCHEMATIC DIAGRAM, M-316 SHEET 1 REACTOR BLDG COOLING WATER P&ID, M-353 REACTOR RECIRCULATION PUMP SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RBW02	RBCCW HEAT EXCHANGER TUBE LEAK	05050

TYPE:GENERIC (A/B) VARIABLE 0-100%

CAUSE:HEAT EXCHANGER TUBE CRACKING. 100% SEVERITY IS EQUIVALENT TO A 200 GPM LEAK AT NORMAL OPERATING PRESSURE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RBCCW HEAT EXCHANGER TO DEVELOP A TUBE LEAK AT THE INSTRUCTOR'S SPECIFIED SEVERITY 0-100%, WHERE 100% IS EQUIVALENT TO A 200 GPM LEAK AT NORMAL OPERATING PRESSURE. IF THE LEAK RATE FROM THE RBCCW SYSTEM IS GREATER THAN THE MAKEUP SUPPLY FLOW RATE FROM THE MAKEUP DEMIN SYSTEM, RBCCW HEAD TANK LEVEL DECREASES AND CAUSES THE RUNNING RBCCW PUMP TO CAVITATE AS INDICATED BY FLUCTUATING SUPPLY PRESSURE. THE RBCCW SYSTEM LO PRESSURE ANNUNCIATOR ACTUATES, AND THE STANDBY RBCCW PUMP AUTO STARTS 20 SECONDS AFTER SUPPLY PRESSURE REACHES 90 PSIG. THE TEMPERATURES OF THE COMPONENTS COOLED BY THE RBCCW SYSTEM INCREASE AS THE SYSTEM FLOW DECREASES. IF THE RBCCW PUMPS ARE STOPPED, SERVICE WATER FLOWS INTO THE RBCCW SYSTEM CAUSING THE RBCCW HEAD TANK TO OVERFLOW TO THE REACTOR BLDG FLOOR DRAIN SUMP. IF THE LEAK RATE IS GREATER THAN 100 GPM, THE REACTOR BLDG FLOOR DRAIN SUMP WILL EVENTUALLY OVERFLOW TO THE REACTOR BLDG FLOOR.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

REACT BLDG COOLING WATER SUPPLY LO PRESS - 212R
A RECIRC PUMP MOTOR COOLING WATER LO FLOW - 204M
B RECIRC PUMP MOTOR COOLING WATER LO FLOW - 204M
REACT BLDG HEADER TANK HI-LO LEVEL - 212R
REACT BLDG FLOOR DRAIN SUMP HI-HI LEVEL - 204R

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-314 SERVICE WATER SYSTEM P&ID, M-316 SHEET 1 REACTOR BLDG COOLING WATER P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
RBW03	RBCCW NON-ESSENTIAL LOAD VALVE AO-2253 FAILS CLOSED	02230

TYPE:DISCRETE

CAUSE:TEST SWITCH CONTACTS SHORT IN SV-2253 CIRCUIT

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES AO-2253 TO FAIL CLOSED. THIS CAUSES COOLING WATER FLOW TO BE LOST TO THE CLEANUP NON REGENERATIVE HEAT EXCHANGER AND CLEANUP RECIRC PUMP SEAL OIL COOLERS. RBCCW SUPPLY HEADER PRESSURE INCREASES AND CLEANUP TEMPERATURES INCREASES. WHEN NRHX OUTLET TEMPERATURE REACHES 200 DEGREES, THE RWCU SYSTEM ISOLATES AND THE RUNNING RWCU PUMPS TRIP.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

CLEANUP NRHX OUTLET HIGH TEMP - 204P
GROUP II AND III OUTBOARD ISOLATION RELAYS NOT RESET - 204M

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE TEST SWITCH CONTACTS TO NORMAL AND OPENS AO-2253 IF A DRYWELL CHILLED WATER/RBCCW AUTO SWAPOVER HAS NOT OCCURRED.

REF: M-327 DRYWELL COOLING CHILLED WATER SYSTEM P&ID, M-315 SHEET 1 REACTOR BLDG COOLING WATER P&ID, E-213 TBCCW/RBCCW PUMPS 480V STARTER ELECTRICAL SCHEMATIC DIAGRAM, M-1-523 PCIG SYSTEM ELECTRICAL SCHEMATIC DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RBW04 RBCCW HEAT EXCHANGER SERVICE WATER FLOW BLOCKAGE 03040

TYPE:GENERIC (A,B) VARIABLE 0-100%

CAUSE:FOULING OF RBCCW HEAT EXCHANGER TUBES. 100% SEVERITY IS EQUIVALENT TO TOTAL BLOCKAGE OF ALL THE HEAT EXCHANGER TUBES.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RBCCW HEAT EXCHANGER TO FOUL AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS EQUIVALENT TO TOTAL BLOCKAGE OF ALL THE HEAT EXCHANGER TUBES. FLOW THROUGH THE HEAT EXCHANGER DECREASES LINEARLY WITH RESPECT TO SEVERITY. RBCCW SUPPLY TEMPERATURE INCREASES AND THE TEMPERATURES OF THE COMPONENTS COOLED BY THE RBCCW SYSTEM INCREASE. THE RUNNING RWCU PUMPS TRIP WHEN THEIR SEAL TEMPS REACH 140 DEGREES F. IF NRHX OUTLET TEMPERATURE REACHES 200 DEGREES, THE RWCU SYSTEM ISOLATES AND THE RUNNING RWCU PUMPS TRIP.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

REACT BLDG COOLING WATER SUPPLY HI TEMP - 212R
CLEANUP NRHX OUTLET HIGH TEMP - 204R
A,B,C CLEANUPORECIRCAPUMPSCOOLINGWATERSHIGHITEMP 204R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE EFFECTED RBCCW HEAT EXCHANGER TO NORMAL.

REF: M-31b SHEET 1 REACTOR BLDG COOLING WATER P&ID, E-213 TBCCW/RBCCW PUMPS 480V STARTER ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

RBW05 RBCCW/TBCCW AUTO SWAPOVER FAILURE 02270

TYPE:DISCRETE

CAUSE:40 SECOND TIME DELAY CONTACT FAILS TO CLOSE

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A FAILURE OF THE AUTO SWAPOVER FEATURE OF THE RBCCW/TBCCW SYSTEMS. IF BOTH TBCCW PUMP BREAKERS ARE OPEN FOR 40 SECONDS, THE ALTERNATE SUPPLY AND RETURN VALVES TO THE UNIT 2 AIR COMPRESSORS (2A/B/CE12) AND THE CRD PUMP LUBE OIL COOLERS FAIL TO REPOSITION. TEMPERATURES OF THE AIR COMPRESSORS IF OPERATING, AND THE CRD PUMP BEARINGS INCREASE ON THE PPC. RBCCW SYSTEM TEMPERATURE AND FLOW REMAINS CONSTANT. IF THE RBCCW SYSTEM IS SUPPLYING THE TBCCW SYSTEM WHEN THE MALFUNCTION IS INSERTED, SV-2352 AND SV-2354 DEENERGIZE, REPOSITIONING AO-2352, AO-2354, AO-3157, AND STOPPING THE RBCCW SYSTEM FLOW TO THE TBCCW SYSTEM.

THERE ARE NO ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE 40 SECOND TIME DELAY CONTACT TO NORMAL AND ALLOWS THE RBCCW/TBCCW AUTO SWAPOVER TO OCCUR.

REF: M-316 SHEET 1 REACTOR BLDG COOLING WATER P&ID, M-316 SHEET 2 TURBINE BLDG COOLING WATER P&ID E-213 TBCCW/RBCCW PUMPS 480V STARTER ELECTRICAL SCHEMATIC DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEMS MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECTS	EQU NO.

RRS15 RECIRC PUMP RBCCW FLOW LOSS

TYPE: GENERIC (A-B)

CAUSE: UNEXPLAINABLE CLOG IN RBCCW LINE TO RECIRC PUMP CAUSES TOTAL LOSS OF RBCCW FLOW

PLT STA: 100%

EFFECTS: INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED RECIRC PUMP TO LOSE RBCCW FLOW. #1 AND #1 SEAL CAVITY TEMPERATURES INCREASE, RECIRC PUMP BEARING TEMPERATURES INCREASE, AND RECIRC PUMP/MOTOR VIBRATIONS INCREASE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A RECIRC PUMP COOLING WATER LO FLOW 204M
B RECIRC PUMP COOLING WATER LO FLOW 204M

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE RECIRC PUMP TO NORMAL.

REF: M-351 NUCLEAR BOILER SYSTEM P&ID, M-353 REACTOR RECIRCULATION PUMP SYSTEM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

SWS01 SERVICE WATER PUMP TRIP 01060

TYPE:GENERIC (A-C)

CAUSE:INTERNAL SHORT CAUSES THE AFFECTED PUMP TO TRIP ON OVERCURRENT.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED SERVICE WATER PUMP TO TRIP. PUMP AMPS INCREASE UPSCALE SHARPLY, THE PUMP'S SUPPLY BREAKER TRIPS, AND AMPS DECREASE TO 0. SERVICE WATER HEADER PRESSURE DECREASES AND THE TEMPERATURES OF THE SYSTEMS AND COMPONENTS COOLED BY THE SERVICE WATER SYSTEM INCREASE. FUEL POOL SERVICE WATER BOOSTER PUMPS MAY TRIP ON LOW SUCTION PRESSURE. IF THE PUMPS HAND SWITCH IS TAKEN TO START WITH THE MALFUNCTION ACTIVE, PUMP AMPS INCREASE UPSCALE AND THE SUPPLY BREAKER TRIPS.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

A/B/C SERVICE WATER PUMP OVLD - 212L
A/B/C SERVICE WATER PUMP TRIP - 212L
FUEL POOL SERVICE WATER TO HX LO PRESSURE - 212L

REMOVAL OF THE MALFUNCTION RESTORES THE SERVICE WATER PUMP TO NORMAL.

REF: E-169 SERVICE WATER PUMP 13.8 KV BREAKER ELECTRICAL SCHEMATIC DIAGRAM, M-714 SERVICE WATER SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

SWS02 SERVICE WATER PUMP STRUCTURE GATE FAILS CLOSED. 02020

TYPE:GENERIC (A-E)

CAUSE:FAILURE OF THE CONTROL SWITCH CAUSES CONTRACT 1-1C TO FAIL CLOSED IN THE MOTOR CONTROL CIRCUIT.

SWS02A - MO-2233A
SWS02B - MO-2233B
SWS02C - MO-2209
SWS02D - MO-3233A
SWS02E - MO-3233B

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED SERVICE WATER PUMP STRUCTURE GATE TO FAIL CLOSED. THE SLUICE GATES POSITION INDICATOR ON PANEL C103 INDICATES CLOSED 300 SECONDS AFTER MALFUNCTION INSERTION. A FAILURE OF 1 UNIT #3 INLET SLUICE GATE, MO-3233A OR MO-3233B WILL NOT AFFECT PLANT OPERATION. IF BOTH UNIT 3 INLET SLUICE GATE ARE FAILED CLOSED, THE B ESW PUMP WILL LOSE ITS INLET WATER SUPPLY. UNIT #3 HPSW BAY LEVEL DECREASES, AND THE B ESW PUMP AND MOTOR DRIVEN FIRE PUMP, IF OPERATING WILL EVENTUALLY LOSE IT'S SUCTION PRESSURE AND CAVITATE AS INDICATED BY FLUCTUATING DISCHARGE PRESSURE, AND LOSS OF COOLING TO THE COMPONENTS COOLED BY THE ESW PUMP. THE OPERATOR MAY INITIATTE AUTOMATIC LEVEL CONTROL FROM THE EMERGENCY COOLING WATER RESEVOIR TO THE UNIT #3 HPSW BAY BY PLACING THE HAND SWITCHES FOR THE UNIT #3 INLET SLUICE GATES IN THE CLOSE POSITION. A FAILURE OF 1 UNIT #2 INLET SLUICE GATE WILL NOT AFFECT PLANT OPERATION. IF BOTH UNIT #2 INLET SLUICE GATES ARE FAILED CLOSED, THE SERVICE WATER PUMPS, HPSW PUMPS, THE DIESEL DRIVEN FIRE PUMP AND A ESW PUMP WILL LOSE THEIR INLETT WATER SUPPLY. UNIT #2 HPSW BAY LEVEL DECREASES, AND THE SERVICE WATER PUMPS WILL EVENTUALLY LOSE IT'S SUCTION PRESSURE AND CAVITATE AS INDICATED BY FLUCTUATING SERVICE WATER SYSTEM PRESSURE. THE TEMPERATURES OF THE COMPONENTS COOLED BY THE SERVICE WATER SYSTEM INCREASE AND THE PLANT REACTS DYNAMICALLY TO THE LOSS OF SERVICE WATER. THE OPERATOR MAY INITIATE AUTOMATIC LEVEL CONTROL FROM THE EMERGENCY COOLING WATER RESEVOIR TO THE UNIT #2 HPSW BAY BY PLACING THE HAND SWITCHES FOR THE UNIT #2 INLET SLUICE GATES IN THE CLOSE POSITION. NOTE THAT THIS WILL ALSO AUTOMATICALLY TRIP THE SERVICE WATER PUMPS, CLOSE MO-499 ESW DISCHARGE TO THE DISCHARGE POND, AND START THE ESW BOOSTER

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

PUMPS. A FAILURE OF THE UNIT #2 AND UNIT #3 HPSW BAY CROSS CONNECT SLUICE GATE, MO-2209, WILL HAVE NO EFFECT ON NORMAL PLANT OPERATION SINCE IT IS NORMALLY CLOSED.

IF THE OPERATOR PLACES THE FAILED SLUICE GATES HAND SWITCH IN OPEN, THE SLUICE GATE WILL FULLY OPEN, THEN AUTOMATICALLY CLOSE ONCE IT REACHES IT'S FULL OPEN POSITION.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

UNIT 2 HIGH PRESSURE SERVICE WATER BAY LEVEL HIGH-LOW - 205RR
UNIT 3 HIGH PRESSURE SERVICE WATER BAY LEVEL HIGH-LOW - 205RR

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF CONTACTS 1-1C TO NORMAL AND ALLOWS THE AFFECTED SLUICE GATE TO REMAIN OPEN.

REF: E-343 ECW SYSTEM SLUICE GATES ELECTRICAL SCHEMATIC DIAGRAM, M-330 EMERGENCY COOLING SYSTEM P&ID.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
TBW01	TBCCW PUMP TRIP	01011

TYPE:GENERIC (A,B)

CAUSE:FAILURE OF 42 RELAY IN TBCCW PUMP MOTOR CIRCUIT.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE TBCCW PUMP TO TRIP. TBCCW SUPPLY PRESSURE DECREASES, THE TBCCW SYSTEM LO PRESSURE ANNUNCIATOR ACTUATES, AND THE STANDBY TBCCW PUMP AUTO STARTS 20 SECONDS AFTER DISCHARGE PRESSURE REACHES 70 PSIG. TBCCW SYSTEM PRESSURE INCREASES TO NORMAL AND THE COMPONENTS COOLED BY THE TBCCW SYSTEM RECEIVE FLOW. IF THE NON-RUNNING PUMP IS FAILED NO EFFECTS WILL BE OBSERVED UNTIL THE PUMP IS STARTED AT WHICH TIME THE PUMP WILL NOT START.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

TURBINE BLDG COOLING WATER SUPPLY LO PRESS - 212R
ISO-PHASE BUS TROUBLE - 203R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE 42 RELA TO NORMAL.

REF: E-213 TBCCW/RBCCW PUMPS 480V STARTER ELECTRICAL SCHEMATIC DIAGRAM, M-316 SHEET 2 TURBINE BLDG COOLING WATER P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

TBW02 TBCCW HEAT EXCHANGER TUBE LEAK 06050

TYPE:GENERIC (A,B) VARIABLE 0-100%

CAUSE:TUBE RUPTURE. 100% SEVERITY IS EQUIVALENT TO 200 GPM AT NORMAL OPERATING PRESSURE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED TBCCW HEAT EXCHANGER TO DEVELOP A TUBE LEAK AT THE INSTRUCTOR'S SPECIFIED SEVERITY 0-100%, WHERE 100% IS EQUIVALENT TO A 200 GPM LEAK AT NORMAL OPERATING PRESSURE. THE STANDBY TBCCW PUMP AUTO STARTS 20 SECONDS AFTER THE DISCHARGE PRESSURE REACHES 70 PSIG. THE TBCCW HEAD TANK LEVEL DECREASES AND CAUSES THE RUNNING TBCCW PUMP TO CAVITATE AS INDICATED BY FLUCTUATING SUPPLY PRESSURE. THE TBCCW SYSTEM LO PRESSURE ANNUNCIATOR ACTUATES. THE TEMPERATURES OF THE COMPONENTS COOLED BY THE TBCCW SYSTEM INCREASE AS THE SYSTEM FLOW DECREASES AND THE PLANT REACTS DYNAMICALLY TO THE INCREASE IN TEMPERATURE. AN RBCCW/TBCCW AUTO SWAPOVER WILL NOT OCCUR UNLESS BOTH TBCCW PUMP BREAKERS ARE OPEN. IF THE TBCCW PUMPS ARE STOPPED, AN RBCCW/TBCCW AUTO SWAPOVER WILL OCCUR 40 SECONDS LATER WITH THE RBCCW SYSTEM WILL SUPPLYING THE CRD PUMP LUBE OIL COOLERS AND THE 2A/B/CE12 AIR COMPRESSORS. SERVICE WATER FLOWS INTO THE TBCCW SYSTEM CAUSING THE TBCCW HEAD TANK TO OVERFLOW TO THE TURBINE BLDG FLOOR DRAIN SUMP WHICH IN TURN OVERFLOWS TO THE T.B. EQUIP. DRAIN SUMP. THE OPERATOR MAY MITIGATE THE EFFECTS OF THE MALFUNCTION BY SWAPPING OPERATING TBCCW HEAT EXCHANGERS USING REMOTE FUNCTION TBW01 OR TBW02, OR PROLONG PUMP CAVITATION BY USING REMOTE FUNCTIONS TBW04 OR TBW07.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

TURBINE BLDG COOLING WATER SUPPLY LO PRESS - 212P
TURB BLDG COOLING WATER HEADER TANK HI-LOW LEVEL - 212R

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M-314 SERVICE WATER SYSTEM P&ID, M-316 SHEET 1 REACTOR BLDG COOLING WATER P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
TBW03	TBCCW HEAT EXCHANGER SERVICE WATER BLOCKAGE	03240

TYPE:GENERIC (A,B) VARIABLE 0-100%

CAUSE:FOULING OF TBCCW HEAT EXCHANGER TUBES. 100% SEVERITY IS EQUIVALENT TO TOTAL BLOCKAGE OF ALL HEAT EXCHANGER TUBES.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED TBCCW HEAT EXCHANGER TO FOUL AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS EQUIVALENT TO TOTAL BLOCKAGE OF ALL THE HEAT EXCHANGER TUBES. SERVICE WATER FLOW THROUGH THE HEAT EXCHANGER DECREASES LINEARLY WITH RESPECT TO SEVERITY. TBCCW SUPPLY HEADER TEMPERATURE INCREASES AND THE TEMPERATURES OF THE COMPONENTS COOLED BY THE TBCCW SYSTEM INCREASE. THE EFFECTS OF THE INCREASED TEMPERATURES WILL BE REFLECTED ON THE OPERATION OF THE ISOLATED PHASE BUS COOLERS, CONDENSATE PUMP BEARING COOLERS, CRD PUMP LUBE OIL COOLERS, AND AIR COMPRESSORS THE OPERATOR MAY MITIGATE THE EFFECTS OF THE MALFUNCTION BY SWAPPING OPERATING HEAT EXCHANGERS USING REMOTE FUNCTIONS TBW01 OR TBW02.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

TURBINE BLDG COOLING WATER SUPPLY HI TEMP - 212B
ISO PHASE COOLING TROUBLE - 208B

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE EFFECTED TBCCW HEAT EXCHANGER TO NORMAL.

REF: M-314 SERVICE WATER SYSTEM P&ID, M-31, SHEET 1 REACTOR BLDG COOLING WATER P&ID.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

TBW04 TBCCW VALVE AO-2352 FAILS TO REPOSITION 02270

TYPE:DISCRETE

CAUSE:VALVE STEM BINDS.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES AO-2352 TO FAIL TO REPOSITION. IF BOTH TBCCW PUMP BREAKERS ARE OPEN, THE RBCCW SYSTEM ATTEMPTS TO SUPPLY THE TBCCW SYSTEM 40 SECONDS LATER. THE TBCCW TO RBCCW RETURN VALVE (AO-2352) DOES NOT POSITION TO THE RBCCW SYSTEM WHICH CAUSES THE RBCCW SYSTEM TO FILL THE TBCCW SYSTEM HEAD TANK. DEPENDING UPON THE FLOW RATE THRU THE 3/4" OUTLET LINE FROM THE CRD PUMP COOLERS AND THE 1" OUTLET FROM THE AIR COMPRESSORS, THE "A/B/C COMPRESSOR TROUBLE" ANNUNCIATOR MAY OR MAY NOT ACTUATE INDICATING LOW COOLING WATER FLOW TO THE 2A/B/CE12 COMPRESSORS. CONDENSATE PUMP TEMPERATURES INCREASE AS INDICATED ON TI-2100 PTS. 28, 29, AND 30. ISO-PHASE BUS TEMPERATURES INCREASE AS INDICATED BY THE "ISO PHASE BUS LOSS OF COOLING" ANNUNCIATORS ACTUATING. GENERATOR AMPS WILL INCREASE DUE TO THE LOSS OF ISOLATED PHASE BUS COOLING. IF THE MALFUNCTION IS ENTERED WHEN AO-2352 IS OPEN AND THE RBCCW/TBCCW SWAPOVER SIGNAL IS RESET, AO-2352 DOES NOT RESPOSITION WHICH CAUSES A REDUCED FLOW OF COOLING WATER FLOW TO THE CRD PUMP LUBE OIL COOLERS AND THE 2A/B/CE12 COMPRESSORS AND TBCCW WATER FLOWS INTO THE RBCCW SYSTEM.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

TBCCW HEADER TANK HI-LO LEVEL - 212L
A/B/C COMPRESSOR TROUBLE - 212L
ISO PHASE BUS LOSS OF COOLING - 208R

REMOVAL OF THE MALFUNCTION RESTORES THE STEM ON AO-2352 TO NORMAL AND ALLOWS AO-2352 TO REPOSITION.

REF: E-213 TBCCW/RBCCW PUMPS 480V STARTER ELECTRICAL SCHEMATIC DIAGRAM, M-316 SHEET 2 TURBINE BLDG COOLING WATER P&ID, M-316 SHEET 1 REACT BLDG COOLING WATER P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

EHH01 BYPASS VALVE FAILS OPEN 05050

TYPE:GENERIC (A-I)

CAUSE:GROUND DEVELOPS IN THE SPECIFIED SERVO MOTOR WHICH CAUSES THE ASSOCIATED BYPASS VALVE TO FAIL OPEN.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED BYPASS VALVE TO FAIL OPEN. THE EFFECTED BYPASS VALVE POSITION INDICATOR ON PANEL C08B INDICATES OPEN. THE SERVO VALVE CURRENT INDICATOR ON PANEL C08B INDICATES THAT AN OPEN CURRENT (POSITIVE) IS APPLIED TO THE EFFECTED SERVO MOTOR.
STEAM FLOW INCREASES, REACTOR PRESSURE AND REACTOR POWER DECREASE AND THE EHC SYSTEM THROTTLES THE CONTROL VALVES TO MAINTAIN THE PRESSURE SETPOINT. CONTROL VALVE POSITIONS INDICATE THE CHANGE IN POSITION AND GENERATOR OUTPUT DECREASES. BYPASS JACK OPERATION WILL HAVE NO EFFECT ON THE FAILED BYPASS VALVE'S POSITION, NOR WILL A LOW CONDENSER VACUUM SHUT THE AFFECTED VALVE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

MAIN STEAM LINE BYPASS VALVE OPEN - 208R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE VALVE SERVO MOTOR TO NORMAL AND CLOSES THE BYPASS VALVE IF A CLOSED CURRENT IS APPLIED FROM THE BYPASS CONTROL UNIT.

REF: M-2-371-1 MAIN TURBINE AND EHC SYSTEM SEK, M-2-502J BYPASS VALVE POSITIONING UNIT SCHEMATIC WIRING DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

EHH02 BYPASS VALVE FAILS CLOSED 05050

TYPE:GENERIC (A-I)

CAUSE:OPEN DEVELOPS IN THE SPECIFIED VALVES SERVO MOTOR WHICH CAUSES THE ASSOCIATED BYPASS VALVE TO FAIL CLOSED.

PLT STA:REACTOR STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED BYPASS VALVE TO FAIL CLOSED, IF OPEN. THE EFFECTED BYPASS VALVE POSITION INDICATOR ON PANEL C088 INDICATES CLOSED. THE SERVO VALVE CURRENT INDICATOR ON PANEL C088 WILL INDICATE THE OPEN OR CLOSED CURRENT FROM THE BYPASS VALVE CONTROL UNIT AMPLIFIER, THE DIRECTION AND MAGNITUDE OF THE OPEN/CLOSED CURRENT DEPENDANT UPON EHC SYSTEM AND PLANT CONDITIONS. THE VALVE WILL NOT RESPOND TO ANY EHC SYSTEM SIGNALS, INCLUDING THE MANUAL BYPASS JACK. STEAM FLOW DECREASES, REACTOR PRESSURE INCREASES, AND THE EHC SYSTEM OPENS THE REMAINING BYPASS VALVES TO MAINTAIN IT'S PRESSURE SETPOINT. IF PRESSURE CAN NOT BE MAINTAINED BY THE OPERATION OF THE REMAINING BYPASS VALVES, REACTOR PRESSURE INCREASES CAUSING A HIGH REACTOR PRESSURE OR A HIGH FLUX SCRAM.

NO ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE VALVE SERVO MOTOR TO NORMAL AND OPENS THE BYPASS VALVE IF A OPEN CURRENT IS APPLIED FROM THE BYPASS CONTROL UNIT.

REF: M-2-371-1 MAIN TURBINE AND EHC SYSTEM GEK. M-2-502J BYPASS VALVE POSITIONING UNIT SCHEMATIC WIRING DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
EHH03	BYPASS VALVE STICKS OPEN	05060

TYPE:GENERIC (A-I)

CAUSE:MECHANICAL BINDING OF STEM.

PLT STA:STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED BYPASS VALVE TO STICK ON IT'S OPEN SEAT. BYPASS VALVE POSITION INDICATION ON PANEL C08B WILL INDICATE THAT THE BYPASS VALVE IS 100% OPEN. THE EFFECTED VALVE WILL NOT RESPOND TO ANY CLOSE SIGNALS FROM THE EHC SYSTEM AND WILL NOT CLOSE IF A HIGH CONDENSER PRESSURE (LOW VACUUM) CONDITION OCCURS. THE SERVO CURRENT INDICATION ON PANEL C08B WILL CONTINUE TO INDICATE THE CORRECT CURRENT SIGNAL FROM THE BYPASS VALVE CONTROL UNIT SERVO AMPLIFIER, HOWEVER IT WILL NOT EFFECT THE FAILED BYPASS VALVE'S POSITION.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

MAIN STEAM LINE BYPASS VALVE OPEN - 208R

REMOVAL OF THE MALFUNCTION RESTORES THE AFFECTED VALVE STEM TO NORMAL AND CLOSES THE BYPASS VALVE IF A CLOSE CURRENT IS APPLIED FROM THE BYPASS CONTROL UNIT.

REF: M-2-371-1 MAIN TURBINE AND EHC SYSTEM GEK.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

EHH04 EHC HYDRAULIC PUMP TRIP 01040

TYPE:GENERIC (A/B)

CAUSE:CONTACT 2-2C IN EHC PUMP CONTROL SWITCH FAILS CLOSED.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED EHC PUMP TO STOP. EHC FLUID PRESSURE DECREASES (PANEL C08A). AT 1500 LBS THE STANDBY PUMP STARTS IF ITS CONTROL SWITCH IS IN AUTO, AND THE PUMP RUNNING INDICATING LAMPS WILL INDICATE THAT THE PUMP HAS STOPPED. IF EHC PRESSURE REACHES 1100 LBS, THE MAIN TURBINE TRIPS AND THE REACTOR SCRAMS. IF THE OPERATOR ATTEMPTS TO RESTART THE TRIPPED EHC PUMP, IT WILL IMMEDIATELY TRIP. IF BOTH EHC PUMPS ARE FAILED, THE BYPASS VALVES WILL OPERATE TO CONTROL REACTOR PRESSURE AFTER THE SCRAM., UNTIL THEIR ACCUMULATORS ARE EXHAUSTED.
THE FOLLOWING ALARMS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION:

ALARM	PANEL
EHC LO PRESS TRIP	C20SP
EHC STANDBY PUMP START	C20SL

REMOVAL OF THIS MALFUNCTION RETURNS THE OPERATION OF CONTACT 2-2C TO NORMAL.

REF: E-111 T-G EHC FLUID PUMP 480V CKT BKR ELECTRICAL SCHEMATIC DIAGRAM, M-2-125J-11 TURBINE CONTROL DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

EHL01 PRESSURE REGULATOR FAILS HIGH 04040

TYPE:GENERIC (A/B)

CAUSE:SHORT IN THE 5K RESISTOR R10 IN THE PRIMARY (SECONDARY) PRESSURE AMPLIFIER CAUSES THE SETPOINT SIGNAL TO GO TO MAXIMUM.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED PRESSURE REGULATOR TO FAIL HIGH. THE SPECIFIED PRESSURE SETPOINT INDICATION ON THE TURBINE CONTROL PANEL INCREASES FULL SCALE. IF THE 10 PSI BIAS IS INITIALLY SET ON THE B(A) REGULATOR [A(B) IS IN CONTROL], FAILING THE A(B) REGULATOR WILL CAUSE IN 'B(A) IN CONTROL' LAMP TO ILLUMINATE ON THE TURBINE CONTROL PANEL. THE TCV'S WILL INITIALLY CLOSE AND REACTOR PRESSURE AND POWER WILL INCREASE. THE TCV'S WILL REOPEN, REACTOR POWER AND GENERATOR MWE WILL RETURN TO 100% WITH PRESSURE ON PI-2184 AND 2185 ON THE TURBINE CONTROL PANEL INDICATING ABOUT 10 PSIG HIGHER THAN INITIALLY. FAILING THE B(A) REGULATOR HIGH WITH THE A(B) IN CONTROL INITIALLY WILL HAVE NO EFFECT OTHER THAN THE SETPOINT INDICATION FAILURE.

THERE ARE NO ANNUNCIATORS ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF RESISTOR R10 TO NORMAL, AND ALLOWS THE PRESSURE REGULATOR TO RETURN TO NORMAL OPERATION.

REF: M-2-371-1 MAIN TURBINE AND EHC SYSTEM GEK, M2-560-5 SH. 1 PRESSURE CONTROL UNIT SCHEMATIC WIRING DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
EHL02	PRESSURE REGULATOR FAILS LOW	03030

TYPE:GENERIC (A/B)

CAUSE:OPEN IN THE 5K RESISTOR R10 IN THE PRIMARY (SECONDARY) PRESSURE AMPLIFIER CAUSES THE SETPOINT SIGNAL TO GO TO MINIMUM.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION WILL CAUSE THE AFFECTED REGULATOR SETPOINT TO FAIL LOW. THE AFFECTED REGULATOR SETPOINT INDICATION ON THE TURBINE CONTROL PANEL FAILS DOWNSCALE. THE TCV'S OPEN UNTIL THE LOAD LIMIT SETPOINT IS REACHED. THE BPV'S WILL OPEN UNTIL THE MAXIMUM COMBINED FLOW LIMIT IS REACHED, REACTOR STEAM FLOW INCREASES, REACTOR PRESSURE DECREASES. THE INCREASED VOID FORMATION IN THE CORE CAUSES REACTOR POWER TO DECREASE. WHEN PRESSURE DECREASES TO 850 PSIG AN MSIV ISOLATION OCCURS. THIS CAUSES A REACTOR SCRAM A TURBINE TRIP WILL OCCUR ON REVERSE POWER. THE SRV'S WILL CONTROL RPV PRESSURE, HPIC AND RCIC WILL CONTROL RPV LEVEL.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

MAXIMUM COMBINED FLOW LIMIT IN CONTROL-208R
MAIN STEAM LINE BYPASS VALVE OPEN - 208R
SYSTEM I MAIN STEAM PRESSURE LOW - 203AA
SYSTEM II MAIN STEAM PRESSURE LOW - 203BB

REMOVAL OF THE MALFUNCTION RETURNS THE OPERATION OF RESISTOR R10 TO NORMAL AND ALLOWS THE PRESSURE REGULATOR TO OPERATE NORMALLY.

REF: M-2-371-1 MAIN TURBINE AND EHC SYSTEM GEK, M2-560-5 SH. 1 PRESSURE CONTROL UNIT SCHEMATIC WIRING DIAGRAM.

REF. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
EHL03	PRESSURE REGULATOR OSCILLATION	04020

TYPE:GENERIC (A/B), VARIABLE (0-100%)

CAUSE:ELECTRONIC FAILURE OF INDIVIDUAL PRESSURE TRANSMITTER CAUSES OUTPUT TO OSCILLATE WITH A 30 SECOND PERIOD. 10% SEVERITY IS EQUIVALENT TO A 50 PSIG OSCILLATION OR A 100 PSIG PEAK TO PEAK CHANGE.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR SPECIFIED PRESSURE REGULATOR TO OSCILLATE. AT 100% SEVERITY WITH A PRESSURE REGULATOR FAILED, A MAIN STEAM PRESSURE INDICATION ON THE TURBINE CONTROL PANEL (PI-2184) WILL INCREASE 50 PSIG FROM IT'S PRESENT VALUE, THEN DECREASE TO 50 PSIG LESS THAN IT'S ORIGINAL VALUE EACH 30 SECONDS. WHEN THE A REACTOR PRESSURE INDICATION INCREASES (ON PI-2184), THE CONTROL VALVES OPEN, STEAM FLOW INCREASES, REACTOR PRESSURE DECREASES, REACTOR POWER DECREASES, AND GENERATOR OUTPUT INCREASES. AS THE A PRESSURE INDICATION DECREASES ON PI-2184 THE CONTROL VALVES CLOSE, STEAM FLOW DECREASES, REACTOR PRESSURE INCREASES, REACTOR POWER INCREASES, AND GENERATOR OUTPUT DECREASES. B PRESSURE REGULATOR WILL TAKE CONTROL AND MAINTAIN REACTOR PRESSURE WHEN A MAIN STEAM PRESSURE INDICATION DECREASES LESS THAN 10 PSIG FROM B PRESSURE INDICATOR (PI-2185) WITH THE "B IN CONTROL" LAMP ILLUMINATING ON THE TURBINE CONTROL PANEL. AT 100% SEVERITY WITH A PRESSURE REGULATOR FAILED, B MAIN STEAM PRESSURE INDICATION (PI-2185) OSCILLATES 50 PSIG ABOVE AND BELOW IT'S ORIGINAL VALUE, AND HAS SIMILAR EFFECTS AS THE A PRESSURE REGULATOR FAILURE EXCEPT B PRESSURE REGULATOR WILL ONLY TAKE CONTROL WHEN IT IS 10 PSIG OR GREATER THAN 'A' MAIN STEAM PRESSURE INDICATOR.

AT HIGH SEVERITIES, THE REACTOR POWER SWINGS MAY BE SUFFICIENT TO CAUSE A SCRAM ON HI APRM FLUX.

NO ANNUNCIATORS ARE DIRECTLY ASSOCIATED WITH THIS MALFUNCTION.

REMOVAL OF THE MALFUNCTION RETURNS THE OPERATION OF THE PRESSURE TRANSMITTERS TO NORMAL.

REF: M-305 MAIN STEAM, BYPASS & CROSSAROUND P&ID,
M-2-571-1 MAIN TURBINE AND EHC SYSTEM SEQ, M2-560-5

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
	SH. 1 PRESSURE CONTROL UNIT SCHEMATIC WIRING DIAGRAM.	
	REV. 3	

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

EHL04 MAIN TURBINE ACCELERATION RELAY FAILURE 02140

TYPE:DISCRETE

CAUSE:ELECTRONIC FAILURE OF ACCELERATION REFERENCE CIRCUIT CAUSES FAST RATE CONTACTS TO CLOSE

PLT STA:TURBINE STARTUP

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE TURBINE SPEED CONTROL UNIT ACCELERATION SIGNAL TO FAIL TO ITS MAXIMUM VALUE. IF THE TURBINE SPEED IS EQUAL TO ITS SELECTED SPEED, THEN NO EFFECTS WILL BE SEEN BY THIS MALFUNCTION. IF A SPEED ERROR EXISTS, THEN THE TURBINE WILL ACCELERATE AT ABOUT 150 RPM UNTIL THE SELECTED SPEED IS REACHED. IF THE TURBINE IS NOT WARMED UP PRIOR TO THE INSERTION OF THE MALFUNCTION, THEN EXCESSIVE TURBINE VIBRATION AND POSSIBLY A HIGH VIBRATION TRIP MAY OCCUR. THE ACCELERATION CONTROL UNIT ON PANEL C08A WILL NOT BE OPERATIONAL DURING INSERTION OF THIS MALFUNCTION. THE CONTROL UNIT WILL SHOW THE STARTUP RATE SELECTED BUT WILL NOT RESPOND TO THE RATE SELECTED. THE ALARMS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

ALARM	PANEL
TURBINE HI VIBRATION	C20BL
TURBINE HI VIBRATION TRIP	C20BR

REMOVAL OF THIS MALFUNCTION WILL RETURN THE SPEED CONTROL UNIT TO NORMAL OPERATION.

REF: M2-371 MAIN TURBINE GENERATOR GEK SPEED CONTROL UNIT SECTION, M2-511J-3 SPEED CONTROL UNIT SCHEMATIC DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

EHL05 LOAD SET FAILURE 03070

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:ELECTRONIC FAILURE OF LOAD SET POTENTIOMETER CAUSES OUTPUT TO FAIL. 100% SEVERITY IS EQUIVALENT TO 100% OF LOAD SET RANGE.

PLT STA:GENERATOR SYNCHRONIZATION

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE LOAD SET POTENTIOMETER TO FAIL TO THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS 100% OF THE LOAD SET RANGE. AT 100% SEVERITY, NO EFFECTS WILL BE OBSERVED DUE TO THE EHC SYSTEM MAINTAINING REACTOR PRESSURE AT IT'S PRESSURE SETPOINT. HOWEVER, IF THE BYPASS VALVES ARE OPEN CONTROLLING PRESSURE WITH THE LOAD SETPOINT MAINTAINING GENERATOR LOAD AND THE LOAD SET POT IS FAILED AT 100%, THE CONTROL VALVES WILL OPEN AND THE BYPASS VALVES WILL CLOSE UNTIL THE PRESSURE CONTROLLER STOPS THE CONTROL VALVES FROM OPENING OR THE LOAD LIMIT SETPOINT IS REACHED. GENERATOR LOAD INCREASES. IF THE LOAD SET POT IS FAILED AT 0% THE CONTROL VALVES CLOSE, REACTOR PRESSURE INCREASES, AND THE BYPASS VALVES OPERATE TO ATTEMPT TO MAINTAIN REACTOR PRESSURE. IF STEAM FLOW IS GREATER THAN APPROX. 25% THE BYPASS VALVES CAN NOT CONTROL PRESSURE AND REACTOR PRESSURE WILL CONTINUE TO INCREASE WITH A RESULTANT INCREASE IN REACTOR POWER. THE REACTOR WILL AUTOMATICALLY SCRAM DUE TO EITHER HIGH PRESSURE OR HIGH FLUX. OPERATION OF THE LOAD SET POTENTIOMETER ON THE TURBINE CONTROL PANEL WILL NOT EFFECT THE LOAD SET SIGNAL WHILE THE MALFUNCTION IS ACTIVE. THE OPERATOR CAN CLOSE THE CONTROL VALVES, IF DESIRED, USING THE LOAD LIMIT POTENTIOMETER.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

MAIN STEAM BYPASS VALVES OPEN - 2038

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE LOAD SET POTENTIOMETER TO NORMAL.

REF: M2-371 MAIN TURBINE GENERATOR GEK LOAD LIMIT CIRCUITS AND LOGIC SECTION, M2-529-J-1 LOAD CONTROL UNIT SCHEMATIC DIAGRAM.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
EHL06	LOAD RUNBACK FAILS TO TERMINATE	C003

TYPE:DISCRETE

CAUSE:FAILURE OF RELAY XKL-209 IN LOAD REFERENCE CIRCUIT.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE LOAD REFERENCE MOTOR TO DECREASES THE LOAD REFERENCE SIGNAL IN THE LOAD CONTROL UNIT TO APPROXIMATELY 0 WHEN ANY LOAD RUNBACK SIGNAL IS RECIEVED. THE CONTROL VALVES EXCEPT LOSS OF STATOR COOLING CLOSE, GENERATOR OUTPUT DECREASES TO 0, REACTOR PRESSURE INCREASES, AND REACTOR POWER INCREASES. THE BYPASS VALVES OPEN AND ATTEMPT TO CONTROL REACTOR PRESS. SINCE THE BYPASS VALVES CAN PASS ONLY APPROX. 25% STEAM FLOW, REACTOR PRESSURE CONTINUES TO INCREASE WITH A RESULTANT INCREASE IN REACTOR POWER DUE TO VOID COLLAPSE. THE REACTOR SCRAM DUE TO HIGH PRESSURE, OR HIGH FLUX. OPERATION OF THE LOAD LIMIT POTENTIOMER OR THE LOAD SET POTENTIOMETER WILL NOT EFFECT THE LOAD SIGNAL.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

MAIN STEAM BYPASS VALVES OPEN - 208R

REMOVAL OF THE MALFUNCTION RETURNS THE OPERATION OF RELAY XKL-209 IN THE LOAD REFERENCE CIRCUIT TO NORMAL AND ALLOWS THE OPERATOR TO LOWER THE LOAD LIMIT POT TO 0 TO RESET THE RUNBACK SIGNAL IN THE LOAD LIMIT CIRCUIT.

REF: M2-371 MAIN TURBINE GENERATOR GEK LOAD LIMIT CIRCUITS AND LOGIC SECTION, M2-529-J-1 LOAD CONTROL UNIT SCHEMATIC DIAGRAM, M2-371 MAIN TURBINE GEK FIG. 43-5.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

MTA03 TURBINE HP VALVE FAILS CLOSED 06110

TYPE:GENERIC (A-H)

THE FOLLOWING COMPONENTS ARE ASSOCIATED WITH THIS MALFUNCTION:

A: MSV-1 D: MSV-4 G: CV-3
B: MSV-2 E: CV-1 H: CV-4
C: MSV-3 F: CV-2

CAUSE:MECHANICAL FAILURE OF DISC DUMP VALVE.

LT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A MAIN STOP OR CONTROL VALVE TO FAIL CLOSED. THE AFFECTED VALVE'S POSITION INDICATOR INDICATES CLOSED. REACTOR PRESSURE INCREASES AND REACTOR POWER INCREASES. MAIN TURBINE FIRST STAGE EXHAUST PRESSURE DECREASES, GENERATOR OUTPUT DECREASES, AND A REACTOR HALF SCRAM OCCURS DUE TO A CONTROL VALVE FAST CLOSURE TRIP SIGNAL BEING PROCESSED FROM THE FAILURE OF IT'S DISK DUMP VALVE. THE TURBINE CONTROL SYSTEM OPENS THE OPERATIONAL CONTROL VALVES TO CONTROL REACTOR PRESSURE. REACTOR PRESSURE DECREASES TO NORMAL, AND REACTOR POWER DECREASES TO NORMAL, A POWER INCREASE OF 10% MAY BE EXPECTED. IF A STOP VALVE IS FAILED VERSUS A CONTROL VALVE, THE SAME EFFECTS WILL BE OBSERVED EXCEPT A SMALLER POWER INCREASE WILL BE OBSERVED. IF THE NUMBER 2 SV IS CLOSED THE REMAINING SVS WILL CLOSE AND CAUSE A SCRAM IF POWER IS GREATER THAN 30%.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

TURBINE STOP VALVE CLOSURE TRIP - 205L
TURBINE CONTROL VALVE FAST CLOSURE TRIP - 205L
REACTOR NEUTRON MONITORING SYSTEM TRIP - 205L
APRM HIGH - 205R
APRM HI-HI INOPERATIVE - 205R

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE AFFECTED VALVES DISK DUMP VALVE TO NORMAL.

REF: M-2-371-1 MAIN TURBINE AND EHC SYSTEM GEK, M2-125J TURBINE CONTROL DIAGRAM, M-303 MAIN STEAM BYPASS AND CROSSAROUND SYSTEM P&ID.

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

MTA07 TURBINE LP VALVE FAILS CLOSED 07090

TYPE:GENERIC (A-L)

CAUSE:FAILURE OF DISK DUMP VALVE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE INSTRUCTOR'S SPECIFIED INTERCEPT VALVE OR INTERCEPT STOP VALVE TO FAIL CLOSED. THE VALVES ASSOCIATED WITH THIS MALFUNCTION ARE:

A:IV-1	E:IV-3	I:IV-5
B:ISV-1	F:ISV-3	J:ISV-5
C:IV-2	G:IV-4	K:IV-6
D:ISV-2	H:ISV-4	L:ISV-6

THE SELECTED IV OR ISV INDICATES CLOSED ON PANEL C08B. IF INTERCEPT VALVE #1, #3, OR #5 IS FAILED, THE ASSOCIATED IV SLAVE VALVE WILL AUTO CLOSE WHEN THE FAILED INTERCEPT VALVE IS 50% OPEN. FOR EXAMPLE, IF IV-1 IS FAILED, THEN IV-4 STARTS CLOSING WHEN IV-1 IS 50% OPEN. THE ASSOCIATED LP TURBINE'S INLET PRESSURE, SEVENTH, EIGHTH, TENTH, AND TWELFTH STAGE PRESSURE DECREASES. THE ASSOCIATED MOISTURE SEPARATOR D/P INDICATOR(S) DECREASE TO '0' AND THE OTHER MOISTURE SEPERATOR D/P INDICATORS INCREASE. THE ASSOC. M.S. DRAIN TANK LOW LEVEL ALARM ON 208R ANNUNCIATES. MAIN STEAM FLOW DECREASES, REACTOR PRESS AND POWER INCREASES, GENERATOR OUTPUT DECREASES, THE TURBINE CONTROL SYSTEM OPENS THE CONTROL VALVES AND/OR BYPASS VALVES TO MAINTAIN REACTOR PRESSURE AT THE PRESSURE REGULATOR SETPOINT, REACTOR PRESSURE DECREASES WITH A RESULTANT DECREASE IN REACTOR POWER. MAIN STEAM FLOW INCREASES TO IT'S ORIGINAL VALUE, GENERATOR OUTPUT INCREASES, AND THE PRESSURES ASSOCIATED WITH THE LP TURBINES THAT DO NOT HAVE FAILED VALVES INCREASE. THE FEED WATER HEATERS ASSOCIATED WITH THE AFFECTED LP TURBINE WILL RECEIVE LESS HEATING STEAM AS INDICATED BY LOWER DRAIN TEMPERATURES AND LOWER FEEDWATER TEMPERATURES. THE TEMPERATURES OF THE HEATERS ASSOCIATED WITH THE OTHER LP TURBINES INCREASE AS STEAM PRESSURES AND FLOWS THRU THE TURBINES INCREASE. REACTOR POWER INCREASES SLIGHTLY DUE TO LOWER F.W. INLET TEMP. THIS RESULTS IN A SLIGHT INCREASE IN GEN. OUTPUT.

ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION:

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE, RANGE/CAUSE & EFFECT	EQU NO.

MOISTURE SEPERATOR DRAIN TANK LOW LEVEL - 20FR

REMOVAL OF THE MALFUNCTION RESTORES THE OPERATION OF THE DISK DUMP VALVES TO NORMAL AND OPENS THE AFFECTED VALVE IF AN OPEN SIGNAL IS PRESENT FROM THE TURBINE CONTROL SYSTEM.

REF: M-304 TURBINE AND EXTRACTION STEAM SYSTEM P&ID, M 303 VENTS AND DRAINS HEATERS 3, 4, & 5, M-2-371-1 MAIN TURBINE AND EHC SYSTEM GEK, M2-125J TURBINE CONTROL DIAGRAM, M-303 MAIN STEAM BYPASS AND CROSSAROUND SYSTEM P&ID.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
ML001	MAIN TURBINE BEARING OIL PRESSURE DECREASE	05070

TYPE:DISCRETE, VARIABLE (0-100%)

CAUSE:OIL SUPPLY PIPING BREAKS INSIDE SUMP ON THE INLET TO THE OIL COOLER. 100% SIVERITY IS EQUIVALENT TO A COMPLETE LOSS OF PRESSURE AT THE MAIN TURBINE BEARINGS.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A LUBE OIL PIPING RUPTURE AT THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% IS EQUIVALENT TO A COMPLETE LOSS OF PRESSURE AT THE MAIN TURBINE BEARINGS. DRIVING OIL PRESSURE AND BEARING HEADER PRESSURE DECREASES. IF BEARING HEADER PRESSURE REACHES 10 PSI, THE EBOP STARTS. IF BEARING HEADER PRESSURE REACHES 8 PSIG THE MAIN TURBINE TRIPS DUE TO THE ACTUATION OF THE THRUST BEARING WEAR/LOW BEARING OIL PRESSURE TRIP. BEARING TEMPERATURES INCREASE DUE TO THE LOW OIL FLOW CONDITION. IF 100% SEVERITY IS SELECTED, BEARING DAMAGE OCCURS DURING TURBINE COASTDOWN AS INDICATED BY INCREASED VIBRATION. IF SUBSEQUENY TURBINE STARTUP IS ATTEMPTED, INCREASED VIBRATIONS WILL BE INCURRED AND THE TURBINE WILL TRIP WHEN IT REACHES 100 RPM.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

EMERGENCY BEARING OIL PUMP RUNNING - 203R
THRUST BEARING WEAR TRIP - 203P

REMOVAL OF THIS MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M2-125J TURBINE CONTROL DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.
ML002	MAIN SHAFT OIL PUMP FAILURE	0:010

TYPE:DISCRETE

CAUSE:COMPLETE MECHANICAL FAILURE OF THE MAIN SHAFT OIL PUMP IMPELLER.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE MAIN SHAFT OIL PUMP IMPELLER TO FAIL. DRIVING OIL PRESSURE DECREASES THROUGH 125 PSIG CAUSING THE TURNING GEAR OIL PUMP TO START. BEARING OIL HEADER PRESSURE DECREASES WHEN THE MALFUNCTION IS INSERTED, AND INCREASES WHEN THE TGOP STARTS. THE MOTOR SUCTION PUMP AUTO STARTS DUE TO THE PRESSURE FROM THE OIL DRIVEN BOOSTER PUMP DECREASING TO LESS THAN 10 PSIG. SHAFT OIL PUMP DISCHARGE PRESSURE DECREASE TO 105 PSIG, A TRIP SIGNAL IS SENT TO THE [illegible] SYSTEM. IF TURBINE SPEED IS <1300 RPM WHEN THE MALFUNCTION IS INSERTED, THE TURBINE WILL NOT TRIP IF MAIN SHAFT OIL PUMP DISCHARGE PRESSURE DECREASES TO 105 PSIG. THE TGOP WILL STILL START WHEN MAIN SHAFT OIL PUMP DISCHARGE PRESSURE (DRIVING OIL PRESSURE) DECREASES TO 125 PSIG, CAUSING BEARING HEADER PRESSURE TO INCREASE.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

MAIN OIL PUMP DISCH LO PRESS TRIP - 20PD

REMOVAL OF THE MALFUNCTION REQUIRES REINITIALIZATION OF THE TRAINER.

REF: M2-125J TURBINE CONTROL DIAGRAM.

REV. 3

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

MTA01 MAIN TURBINE BEARING HIGH TEMPERATURE 05060

TYPE:GENERIC (A-L) VARIABLE (0-100%)

CAUSE:BLOCKAGE IN OIL SUPPLY LINE TO TURBINE BEARING CAUSE THE BEARING TEMPERATURE TO INCREASE. 100% SEVERITY IS EQUIVALENT TO 300 DEG. F GREATER THAN INITIAL BEARING TEMPERATURE.

PLT STA:100%

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES THE SELECTED BEARING'S GREATER THAN INITIAL BEARING TEMPERATURE. BEARING AND BEARING LUBE OIL DRAIN TEMPERATURE INCREASES ON THE PPC AND TR-2401,2402. WHEN ANY BEARING TEMPERATURE REACHES 180 DEGREES, THE HIGH TEMPERATURE ANNUNCIATOR ACTUATES. IF BEARING TEMPERATURE REACHES 300 DEGREES, DAMAGE OCCURS AS INDICATED BY DECREASING METAL TEMPERATURES, INCREASING VIBRATION, AND A MAIN TURBINE HIGH VIBRATION TRIP. IF BEARING DAMAGE DOES NOT OCCUR, FINAL TEMPERATURE WILL BE A FUNCTION OF TURBINE LOAD AND THE MALFUNCTION SEVERITY SELECTED.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

TURBINE BEARING DRAIN OIL HIGH TEMPERATURE - 203L
TURBINE BEARING DRAIN OIL HIGH TEMPERATURE - 208L
TURBINE BEARING METAL PLATE HI TEMP - 208L
TURBINE BEARING METAL HI TEMP - 208L

REMOVAL OF THE MALFUNCTION RETURNS THE BEARING TEMPERATURE TO NORMAL. IF BEARING DAMAGE HAS OCCURRED, THE TRAINER WILL HAVE TO BE RESET TO REMOVE THE DAMAGE.

REF: M2-125J TURBINE CONTROL DIAGRAM.

REV. 1

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/RANGE/CAUSE & EFFECT	EQU NO.

MTA02 MAIN TURBINE BEARING HIGH VIBRATION 02030

TYPE:GENERIC (A-L) VARIABLE (0-100%)

CAUSE:ROTOR IMBALANCE CAUSES THE TURBINE BEARING VIBRATION TO INCREASE AT .5 MIL/MIN TO THE INSTRUCTOR SPECIFIED VALUE WHERE 100% = 16 MILS GREATER THAN THE INITIAL VALUE.

PLT STA:100%

EFFECTS:THIS MALFUNCTION CAUSES THE SELECTED BEARING'S VIBRATION TO INCREASE AT .5 MIL/MIN TO THE INSTRUCTORS SPECIFIED SEVERITY 0-100%, WHERE 100% SEVERITY IS EQUIVALENT TO A 16 MIL INCREASE IN BEARING VIBRATION FROM IT'S INITIAL VALUE. VIBRATION INDICATION INCREASES FOR THE FAILED BEARING AS INDICATED ON VIBRATION RECORDER VR-2657 AND THE PPC. THE BEARING ADJACENT TO THE FAILED BEARING WILL INDICATE SLIGHTLY HIGHER VIBRATIONS PROPORTIONAL TO THE INCREASE IN VIBRATION OF THE EFFECTED BEARING. IF THE VIBRATION OF ANY BEARING REACHES 8.5 MILS, THE HIGH VIBRATION ANNUNCIATOR ACTUATES. IF THE VIBRATION INCREASES TO 10 MILS ON BEARINGS 1 AND 2, OR 12 MILS ON BEARINGS 3 THROUGH 10, A TURBINE HI VIBRATION TRIP OCCURS. IF THE GENERATOR OUTPUT BREAKER IS OPEN, AND THE HIGH VIBRATION TRIP SETPOINT IS REACHED, THE HI VIBRATION TRIP WILL OCCUR AFTER A 30 SECOND TIME DELAY.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

TURBINE HI VIBRATION - 208P
TURBINE HI VIBRATION TRIP - 208L

REMOVAL OF THE MALFUNCTION RESTORES THE VIBRATION OF THE FAILED BEARING TO NORMAL.

REF: M-2-371-1 MAIN TURBINE AND EHC SYSTEM GEK, PLANT ANNUNCIATOR RESPONSE CARDS.

REV. 2

TABLE I.C-1
SYSTEM MALFUNCTIONS

MALF NO.	MALFUNCTION TITLE/ANN/CAUSE & EFFECT	EQU NO.

PPC01 PLANT PROCESS COMPUTER FAILURE

TYPE:DISCRETE

CAUSE:INTERNAL POWER SUPPLY TO SC-4020 FAILS.

PLT STA:100% POWER

EFFECTS:INSERTION OF THIS MALFUNCTION CAUSES A FAILURE OF THE PLANT PROCESS COMPUTER. THE ALARM AND CRT TYPE STOP, ALL INDICATOR WINDOWS ON THE PPC CONSOLE GO OUT, ALL PROGRAMS IN PROCESS STOP AND ARE ABORTED, THE PPC COMPUTER HARDWARE ALARM WINDOW ILLUMINATES AND THE HARDWARE ALARM HORN SOUNDS. THE TREND RECORDER PENS ASSOCIATED WITH THE PPC MAINTAIN THEIR PRESENT POSITIONS AND DO NOT CHANGE WITH CHANGES IN PLANT PARAMETERS. THE RWM PROGRAM IN THE PPC ABORTS AND A INSERT AND WITHDRAW BLOCK IS ENFORCED UNTIL THE RWM IS MANUALLY BYPASSED. THE FOLLOWING INDICATORS ILLUMINATE ON THE RWM CONSOLE: INSERT BLOCK, WITHDRAW BLOCK, SELECT ERROR, RWM, COMP, PWR, AND BUFF.

THE ANNUNCIATORS DIRECTLY ASSOCIATED WITH THIS MALFUNCTION ARE:

ROD WITHDRAWAL BLOCK - 205A
ROD WORTH MINIMIZER ROD BLOCK - 205B

REMOVAL OF THE MALFUNCTION RESTORES POWER TO THE PLANT PROCESS COMPUTER AND ALLOWS THE OPERATOR TO REINITIALIZE THE RWM AND USE THE COMPUTER OUTAGE RECOVERY MONITOR PROGRAM CO-15 OPTION 2 TO ENTER THE CORRECT DATE AND TIME IN THE PPC.

REF: M-1-3E0 SH.2 REACTOR MANUAL CONTROL SYSTEM ELECTRICAL SCHEMATIC DIAGRAM, PEACH BOTTOM UNITS 2 AND 3 PLANT PROCESS COMPUTER SYS, M-1-5I1 ROD WORTH MINIMIZER SYSTEM ELECTRICAL SCHEMATIC DIAGRAM.

REV. 2