DOCUMENT REVISION DISTRIBUTION SHEET - UNIT 1 OFF NORMAL & EMERGENCY OPER. PROCEDURE

DOCUMENT TITLE BLACKOUT OPERATION

DOCUMENT FILE NUMBER 0030140

DOCUMENT REVISION NUMBER 26

DOCUMENT DISTRIBUTED ON 4-26-83
DATE

DOCUMENT SENT TO:

COPY NO.	DOCUMENT HOLDER	TRANSMITTAL RETURNED	COPY NO.	DOCUMENT HOLDER	TRANSMITTAL RETURNED
	MASTER			UNCONTROLLED COPIES	
1	NTO			NRC-Region II	
2				Attn: EPPS BRANCH CHIEF	
3				H. Paduano - GO	
4				A. W. Bailey	
5	N. C. Roos			G. Anglehart - CE	
6	TSC			Training	
7				Training	
8				Training	
9	Watch Engineers I			G. Regal	
10	Control Room II			A.J. Upelow Backfit Eng.	
11				Training-Larry Baker	
12					
13	A&O-Tech				
14					
15	Training			T. Vogan - GO	
				~~C. J. Bailey~~	
				R. R. Jennings	
				H. M. Mercer	
				J. Spodick	
				Resident NRC	
				~~NRC~~ - IE : HQ	
				Attn: Chief, Nuclear Response Branch	

8306220236 830606
PDR ADOCK 05000335
F PDR

PROCESSED BY: [signature] DATE _____

*Note: New distribution per instructions. Effective 9-12-79.

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT #1
EMERGENCY OPERATING PROCEDURE NO. 0030140
REVISION 26

1.0 Title:

BLACKOUT OPERATION

2.0 Approval:

Reviewed by Plant Nuclear Safety Committee _____ 19__
Approved by _____ Plant Manager _____ 19__

Revision 25 Reviewed by Facility Review Group _____ 19__
Approved by _____ Plant Manager 4-25- 1982

Revision 26 Reviewed by Facility Review Group April 6, 1983
Approved by _____ Plant Manager _____ 19__

3.0 Purpose or Discussion:

3.1 This procedure provides the action to be taken in the event of a complete loss of off site electrical power concurrent with a turbine trip.

3.2 Discussion

3.2.1 A loss of power to the 4160 V buses, results in a loss of power to all 480 V load centers and motor control centers and to all instrumentation not fed directly or indirectly from the station battery. A reactor trip will occur from a low reactor coolant flow rate signal due to the loss of power to the 6900 V buses supplying the reactor coolant pumps and will be accompanied by a turbine trip and generator lockout.

3.2.2 Steam dump to atmosphere must be used to remove reactor decay heat. Initially, steam generator safety valves may actuate to augment the steam flow and to help control steam generator pressure immediately after the trip.

3.2.3 On site power will be supplied by Emergency Generators.

3.3 A rapid reduction in steam generator water levels will occur due to the reduction of the steam generator void fraction on the secondary side and also because steam flow will continue after normal feedwater flow stops. Auxiliary feedwater flow will automatically initiate 3 minutes after the first steam generator level reaches 34% (2/4 logic).

3.0 Purpose or Discussion: (Cont'd)

3.4 Core decay heat removal is accomplished by natural circulation in the reactor coolant loops.

3.5 Core damage is not expected as a result of a loss of power condition as the steam generators are maintained as a heat sink and no loss of water occurs from the pressurizer.

3.6 If operating under blackout conditions and an engineered safety features actuation signal occurs, any non-emergency loads that are running will be automatically tripped and the required emergency loads will be automatically started.

4.0 Symptoms:

4.1 Alarms associated with the loss of operating plant components.

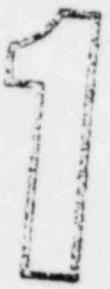
4.2 Loss of normal control room lighting and DC lighting energized.

4.3 Reactor and turbine trip.

4.4 Emergency diesel generators start.

4.5 Reactor coolant pump trip and steam generator feed pump trip.

EMERGENCY OPERATING PROCEDURE NO. 0030140, REV 26
BLACKOUT OPERATION



5.0 Instructions:

5.1 Immediate auto action

5.1.1 Reactor and turbine trip, generator lockout

5.1.2 Generator breakers open.

5.1.3 Incoming feeder breakers open to 4160 V and 6900 V buses.

5.1.4 Tie breakers between Normal 4160 buses (1A2 and 1B2) and the emergency 4160 V buses (1A3 and 1B3) open.

5.1.5 Ties between essential and non-essential sections of emergency 480 V MCC's open.

5.1.6 Breakers open for the following non-safety related loads which are normally fed from emergency buses.

NOTE: These loads can be manually reconnected to the emergency buses as needed.

5.1.6.1 Pressurizer heater transformers 1A and 1B.
5.1.6.2 Fire pump 1A and 1B.
5.1.6.3 CEA Drive M.G. 1A & 1B.
5.1.6.4 Fuel Handling 480 V MCC 1A8, 1B8/
5.1.6.5 Reactor cavity sump pump 1A
5.1.6.6 Reactor building elevator
5.1.6.7 Electrical equipment room hoist
5.1.6.8 120/208 power panel 121 transformer
5.1.6.9 Lighting panel transformers 110, 112, 114, 117, 125, 126
5.1.6.10 Incoming feeder from 1A2 & 1B2 4160V buses
5.1.6.11 RCP oil lift pumps (8 pumps only - A pumps running)
5.1.6.12 Airborne radioactivity removal fans HVE-1&2
5.1.6.13 Pressurizer relief isol valves 1403 & 1405
5.1.6.14 CVCS heat tracing transformer 1A & 1B
5.1.6.15 480V Lighting panel 2A, 2B & 2C
5.1.6.16 Waste management heat tracing transformers 2A & 2B
5.1.6.17 Air conditioner HVA-4, ACC-4.
5.1.6.18 Power panel 120
5.1.6.19 Lighting panels 113, 116, 109, 115, 130
5.1.6.20 Refueling equipment
5.1.6.21 Refueling water to charging pumps V-2504
5.1.6.22 Boric Acid batching tank heaters
5.1.6.23 Fire siren

EMERGENCY OPERATING PROCEDURE NO. 0030140, REV 26
BLACKOUT OPERATION

5.0 Instructions: (cont)

5.1 (cont)

5.1.7 All loads on emergency buses are tripped except the following:

5.1.7.1 Boric Acid makeup pumps
5.1.7.2 Charging pumps
5.1.7.3 Emergency lighting
5.1.7.4 Class I power panels
5.1.7.5 RCP oil lift pumps (A pumps only - B pumps off)
5.1.7.6 Diesel fuel transfer pump.

5.1.8 Diesel generators A & B start and energize 4160 V emergency buses 1A3, 1B3, and 1AB and loads listed in step 5.1.7.

5.1.9 Subsequent loads are started at 3 second intervals. See Table 1, Emergency Diesel Generator Loading Sequence.

5.1.10 Auxiliary Feedwater auto start sequence initiates when the first steam generator level decreases to 34%.

NOTE: Pump start and flow initiation is delayed for 3 minutes. Pumps may be started by the operator AT ANY TIME.

5.2 Immediate Operator Actions

5.2.1 Trip turbine and reactor manually.

5.2.2 Check all full length CEA's are fully inserted and reactor trip breakers are open.

5.2.3 Check turbine valves are closed.

5.2.4 Check generator field and 240 KV breakers are open.

5.2.5 Place reheater control system in manual, close TCV's.

5.2.6 Check that diesel generators have started and are feeding only emergency buses.

5.2.7 Open start-up transformer breakers.

5.2.8 Reduce T_{avg} to reference set point by manual operation of the steam dump valves to atmosphere.

5.2.9 Isolate steam generator blowdown.

5.0 Instruction: (Cont'd)

5.2 Immediate Operation Action (Cont'd)

5.2.10 Start steam driven aux. feed pump and establish flow to S.G.'s. If aux. feed pumps have started due to the auto start feature, the motor driven pumps may be secured 30 seconds after they start, if desired.

5.2.11 If all feedwater flow is stopped or lost and steam generator level is less than 42% then:

1. Reinitiate auxiliary feedwater flow as soon as possible; however, do not exceed a flow rate of 150 gpm per steam generator.
2. Limit feedwater flow rate to 150 gpm per steam generator until continuous feedwater flow to the SG has been maintained for five minutes.

5.2.12 If any of the automatic actions listed in 5.2.2 thru 5.2.9 do not occur automatically, then manually initiate that action.

5.2.13 Implement the Emergency Plan as necessary in accordance with EPIP 3100021E, "Duties of the Emergency Coordinator'.

5.3 Subsequent Action

5.3.1 Ensure adequate natural circulation flow by ensuring that hot and cold leg temperatures, pressurizer pressure and level stabilize within minutes. The core ΔT should be less than $\sim 46^{\circ}F$ (ΔT for full power).

5.3.1.1 If the above conditions are not established:

5.3.1.1.1 Check QSPDS saturation margin display and ensure that the RCS and Upper Head are at least $20^{\circ}F$ but less than $200^{\circ}F$ subcooled. R26

5.3.1.1.2 Ensure auxillary feed flow to the steam generators has been initiated and the steam dumps to atmosphere are in operation.

5.3.1.2 Return at least one RCP in each loop to operation as soon as offsite power is available.

5.3.2 Start equipment in Table 1 if required.

EMERGENCY OPERATING PROCEDURE NO. 0030140,
REVISION 26
BLACKOUT OPERATION

5.0 Instruction: (Cont'd)

5.3 (cont'd)

5.3.3 If one diesel fails to start, attempt a manual start.

5.3.3.1 If manual start attempt is unsuccessful, an operator should be sent to the diesel local control station to inspect status of local alarm panel.

5.3.3.2 If no alarms are present on the local alarm panel, an inspection of the overspeed trip lever should be made to insure it has not tripped.

5.3.3.3 If the overspeed trip levers are latched, the normal isolate switches on the local control panel should be placed in the isolate position and a local start attempt should be made.

5.3.3.4 Refer to Operating Procedure 2200020, 2200050 Emergency Diesel Standby Line up and Periodic Test.

5.3.4 Locally open condenser vacuum breakers MV10-1A and MV10-1B. Locally close MSR main steam block valves MV08-4, MV08-6, MV08-8, and MV08-10.

5.3.5 Check MSR warm-up valves MV08-5, MV08-7, MV-9, and MV08-11 to be closed or close manually.

5.3.6 Send an operator to align and start emergency cooling water to the instrument air compressor, then reset local handswitch and manually start the instrument air compressor.

CAUTION: Do not overload the diesel generators when starting additional equipment. (3500 KW max. continuous rating).

5.3.7 When diesel generator power is available energize equipment as may be required for plant safety and to achieve an orderly shutdown within the diesel generator load limitations by:

5.3.7.1 Verify one set of cavity and support cooling fans operating. If not, start one set.

5.3.7.2 Locking out automatic starting equipment that is not in service.

5.3.7.3 Manually opening all breakers on any non-vital bus or motor control center that is to be re-energized.

EMERGENCY OPERATING PROCEDURE NO. 0030140,
REVISION 26
BLACKOUT OPERATION

5.0 Instructions: (Cont)

5.3 (Cont)

5.3.7 (Cont)

5.3.7.4 Resetting lockout relays for each required bus to allow closing of feeder breakers.

5.3.8 Energize 4160 V buses 1A2, 1B2, 480 V load centers 1A1, 1B1 and 480 MCC's 1A1, 1B1, 1A4, 1B4, and 1C as follows:

	ACTION	LOCATION	
5.3.8.1	Strip non-vital 4.16 KV busses (All should be opened automatically)	1A2	1B2
5.3.8.2	Insert sync plug, close 4.16 KV non-vital breaker and hold control switch closed while closing 4.16 KV vital breaker.	1A2-20109 1A3-20209	1B2-20309 1B3-20411
5.3.8.3	Strip non-vital load center	1A1	1B1
5.3.8.4	Close 4.16KV feed breaker to non-vital load centers	1A2-20110	1B2-20310
5.3.8.5	Strip 480V MCC	1A1 1A4 1C	1B1 1B4
5.3.8.6	Close 480V load center feed breaker to MCC 1A1 & 1B1	1A1-40115	1B1-40411
5.3.8.7	Close 480V load center feed breaker to MCC 1A4 & 1B4	1A1-40113	1B1-40413
5.3.8.8	Close 480V load center feed breaker to MCC 1C	1A1-40119	1B1-40410

5.3.9 At MCC 1C, close breakers for turning gear, bearing oil pump, air side seal oil pump and hydrogen seal oil pump.

5.3.10 Place turbine plant cooling water pump in operation.

5.3.11 Align turbine cooling water system to the instrument air compressor back to normal alignment.

5.3.11.1 Open all Ckt's on PP-104 except Ckt's 21 & 23.

5.3.11.2 Close Breaker 40851 on MCC 1A1

5.3.11.3 Open all Ckt's on PP-146 except Ckt 1.

EMERGENCY OPERATING PROCEDURE NO. 0030140,
REVISION 26
BLACKOUT OPERATION

5.0 Instructions: (Cont)

5.3.11.3.1 Open all Ckt's on PP-150 except Ckt's 7,9 and 11.

NOTE: PP-146 is located on the wall of the new cold lab just west of MCC 1B1. PP-150 is located in the new cold lab closet.

5.3.11.4 Close Breaker 41634 on MCC 1B1.

5.3.12 Place turbine drain valve switch in the open position.

5.3.13 Start bearing oil pump before turbing bearing oil pressure reaches 12 psig. decreasing. Pump starts automatically at 12 psig decreasing turbine bearing oil pressure. NOTE: If bearing oil pump fails to start, the emergency DC oil pump will start at 10 psig decreasing bearing oil pressure. Operator should start pump before 10 psig is reached. Stop the DC oil pump if it is running in addition to the bearing oil pump.

5.3.14 Remove the following components from service:

5.3.14.1 Steam jet air ejectors
5.3.14.2 Priming ejector
5.3.14.3 Auxiliary priming ejector
5.3.14.4 Auxiliary steam to R.A.B.
5.3.14.5 Gland seal system

5.3.15 Start CEDM cooling fans A & B.

5.3.16 Start reactor support cooling fans A & B.

CAUTION: Consider equipment starting requirements. Alternate operation of equipment may be required to avoid overloading the diesel generators. (3500 KW Max. continuous rating).

5.3.17 Manually close breakers for pressurizer heater buses on 4150 V buses 1A3 and 1B3.

5.0 Instructions: (cont)

5.3 (cont)

5.3.18 Check that the bearing oil lift pump starts automatically when turbine speed decreases to approximately 600 rpm.

5.3.19 Start turbine lube oil vapor extractor and generator oil vapor extractor.

5.3.20 Check that the turning gear engages and starts automatically when turbine speed decreases to zero rpm, or manually engage it.

5.3.21 Reduce the flow of cooling water to maintain the temperature of the oil leaving the turbine lube oil and the air side and hydrogen side oil coolers between 95 - 100°F.

5.3.22 Isolate cooling water supply to the generator hydrogen coolers.

5.3.23 If additional condensate storage tank water is required and sufficient power is available from the diesel generators, place the water treatment plant in service.

5.3.24 Place the spent fuel pit cooling pump in operation as necessary.

NOTE: With spent fuel elements from 3-1/3 cores present, the spent fuel pit can safely withstand 5 hours without cooling before reaching the boiling point.

5.3.25 Periodically check fuel oil levels in the diesel generator day tanks to confirm proper operation of the fuel oil transfer system and to ensure uninterrupted diesel generator operation.

5.3.26 Sample and analyze the reactor coolant to determine if fuel element clad failure has occurred.

5.3.27 Determine expected duration of power outage. If unable to do so or if outage is to be prolonged, borate RCS to cold shutdown concentration.

5.3.28 If the outage will exceed 4 hours and the RWT is available, proceed to cold shutdown conditions utilizing thermal circulation, atmospheric steam dump and feedwater addition. Place shutdown cooling in service when appropriate temperatures and pressures are reached. Proceed to step 5.3.32.

5.0 Instructions: (cont)

5.3 (cont)

5.3.28 (cont)

NOTE: Do not begin plant cooldown until cold shutdown boron concentration is verified.

5.3.29 If the outage will exceed 4 hours and the RWT is not available, the Safety Injection tanks should be used for makeup to the RCS, if other sources are not available.

5.3.30 Make the following preparations:

5.3.30.1 Close either or both non-essential tie breakers for MCC 1A5 and MCC 1B5
1A5 - 41230
1B5 - 42027
This will provide power to the containment instrument air compressors.

5.3.30.2 If running of containment instrument air compressors is not desirable, insure that a turbine building instrument air compressor is running and containment instrument air pressure is normal.

5.3.30.3 Open the 480 V AC breakers for MOV-2501 and MOV-2504.
MOV-2501 - 42021
MOV-2504 - 42017

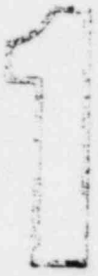
5.3.30.4 Open and lock the following valves:

V-07009 SIT test line return to RWT penetration #41
V-3463 SIT test line return to RWT penetration #41
V-03920 SIT test line tie to VCT inlet

5.3.30.5 Borate the RCS to cold shutdown boron concentration.

CAUTION: Insure that one BAMT tank ramains in service to use as a source of borated water while in mode 5.

EMERGENCY OPERATING PROCEDURE NO. 0030140, REV 26
BLACKOUT OPERATION



5.0 Instructions: (cont)

5.3 (cont)

5.3.31 Proceed to cold shutdown conditions utilizing thermal circulation, atmospheric steam dump and feedwater addition.

5.3.31.1 When makeup to VCT is necessary, select a S.I.T. to use as makeup source. Open the appropriate tanks, fill and drain valve.
1A1 - AOV-3621
1A2 - AOV-3611
1B1 - AOV-3631
1B2 - AOV-3641

5.3.31.2 Close the appropriate fill and drain valve when VCT is restored to normal level.

CAUTION: Use one SIT tank at a time. Insure RCS is 1750 psia before the second SIT tank is used.

5.3.31.3 Place shutdown cooling in service when appropriate temperatures and pressures are reached.

5.3.32 If pressurizer cooldown cannot be accomplished in a timely manner from the addition of cooler liquid (Aux. Spray) from the charging pump via the pressurizer spray line, proceed with the alternate positive means of depressurization as follows:

5.3.32.1 Place the switches for the power operated relief valves V1402 and V1404 in the override position.

5.3.32.2 Initiate a high pressurizer pressure trip signal on two RPS channel trip units.

5.3.32.3 Place the switch for either power operated relief valve (V1402 or V1404) in the normal range position and vent the pressurizer to the quench tank. Return the switch to override to close valve.

5.3.32.4 Control the rate of cooldown and depressurization by selective operation of the power operated relief valves in this mode until cooldown via the Auxiliary Spray valves can be initiated.

EMERGENCY OPERATING PROCEDURE NO. 0030140, REV 26
BLACKOUT OPERATION

5.0 Instructions: (cont)

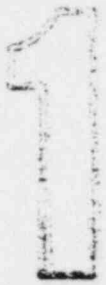
5.3 (cont)

5.3.33 When normal AC power is available:

5.3.33.1 Restore bus sections to their normal supplies.

5.3.33.2 Place the diesel generator system in standby lineup as per OP 2200020.

5.3.33.3 Restore all plant systems to normal.



6.0 References:

6.1 FSAR, Section 15

6.2 FSAR, Section 8

6.3 Operating Procedure #0030130, Shutdown Resulting From Reactor/Turbine Trip

6.4 Operating Procedure #0210020, Charging and Letdown

6.5 Operating Procedure #0330020, Turbine Cooling Water Operation

6.6 Operating Procedure #0250031, Boron Concentration Control, Off-Normal

6.7 Operating Procedure #1010040, Loss of Instrument Air

6.8 Operating Procedure #1540020, Water Plant Startup and Shutdown

6.9 Operating Procedure #2200020, Emergency Diesels - Standby Lineup

6.10 Operating Procedure #0700022, Aux. Feedwater System Operation

7.0 Records/Notification:

7.1 Normal Log Entries.

7.2 Notify Duty Call Supervisor.

7.3 AP 0010134 "Component Cycles and Transients"

TABLE I

EMERGENCY DIESEL GENERATOR LOADING SEQUENCE

Service	Qty	Nominal Load - Ea	Loss of Coolant Accident and Loss of Off-Site Power: Running Load - Kw	Timing* Starting	Running	Loss of Off-Site Power: Running Load - Kw
HPSI pump	1	400 HP	330	From 0.2 Sec	- Cont	-
Boric acid makeup pump	1	25 HP	22	From 0 Sec	- 4 hrs 1st	22
Charging pump	1	100 HP	80	From 0 Sec	- 4 hrs Block	80
Motor operated valves	Lot	60 HP	40	From 0 Sec	- 1 min	-
Emergency lighting	Lot	50 KW	50	From 0 Sec	- Cont	50
Class I power panels	4	45KVA	40	From 0 Sec	- Cont	40
Fuel Transfer Pump	1	5 HP	5	From 0 Sec	- Cont	5
LPSI pump	1	400 HP	330	From 3 Sec	- 90 min 2nd	330
Containmnet fan coolers	2	150 HP	245	From 3 Sec	- Cont Block	167
Component coolant pump	1	450 HP	376	From 6 Sec	- Cont	376
Shield bld vent fan	1	60 HP	54	From 6 Sec	- Cont 3rd	-
Shield Bld Vent Sys Elec Htr	1	30KW	30	From 6 Sec	- Cont Block	-
D-G Bld Exh. Fan	1	1HP	1	From 6 Sec	- Cont	1
Intake cooling pump	1	600 HP	492	From 9 Sec	- Cont 4th Block	492
Containment spray pump	1	500 HP	400	From 12 Sec	- Cont 5th Block	-
Auxiliary feedwater pump	1	350 HP	305	From 15 Sec	- 4 hrs 6th Block	305
Boric acid heating	1 Lot	51.75 KW	51.75	From 18 Sec	- 4 hrs	51.75
Auxiliary bld supply fan	1	60 HP	54	From 18 Sec	- Cont	54
ECCS Area exhaust system	1	50 HP	44	From 18 Sec	- Cont 7th	44
Control Room AC Outdoor Unit	1	50 HP	44	From 18 Sec	- Cont Block	44
Control room AC Indoor Unit	1	7.5 HP	8	From 18 Sec	- Cont	8
Control room booster fan	1	3 HP	3	From 18 Sec	- Cont	3
Reactor Support CLG Fan	1	40 HP	37	From 18 Sec	- Cont	37
Reactor Cavity CLG Fan	1	20 HP	19	From 18 Sec	- Cont	19
Battery Charger	1	68 KVA	68	From 30 Sec	- Cont 8th	68
Plant Security Inverter	1	20 KVA	20	From 30 Sec	- Cont Block	20
UPS Inverter	1	15 KVA	15	From 30 Sec	- Cont	15
Fire Pump	1	250 HP	**	From 35 Sec	- **	198
		Totals:	3163.75 kw (maximum, 18 Sec - 30 min)			2429.75 kw

* Counting from the time the D-G breaker closes

** Auto-start feature on fire pump is defeated if SIAS is present.

DOCUMENT REVISION DISTRIBUTION SHEET - UNIT II
OFF NORMAL & EMERGENCY OPER. PROCEDURE

DOCUMENT TITLE Blackout Operation

DOCUMENT FILE NUMBER 2-0030140

DOCUMENT REVISION NUMBER 2

DOCUMENT DISTRIBUTED ON 4-25-83
DATE

DOCUMENT SENT TO:

2

COPY NO.	DOCUMENT HOLDER	TRANSMITTAL RETURNED	COPY NO.	DOCUMENT HOLDER	TRANSMITTAL RETURNED
	MASTER			UNCONTROLLED COPIES	
1	D. A. Sager				
2				NRC - Region II	
3				Attn: EPPS Branch Chief	
4				M. Paduano - CO	
5	N. G. Roos			A. W. Dalley	
6	TSC			G. Anglemart - CE	
7					
8					
9					
10	Control Room II			G. Regal	
11				A. Udelow - Backfit	
12				Training - Larry Baker	
13					
14					
15	Training			J. Spodick	
				T. Vogan - CO	
				G. J. Boissy	
				R. R. Jennings	
				E. M. Mercer	
				~~Resident NRC~~	
				NRC - IE: EO	
				Attn: Chief, Nuclear Response Branch	
				C. Burns - CE	

PROCESSED BY: _____ DATE _____

EMERGENCY PROCEDURE
2-0030140 REV. 2
BO

2

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030140
REVISION 2

BLACKOUT OPERATION
(BO)

TOTAL NUMBER OF PAGES: 14

2

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030140
REVISION 2

1.0 SCOPE:

This procedure provides the action to be taken in the event of a complete loss of off-site electrical power concurrent with a Turbine trip.

2.0 SYMPTOMS:

2.1 Alarms associated with the loss of operating plant components.

2.2 Loss of normal Control Room lighting and DC lighting energized.

2.3 Reactor and Turbine trip.

2.4 Emergency Diesel Generators start.

2.5 Reactor Coolant Pump trip and Main Feedwater Pump trip.

3.0 AUTOMATIC ACTIONS:

NOTE: Any Automatic Actions that should occur and do not, must be manually initiated.

AUTOMATIC ACTION	INITIATING EVENT
3.1 Reactor Trip	3.1 RCS Low Flow $\leq$95%
3.2 Turbine Trip	3.2 Reactor trip bus low voltage
3.3 Generator lock-out	3.3 Turbine trip/Bkrs closed
3.4 Generator breakers open	3.4 Turbine Trip
3.5 Incoming feeder breakers open to 4160V and 6900V buses	3.5 Start up transformer breakers fail to close
3.6 Tie breakers between normal 4160V buses (2A2 and 2B2) and the emergency 4160V buses (2A3 and 2B3) open	3.6 Undervoltage on 2A2 and 2B2 4160V buses
3.7 Ties between essential and non-essential sections of emergency 480V MCCs open	3.7 Undervoltage on Emergency 480V MCCs

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030140, REVISION 2
BLACKOUT OPERATION

3.0 IMMEDIATE AUTOMATIC ACTION: (Cont.)

AUTOMATIC ACTION	INITIATING EVENT
3.8 Breakers open for the following non-safety related loads which are normally fed from emergency buses	3.8 Diesel load shedding sequence

NOTE: These loads can be manually reconnected to the emergency buses as needed.

Pressurizer heater transformers A and B

CEDM MG Sets 2A and 2B

Fuel Handling 480V MCC 2A8, 2B8

Reactor cavity sump pump 2A and 2B /R2

Containment building elevator

Electrical equipment room hoist

120/208 Power Panel 121 transformer

Lighting panel transformers 110, 112, 114, 117, 125, 126

Incoming feeder from 2A2 and 2B2 4160V buses

RCP oil lift pumps (B pumps only - A pumps running)

Pressurizer relief isol valves (1476 and 1477) /R2

CVCS heat tracing transformer 2A and 2B

480V Lighting panel 2A, 2B and 2C

Waste management heat tracing transformers 2A and 2B

Air conditioner HVA-4, ACC-4

Power panel 120

Lighting panels 113, 116, 109, 115, 130

Refueling equipment

Refueling water to charging pumps (V-2504)

Boric Acid batching tank heaters

Fire siren

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030140, REVISION 2
BLACKOUT OPERATION

2

3.0 IMMEDIATE AUTOMATIC ACTION: (Cont.)

	AUTOMATIC ACTION	INITIATING EVENT
3.9	All loads on emergency buses are tripped except the following: Boric Acid Makeup Pumps Charging Pumps Emergency lighting Class I power panels RCP oil lift pumps (A pumps only - B pumps off) Diesel fuel oil transfer pump	3.9 Diesel load shedding sequence
3.10	2A and 2B Diesel Generators start and energize 4160V emergency buses 2A3, 2B3, and 2AB and loads listed in Step 3.9	3.10 Undervoltage on 2A3 and 2B3 4160V buses
3.11	Subsequent loads are started at three second intervals (See Table 1, Emergency Diesel Generator Loading Sequence).	3.11 Diesel Generator Loading sequence
3.12	Auxiliary Feedwater auto start initiates	3.12 2A or 2B Steam Generator level decreases to 20.6% /R2

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030140, REVISION 2
BLACKOUT OPERATION

2

4.0 IMMEDIATE OPERATOR ACTION:

	ACTION		LOCATIONS
4.1	Trip Turbine and reactor manually	4.1	RTGB-201 and 204
4.2	Check all CEAs are fully inserted and reactor trip breakers are open	4.2	RTGB-204 and top of RPS Panels
4.3	Check turbine valves are closed	4.3	RTGB-201
4.4	Check generator Exciter Supply Breaker and Generator Breakers 8W49 and 8W52 are open	4.4	RTGB-201 /R2
4.5	Place reheater control system system in MANUAL, close TCVs	4.5	RTGB-201
4.6	Check that Diesel Generators have started and are feeding only emergency buses	4.6	RTGB-201
4.7	Open Startup Transformer breakers	4.7	RTGB-201
4.8	Reduce T_{avg} to reference setpoint by manual operation of the steam dump valves to atmosphere	4.8	RTGB-203 /R2
4.9	Isolate Steam Generator blowdown	4.9	RTGB-206
4.10	Verify 2C steam-driven AFW pump has started and has established flow to the Steam Generators. If AFW pumps have started due to the auto start feature, the motor driven pumps may be secured, if desired	4.10	RTGB-202

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030140, REVISION 2
BLACKOUT OPERATION

5.0 SUBSEQUENT ACTIONS:

5.1 Implement the Emergency Plan as necessary in accordance with EPIP 3100021E, "Duties of the Emergency Coordinator".

5.2 Verify adequate natural circulation flow by ensuring that hot and cold leg temperatures, Pressurizer pressure and level stabilize within approximately 15 minutes. The core Δ T should be <49°F (Δ T for full power). /R2

1. If the above conditions are not established:

   A. Check RCS temperature and pressure to ensure that the RCS is subcooled.

   B. Ensure AFW flow to the Steam Generators has been initiated and the steam dumps to atmosphere are in operation.

   C. Refer to EOP 2-0120043, "Inadequate Core Cooling".

2. Return at least one RCP in each loop to operation as soon as off-site power is available and the requirements for pump restart are satisfied in accordance with EOP 2-0120040, Paragraph 5.8. /R2

5.3 Start equipment in Table 1 if required.

5.4 If one Diesel fails to start, attempt a manual start.

1. If manual start attempt is unsuccessful, an operator should be sent to the diesel local control station to inspect status of local alarm panel.

2. If no alarms are present on the local alarm panel, an inspection of the overspeed trip lever should be made to ensure it has not tripped.

3. If the overspeed trip levers are latched, the Normal/Isolate switches on the local control panel should be placed in the ISOLATE position and a local start attempt should be made.

4. Refer to OP 2-2200020 and OP 2-2200050.

5.5 Locally open Condenser Vacuum breakers (MV-10-1A and MV-10-1B). Locally close MSR main steam block valves (MV-08-4, MV-08-6, MV-08-8, and MV-08-10).

5.6 Check MSR warm-up valves (MV-08-5, MV-08-7, MV-08-9, and MV-08-11) to be closed or close manually.

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030140, REVISION 2
BLACKOUT OPERATION

5.0 SUBSEQUENT ACTIONS: (Cont.)

5.7 Send an operator to align and start emergency cooling water to the Instrument Air Compressor, then reset Control Room handswitch and manually start the Instrument Air Compressor (Plant Auxiliaries Control Panel). /R2

CAUTION: Do not overload the Diesel Generators when starting additional equipment (3685KW maximum continuous rating).

5.8 When Diesel Generator power is available, energize equipment as may be required for plant safety and to achieve an orderly shutdown within the Diesel Generator load limitations as follows:

1. Verify one set of reactor cavity and reactor support cooling fans operating. If not, start one set. /R2

2. Lock out automatic starting equipment that is not in service.

3. Manually open all breakers on any non-vital bus or Motor Control Center that is to be re-energized.

4. Reset lockout relays for each required bus to allow closing of feeder breakers.

5.9 Remove the following components from service:

Steam jet air ejectors
Priming ejector
Auxiliary priming ejector
Auxiliary steam to RAB
Gland seal system

5.10 Start 2A and 2B CEDM cooling fans.

5.11 Start 2A and 2B reactor support cooling fans.

CAUTION: Consider equipment starting requirements. Alternate operation of equipment may be required to avoid overloading the Diesel Generators (3685KW maximum continuous rating).

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030140, REVISION 2
BLACKOUT OPERATION

5.0 SUBSEQUENT ACTIONS: (Cont.)

5.12 Manually close breakers for Pressurizer heater buses on 4160V buses 2A3 and 2B3. Place the Override Key Switch to the PRESSURE OVERRIDE position and reset the Backup heater breakers. This should be accomplished within two hours following the loss of off-site power.

CAUTION: Consider equipment starting requirements. Alternate operation of equipment may be required to avoid overloading the Diesel Generators (3685KW maximum continuous rating).

NOTE: The above actions will only energize B-1 and B-4 banks of Backup heaters.

5.13 Check that the Bearing Oil Lift Pump starts automatically when Turbine speed decreases to approximately 600 rpm.

5.14 Start oil reservoir vapor extractor and generator oil vapor extractor. /R2

5.15 Check that the turning gear engages and starts automatically when turbine speed decreases to zero rpm, or manually engage it.

5.16 Reduce the flow of cooling water to maintain the temperature of the oil leaving the turbine lube oil and the air side and hydrogen side oil coolers between 95 - 100oF.

5.17 Isolate cooling water supply to the Generator hydrogen coolers.

5.18 If additional Condensate Storage Tank water is required, have Unit 1 personnel place the Water Treatment Plant in service.

5.19 Place the Spent Fuel Pool Cooling Pump in operation as necessary.

NOTE: With spent fuel element assemblies from 3-1/3 cores present, the Spent Fuel Pool can safely withstand at least five hours without cooling before reaching the boiling point.

5.20 Periodically check fuel oil levels in the Diesel Generator day tanks to confirm proper operation of the fuel oil transfer system and to ensure uninterrupted Diesel Generator operation.

5.21 Sample and analyze the reactor coolant to determine if fuel element clad failure has occurred.

5.22 Determine expected duration of power outage. If unable to do so or if outage is to be prolonged, borate RCS to Cold Shutdown concentration.

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030140, REVISION 2
BLACKOUT OPERATION

5.0 SUBSEQUENT ACTIONS: (Cont.)

5.23 If the outage will exceed four hours and the RWT is available, proceed to Cold Shutdown conditions utilizing natural circulation, atmospheric steam dump and feedwater addition. Refer to EOP 2-0120040, "Natural Circulation/Cooldown". Place Shutdown Cooling in service when appropriate temperatures and pressures are reached.

NOTE: Do not begin plant cooldown until Cold Shutdown boron concentration is verified.

5.24 If Pressurizer cooldown cannot be accomplished in a timely manner from the addition of cooler liquid (auxiliary spray) from the Charging Pump via the Pressurizer spray line, proceed with the alternate positive means of depressurization as follows:

1. Place the switches for the Power Operated Relief Valves (V-1474 and V-1475) in the OVERRIDE position.

2. Initiate a high Pressurizer pressure trip signal on two RPS channel trip units.

3. Place the switch for either Power Operated Relief Valve (V-1474 or V-1475) in the OFF position and vent the Pressurizer to the Quench Tank. Return the switch to OVERRIDE to close valve. /R2

4. Control the rate of cooldown and depressurization by selective operation of the Power Operated Relief Valves in this mode until cooldown via the auxiliary spray valves can be initiated.

5.25 When normal AC power is available:

1. Restore bus sections to their normal supplies.

2. Place the Diesel Generator system in standby lineup as per OP 2-2200020.

3. Restore all plant systems to normal.

6.0 DISCUSSION:

6.1 A loss of power to the 4160V buses results in a loss of power to all 480V Load Centers and Motor Control Centers and to all instrumentation not fed directly or indirectly from the station battery. A reactor trip will occur from a low reactor coolant flow rate signal due to the loss of power to the 6900V buses supplying the Reactor Coolant Pumps and will be accompanied by a Turbine Trip and Generator lockout.

6.2 Steam dump to atmosphere must be used to remove reactor decay heat. Initially, Steam Generator safety valves may acuatate to augment the steam flow and to help control Steam Generator pressure immediately after the trip.

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030140, REVISION 2
BLACKOUT OPERATION

6.0 DISCUSSION: (Cont.)

6.3 On-site power will be supplied by the Emergency Diesel Generators.

6.4 A rapid reduction in Steam Generator water levels will occur due to the reduction of the Steam Generator void fraction on the secondary side and also because steam flow will continue after normal feedwater flow stops. Auxiliary feedwater flow will automatically initiate after the first Steam Generator level reaches 20.6% (2/4 logic). /R2

6.5 Core decay heat removal is accomplished by natural circulation in the reactor coolant loops.

6.6 Core damage is not expected as a result of a loss of power condition since the Steam Generators are maintained as a heat sink and RCS pressure and inventory control are available. /R2

6.7 If operating under blackout conditions and an Engineered Safety Features Actuation signal occurs, any non-emergency loads that are running will be automatically tripped and the required emergency loads will be automatically started.

2

ST. LUCIE UNIT 2
EMERGENCY OPERATING PROCEDURE 2-0030140, REVISION 2
BLACKOUT OPERATION

TABLE 1

DIESEL GENERATOR LOADING SEQUENCE

ITEM	Automatic Starting Equipment (4)	Per Diesel Generator Quantity	Nominal Load or Nameplate HP	Starting KVA	Timing Sequence	RUNNING LOAD (KW) Shutdown With Loss of OFF-Site Power (LOOP)	LOCA (Recirculation) With Loss of OFF-Site Power (LOOP)	Main Steam Line Break With Loss of Offsite Power (LOOP)
1	High Pressure Safety Inj. Pump	1	400	2422.0	0 Sec.	-	324	324
2	Motor Operated Valves	Lot	-	-	0 Sec.	6.7	27.2	33.1
3	Emergency Lighting	Lot	-	-	0 Sec.	125	125	125
4	Power Panels	Lot	-	-	0 Sec.	195	195	195
5	Diesel Oil Transfer Pumps	1	3	21.5	0 Sec.	3	3	3
6	RCP Oil Lift Pumps	4	10	66.85	0 Sec.	40	20	20
7	Uninterruptible Power Supply	1	-	-	0 Sec.	55	55	55
8	HVAC Dampers	Lot	-	-	0 Sec.	4	4	4
9	HVAC Valves	Lot	-	-	0 Sec.	1.5	1.5	1.5
10	Low Pressure Safety Inj. Pump	1	400	2183.3	3 Sec.	274	321	274
11	Containment Fan Coolers	2	125/83	828.4	3 Sec.	134	96	96
12	Elec. Equip. Room Supply	1	100	584.12	3 Sec.	95	95	95
13	Component Cooling Water	1	450	2491.2	6 Sec.	351	351	351
14	Shield Building Exhaust	1	60	340.6	6 Sec.	-	40.2	40.2
15	Shield Building Heaters	Lot	-	-	6 Sec.	-	31.5	31.5
16	Intake Cooling Water Pump	1	600	3709.0	9 Sec.	453	453	453

2

ST. LUCIE UNIT 2
EMERGENCY OPERATING PROCEDURE 2-0030140, REVISION 2
BLACKOUT OPERATION

TABLE 1

DIESEL GENERATOR LOADING SEQUENCE

ITEM	Automatic Starting Equipment (4)	Per Diesel Generator Quantity	Nominal Load or Nameplate HP	Starting KVA	Timing Sequence	RUNNING LOAD (KW) Shutdown With Loss of OFF-Site Power (LOOP)	LOCA (Recirculation) With Loss of OFF-Site Power (LOOP)	Main Steam Line Break With Loss of Offsite Power (LOOP)
17	Containment Spray Pump	1	500	2892.6	12 Sec.	-	405	405
18	Hydrazine Pump	1	3	21.5	12 Sec.	-	1	1
19	Reactor Supports Cooling	1	40	234.76	18 Sec.	22	-	-
20	Reactor Cavity Supply Fan	1	20	124.15	18 Sec.	15	-	-
21	Intake Building Cooling Fan	1	7.5	44.0	21 Sec.	7.5	7.13	7.5
22	Battery Room Roof Ventilator 2-RV-1	1	0.75	8.5	21 Sec.	.75	.75	.75
23	Elec. Equip. Room Exhaust, 2-RV-3	1	5	34.22	21 Sec.	5	5	5
24	ECCS Area Exhaust Fan	1	60	358	24 Sec.	45	45	45
25	Control Room Emer. Filter Fan	1	10	62.0	24 Sec.	-	10	10
26	Control Room Air Conditioning	2	55	-	24 Sec.	68	68	68
27	Boric Acid Heat Trace	Lot	Lot	-	27 Sec.	30	30	30
28	Battery Charger	1	60KW	-	27 Sec.	60	60	60
29	Auxiliary Feedwater Pump	1	350	1951.4	30 Sec.	255	255	255

2

ST. LUCIE UNIT 2
EMERGENCY OPERATING PROCEDURE 2-0030140, REVISION 2
BLACKOUT OPERATION

TABLE 1

DIESEL GENERATOR LOADING SEQUENCE

ITEM	Automatic Starting Equipment	Per Diesel Generator Quantity	Nominal Load or Nameplate HP	Starting KVA	Timing Sequence	RUNNING LOAD (KW) Shutdown With Loss of OFF-Site Power (LOOP)	LOCA (Recirculation) With Loss of OFF-Site Power (LOOP)	Main Steam Line Break With Loss of Offsite Power (LOOP)
30	RAB Supply Fan	1	150	900.1	33 Sec.	111	111	111
31	Elec. Equip. Room Exhaust, 2-HVE-11	1	50	244.7	38 Sec.	38	38	38
32	Charging Pumps	2	125	1656.8	5 Min.	60	60	60
33	Boric Acid Makeup Pump (2)	2	25	124.1	5 Min.	24	24	24
34	Instrument Air Compressor	1	60	340.6	Manual load	60	60	60
35	Fuel Pool Cooling Pump	1	40	234.6	Manual load	26	-	26
36	Hydrogen Recombiner	1	75KW	-	Manual load	-	75	75
37	Pressurizer Heaters	1	200KW	-	Manual load	200 (after 2 hours LOOP)	-	-

Notes:
(1) Actuated on RAS
(2) Both Boric Acid Makeup Pumps are loaded onto Diesel Generator A

ST. LUCIE UNIT 2
EMERGENCY OPERATING PROCEDURE NO. 2-0030140. REVISION 1
BLACKOUT OPERATION

2

7.0 REFERENCES:

7.1 St. Lucie Unit 2 FSAR, Sections 8 and 15

7.2 Off-Normal OP 2-0030130, "Shutdown Resulting From Reactor/Turbine Trip"

7.3 OP 2-0210020, "Charging and Letdown"

7.4 OP 2-0330020, "Turbine Cooling Water Operation"

7.5 Off-Normal OP 2-0250031, "Boron Concentration Control, Off-Normal"

7.6 Off-Normal OP 2-1010040, "Loss of Instrument Air"

7.7 OP 2-1540020, " Water Plant Startup and Shutdown"

7.8 OP 2-2200020, "Emergency Diesels - Standby Lineup"

7.9 OP 2-0700022, "Auxiliary Feedwater System Operation"

8.0 RECORDS/NOTIFICATIONS:

8.1 Normal log entries

8.2 AP 0010134, "Component Cycles and Transients"

9.0 APPROVAL:

Reviewed by Facility Review Group October 26 1982

Approved by J. H. Barrow (for) Plant Manager October 26 1982

Revision 2 Reviewed by FRG April 22 & April 6, 1983

Approved by J. H. Barrow Plant Manager April 22 1983

"LAST PAGE"

EP 2-0030140
Rev. 2
Total No. of Pages 14

DOCUMENT REVISION DISTRIBUTION SHEET - TMI-II
DT NORMAL & DISTRIBUTION ITEM: TRANSMITTAL

DOCUMENT TITLE Total Loss of AC Power

DOCUMENT FILE NUMBER 2-0030143

DOCUMENT REVISION NUMBER 2

DOCUMENT DISTRIBUTED ON 4-25-83
DATE

DOCUMENT SENT TO:

2

COPY NO.	DOCUMENT HOLDER	TRANSMITTAL RETURNED	COPY NO.	DOCUMENT HOLDER	TRANSMITTAL RETURNED
1	MASTER			UNCONTROLLED COPIES	
2	D. A. Sager				
3				NRC - Region II Attn: IDPS Branch Chief M. Paduano - GO A. W. Bailey G. Anglenart - II	
4					
5	N. G. Ross TSC				
6					
7					
8	Control Room II			G. Rezal A. Uptelow - Backfit Training - ~~Harry Seiler~~ EOI	
9					
10					
11					
12	Training			J. Spodick T. Togam - GO D. J. Boissy	
13					
14				R. R. Jennings R. M. Harper	
15					
16					
17				~~President NRC~~ NRC - II: HO Attn: Chief, Nuclear Response ~~Branch~~	
18					
19				G. Burns - II	
20					

PROCESSED BY: _____ DATE _____

EMERGENCY PROCEDURE
2-0030143 REV. 2
TLOP

2

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030143
REVISION 2

TOTAL LOSS OF AC POWER
(TLOP)

TOTAL NO. OF PAGES 9

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030143, REVISION 2
TOTAL LOSS OF AC POWER

2

1.0 SCOPE:

This procedure is to be used in the event of a total loss of both offsite AC power and loss of both Diesel Generators.

2.0 SYMPTOMS:

2.1 Loss of power to 2A1, 2B1 6.9 KV Bus.

2.2 Loss of power to 2A2, 2A3, 2B2, 2B3 and 2AB 4.16 KV Bus.

3.0 AUTOMATIC ACTIONS:

	ACTION		INITIATING EVENT	
3.1	Reactor Trip	3.1	Low RCS Flow	
3.2	Turbine Trip/Generator Lockout	3.2	Reactor Trip	
3.3	Auxiliary Feedwater Auto Actuation	3.3	Low S/G Level @ 20.6%	/R2
3.4	PORV's Operate	3.4	Hi Pressurizer Press @ 2370 PSIA	/R2

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030143, REVISION 2
TOTAL LOSS OF AC POWER

2

4.0 IMMEDIATE OPERATOR ACTIONS:

4.1	Ensure all CEA's on bottom, and reactor trip breakers open.	4.1 RTGB-204 and top of RPS panels
4.2	Ensure 2C Auxiliary Feedwater Pump is restoring Steam Generator level.	4.2 RTGB-202
4.3	Close HCV-08-1A and HCV-08-1B (Main Steam Isolation Valves).	4.3 RTGB-206
4.4	Isolate letdown flow by closing V-2515, V-2516, and V-2522 (Letdown isol).	4.4 RTGB-205

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030143, REVISION 2
TOTAL LOSS OF AC POWER

2

5.0 SUBSEQUENT ACTIONS:

CHECK

5.1 Ensure Generator OCB's and field breaker open. ____

5.2 Open 2-30102 (S.U. Transformer to 2A1 6.9 KV bus). ____
Open 2-30202 (S.U. Transformer to 2B1 6.9 KV bus). ____
Open 2-20102 (S.U. Transformer to 2A2 4.16 KV bus). ____
Open 2-20302 (S.U. Transformer to 2B2 4.16 KV bus). ____

5.3 Ensure D/G breakers open:

2A D/G: 2-20211 ____
2B D/G: 2-20401 ____

5.4 Ensure 2AB 4.16KV bus feeders are open:

2-20208, 2-20505 (2A3 4.16KV to 2AB 4.16 KV bus) ____
2-20409, 2-20504 (2B3 4.16KV to 2AB 4.16 KV bus) ____

5.5 Open 2-40103 (2A2 4.16KV feed to 2A1 L.C. - Hi side). ____
Open 2-20110 (2A2 4.16KV feed to 2A1 L.C. - Lo side). ____
Open 2-40219 (2A3 4.16KV feed to 2A2 L.C. - Lo side). ____
Open 2-20210 (2A3 4.16KV feed to 2A2 L.C. - Hi side). ____ /R2

5.6 Open 2-40419 (2B2 4.16KV feed to 2B1 L.C. - Lo side). ____
Open 2-20310 (2B2 4.16KV feed to 2B1 L.C. - Hi side). ____
Open 2-40503 (2B3 4.16KV feed to 2B2 L.C. - Lo side). ____
Open 2-20402 (2B3 4.16KV feed to 2B2 L.C. - Hi side). ____ /R2

5.7 Ensure 2AB 480V Load Center Feeders are open:

2-40220, 2-40702 (2A2 480V L.C. to 2AB) ____
2-40706, 2-40504 (2B2 480V L.C. to 2AB) ____

5.8 Ensure the main steam isolation bypass valves both indicate closed or dispatch an operator to locally take control and close the valves. ____

5.9 Open 2A and 2B Atmospheric Dump Valves to reduce Steam Generator pressure below safety valve lift pressure. AC power to controllers will be lost, so DC operation of the valves will become necessary as below:

1. Take desired ADV auto/man switch to MANUAL. ____

2. Modulate the dump valve open or closed with direct DC power with the open/close control switch. ____

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030143, REVISION 2
TOTAL LOSS OF AC POWER

2

5.0 SUBSEQUENT ACTIONS: (Cont.)

CHECK

5.10 Close FCV-23-3, 5, 4 and 6 (2A and 2B S/G Blowdown Isol). ____

5.11 Close FCV-23-7 and FCV-23-9 (2A and 2B S/G Blowdown Sample Isol). ____

5.12 Close V-5200, 5201, 5203, 5204 and 5205 (Primary Coolant and Pressurizer Sample Isol). ____ /R2

5.13 Implement the Emergency Plan as necessary in accordance with EP 3100021E, "Duties of the Emergency Coordinator." ____

5.14 Minimize atmospheric steam dump use thereby ensuring minimum RCS heat loss; however, ____

1. Maintain S/G pressure less than S/G safety setpoint.

2. With decreasing RCS pressure, maintain hot leg temperature (Th) at least 20°F below the saturation temperature corresponding to the RCS pressure. ____

5.15 Verify by the following indications that natural circulation flow has been established within approximately 15 minutes after RCP's were stopped.

1. Loop Delta T less than normal full power Delta T (<46°F). ____

2. Cold leg (Tc) constant or decreasing. ____

3. Hot leg (Th) stable (i.e., not steadily increasing). ____

5.16 If RCS pressure decreases to 1836 psia, verify receipt of block permissive annunciator R-8 and block SIAS. ____ /R2

5.17 Notify system dispatcher of plant conditions and request most urgent priority in restoring off-site power. ____

5.18 If 2C Auxiliary Feedwater Pump is stopped or flow is lost, then:

1. Reinitiate auxiliary feed flow as soon as possible; however, do not exceed a flow rate of 150 GPM per affected Steam Generator.

2. Limit feed flow rate to 150 GPM per affected Steam Generator until continuous feed flow to the affected Steam Generator has been maintained for five minutes.

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030143, REVISION 2
TOTAL LOSS OF AC POWER

2

5.0 SUBSEQUENT ACTIONS: (Cont.)

CHECK

5.19 Use all available resources to restore one Emergency Diesel Generator to operable status. ____

5.20 The following restoration sequence assumes "A" train power supply is restored first.

1. Strip all vital and non-vital load center breakers in preparation for a systematic power restoration. ____

2. Energize 2A3 4.16KV bus by either: ____

   A. Starting 2A D/G and closing D/G breaker. Adjust and maintain voltage and frequency at 4.16KV/60 HERTZ.

   or

   B. Close 2-20102 (S.U. Transformer to 2A2 4.16KV bus). Close 2-20109 (2A2 4.16KV to 2A3 4.16KV bus). Insert sync plug and close 20209 (2A2 4.16KV to 2A3 4.16KV bus).

3. Energize 2A2 and 2A5 480V load centers:

   A. Close 2-20210 2A3 4.16KV 2A2 and 2A5 480V L.C. ____

   B. Close 2-40219 Incoming Feeder to 2A2 480V L.C. ____

   C. Close 2-40361 Incoming Feeder to 2A5 480V L.C. ____

4. Energize 2AB 480V Load Center by closing 2-40220 and 2-40702 (2A2 480V L.C. feed to 2AB L.C.). ____

5. Energize 2A5, 2A6, 2A7 and 2A8 480V MCC's as follows:

   A. Close 2-40203 (2A2 480V L.C. feed to 2A5 MCC). ____

   B. Close 2-40351 (2A5 480V L.C. feed to 2A6 MCC). ____

   C. Close 2-40202 (2A2 480V L.C. feed to 2A7 MCC). ____

   D. Close 2-40352 (2A5 480V L.C. feed to 2A8 MCC). ____

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030143, REVISION 2
TOTAL LOSS OF AC POWER

5.0 SUBSEQUENT ACTIONS: (Cont.)

5.20 (Cont.)

CHECK

6. Energize non-essential sections of 2A5, 2A6 and 2A8 MCC's as follows:

   A. Close 2-41234 (MCC 2A5 non-essential breaker). _____

   B. Close 2-41332 (MCC 2A6 non-essential breaker). _____

   C. Close 2-41514 (MCC 2A8 non-essential breaker). _____ /R2

7. Ensure 2A Battery Charger is "ON LINE" supplying the 2A DC bus by observing 2A DC bus voltage on RTGB-201 to be greater than 120V DC. _____

8. Align and start emergency cooling water to the Instrument Air Compressor. Start the 2A Instrument Air Compressor and observe restoration of instrument air pressure. _____

9. Start the 2A Charging Pump to reestablish Pressurizer level. When the CCW system has been restored, then 2A HPSI Pump can also be started to augment refilling of the Pressurizer. _____

   A. Evaluate RCS temperature, pressure, and level instrumentation to determine if a bubble exists other than in the Pressurizer.

   B. If evaluation confirms, then continue charging to increase RCS pressure.

   C. When greater than 20°F subcooled, operate Charging and/or HPSI pumps to maintain Pressurizer level greater than 30% level.

10. Ensure closed 2-20204 (Pressurizer heater transformer 2A 4.16V feed). _____

11. When Pressurizer level indicates >30%, energize Pressurizer heaters B-1, B-2, B-3 and P-1. _____

12. Ensure ICW seal water from Unit 1 Domestic Water System is available. _____

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030143, REVISION 2
TOTAL LOSS OF AC POWER

5.0 SUBSEQUENT ACTIONS: (Cont.)

5.20 (Cont.)

CHECK

13. Reestablish "A" train Intake Cooling Water System as follows:

    A. Establish seal water. _____

    B. Throttle 2A ICW pump discharge valve. _____

    C. Start 2A ICW pump; pressurize and vent "A" ICW header. _____

    D. After venting, open 2A ICW pump discharge valve. _____

14. Reestablish "A" train Component Cooling Water System as follows:

    A. Isolate CCW to RCP's by closing HCV-14-1, 2, 6 and 7 (to prevent thermal shocking RCP seals). _____

    B. Throttle 2A CCW pump discharge valve. _____

    C. Ensure surge tank at normal level. _____

    D. Start 2A CCW pump; pressurize and slowly open 2A CCW pump discharge valve. _____

15. Reestablish CVCS letdown to maintain Pressurizer level at normal operating level. _____

16. Commence boration to Cold Shutdown boron concentration. _____

17. Start one set of cavity and support cooling fans. _____

18. Proceed to EOP 02-0120040, "Natural Circulation/Cooldown", Step 5.10, and perform in conjunction with the balance of this procedure. _____

19. Restore balance of secondary plant in accordance with EOP 2-0030140, "Blackout Operation". _____

ST. LUCIE UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0030143, REVISION 2
TOTAL LOSS OF AC POWER

6.0 DISCUSSION:

The "Total Loss of AC Power" event consists of a loss of off-site power in conjunction with failure of the Emergency Diesel Generators to provide emergency power. This results in a loss of all AC electrical power except that provided by inverters powered from the vital DC buses. The termination of AC power causes a loss of forced reactor coolant flow, main feedwater flow, steam flow to the Turbine and Pressurizer pressure control. The reactor trips on either low reactor coolant flow, high Reactor Coolant System pressure or low Steam Generator level depending on initial conditions.

The "Total Loss of AC power" event also causes a loss of all Reactor Coolant System makeup capability which includes charging and safety injection flow. Inventory losses through leakage, Reactor Coolant Pump controlled bleedoff, and primary relief valve releases are the major contributors to the degradation of pressure and level control during the event. The other contributor to coolant system shrinkage and pressure reduction is system heat loss, primarily through the Pressurizer walls.

Core heat removal is accomplished through natural circulation. Reactor Coolant System heat removal is accomplished using Atmospheric Pump Valves and the steam-driven Auxiliary Feedwater Pump.

7.0 REFERENCES:

7.1 CE Emergency Procedure Guidelines, CEN-152

7.2 St. Lucie Unit 1 Off-Normal Operating Procedures

8.0 RECORDS REQUIRED:

8.1 Normal log entries

9.0 APPROVAL:

Reviewed by the Facility Review Group October 26 1982
Approved by J. H. Barrow (CMW) Plant Manager April 13 1983

Revision 2 Reviewed by FRG April 22 1983
Approved by J H Barrow Plant Manager April 22 1983

"L A S T P A G E"

EP 2-0030143
REV. 2
TOTAL NO. OF PAGES 9

DOCUMENT REVISION DISTRIBUTION SHEET - UNIT II
OFF NORMAL & EMERGENCY OPER. PROCEDURES

DOCUMENT TITLE CEA OFF-NORMAL OPERATION AND REALIGNMENT

DOCUMENT FILE NUMBER: 2-0110030

DOCUMENT REVISION NUMBER 1

DOCUMENT DISTRIBUTED ON 4-25-83
DATE

DOCUMENT SENT TO:

2

COPY NO.	DOCUMENT HOLDER	TRANSMITTAL RETURNED	COPY NO.	DOCUMENT HOLDER	TRANSMITTAL RETURNED
	MASTER			UNCONTROLLED COPIES	
1	D. A. Sager				
2					
3				NRC - Region II	
4				Attn: EPPS Branch Chief	
5	N. G. Roos			H. Paduano - GO	
6	TSC			A. W. Bailey	
7				G. Anglehart - CE	
8					
9					
10	Control Room II			G. Regal	
11				Ugelow, Al —Backfit	
12				Training - Larry Baker	
13					
14					
15	Training			J. Spodick	
				T. Vogan - GO	
				G. J. Boissy	
				R. R. Jennings	
				H. M. Mercer	
				A. Pell	
				R. J. Prechette	
				~~Resident NRC~~	
				NRC - IE: HQ	
				Attn: Chief, Nuclear Response Branch	
				C. Burns CE	

PROCESSED BY: _____ DATE _____

2

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0110030
REVISION 1

1.0 TITLE:

CEA OFF-NORMAL OPERATION AND REALIGNMENT

2.0 APPROVAL:

Reviewed by Facility Review Group March 10 1983

Approved by C. M. Wethy Plant Manager March 10 1983

Revision 1 Reviewed by FRG April 22 1983

Approved by J. H. Barrow Plant Manager April 22 1983

3.0 PURPOSE AND DISCUSSION:

3.1 Purpose:

This procedure provides instructions for operator action during abnormal operation and realignment of Control Element Assemblies (CEA).

3.2 Discussion:

1. The action statements applicable to a stuck or untrippable CEA, to two or more inoperable CEAs and to a large misalignment ($\geq$15 inches) of two or more CEAs, require a prompt shutdown of the reactor since either of these conditions may be indicative of a possible loss of mechanical functional capability of the CEAs and in the event of a stuck or untrippable CEA, the loss of Shutdown Margin.

2. For small misalignments (<15 inches) of the CEAs, there is 1) a small effect on the time dependent long term power distributions relative to those used in generating LCOs and LSSS setpoints, 2) small effect on the available Shutdown Margin, and 3) a small effect on the ejected CEA worth used in the safety analysis. Therefore, the action statement associated with small misalignments of CEAs permits a 1 hour time interval during which attempts may be made to restore the CEA to within its alignment requirements. The one hour time limit is sufficient to (1) identify causes of a misaligned CEA, (2) take appropriate corrective action to realign the CEAs and (3) minimize the effects of xenon redistribution.

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0110030, REVISION 1
CEA OFF-NORMAL OPERATION AND REALIGNMENT

3.0 PURPOSE AND DISCUSSION: (Cont.)

3.1 (Cont.)

3. Overpower margin is provided to protect the core in the event of a large misalignment ($\geq$15 inches) of a CEA. However, this misalignment would cause distortion of the core power distribution. This distribution may, in turn, have a significant effect on 1) the available Shutdown Margin, 2) the time dependent long term power distributions relative to those used in generating LCOs and LSSS setpoints, and 3) the ejected CEA worth used in the safety analysis. Therefore, the action statement associated with the large misalignment of a CEA requires a prompt realignment of the misaligned CEA.

4. The action statements applicable to misaligned or inoperable CEAs include requirements to align the operable CEAs in a given group with the inoperable CEA. Conformance with these alignment requirements bring the core, within a short period of time, to a configuration consistent with that assumed in generating LCO and LSSS setpoints. However, extended operation with CEAs significantly inserted in the core may lead to perturbations in 1) local burnup, 2) peaking factors, and 3) available Shutdown Margin which are more adverse than the conditions assumed to exist in the safety analyses and LCO and LSSS setpoint determination. Therefore, time limits have been imposed on operation with inoperable CEAs to preclude such adverse conditions from developing.

4.0 SYMPTOMS:

4.1 Upon observation from ADS, digital position indicators, or data processor, one or more CEAs are misaligned, dropped, or slipped.

4.2 CEA position deviation alarm.

4.3 CEA motion inhibit alarm.

4.4 Dropped CEA alarm.

4.5 AWP alarm.

4.6 PDIL and PPDIL alarms.

4.7 Group out of sequence alarm.

4.8 Short term, steady state insertion alarm.

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0110030, REVISION 1
CEA OFF-NORMAL OPERATION AND REALIGNMENT

2

5.0 INSTRUCTIONS:

5.1 CEA inoperable or misalignment of greater than 7.0 inches but less than 15.0 inches.

5.1.1 Immediate Automatic Action:

1. CEA motion inhibit.

5.1.2 Immediate Operator Action:

1. Place CEDs control panel in OFF.

2. Determine if any mismatch exists between reactor power and turbine power. If a mismatch exists, adjust turbine power to equal reactor power.

5.1.3 Subsequent Operator Action:

1. Determine from symptoms and CEA position indications the cause of the inoperability or if the CEA is operable but misaligned, in accordance with Appendix "B".

2. Ensure automatic functions have initiated.

3. Determine Shutdown Margin within one hour after detection of an inoperable CEA to be greater than the Shutdown Margin specified in Technical Specification 3.1.1.1 and once per 12 hours thereafter.

4. If excessive friction or mechanical interference prevents movement of the CEA or the CEA is untrippable, be in Hot Standby in six hours. See OP #2-0030125, "Turbine Shutdown Full Load to Zero Load".

5. If one or more CEAs are inoperable due to other reasons than stated in Step 5.1.3.4, declare inoperable within one hour and realign remainder of operable CEAs in group within 7.0 inches of inoperable CEAs, without violating CEA sequence and insertion limits, within one hour (or be in Hot Standby within 6 hours). Operation in Modes 1 and 2 may continue provided the thermal power level is restricted pursuant to Technical Specification 3.1.3.6 during subsequent operation and the Shutdown Margin requirement of Technical Specification 3.1.1.1 is determined at least once per 12 hours. /R1

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0110030, REVISION 1
CEA OFF-NORMAL OPERATION AND REALIGNMENT

2

5.0 INSTRUCTIONS: (Cont.)

5.1 (Cont.)

5.1.3 (Cont.)

6. If CEAs are functioning properly, realign CEA(s) within one hour, in accordance with Appendix "A".

CAUTION: If CEA(s) become misaligned by 15 inches or more, but does not drop while performing the above instruction, proceed to Section 5.2. If CEA(s) drop while performing the above instruction, proceed to Section 5.3.

5.2 One CEA misaligned by 15 inches or more but not a dropped CEA.

5.2.1 Immediate Automatic Action:

1. CEA motion inhibit.

5.2.2 Immediate Operator Action:

1. Place CEDS control panel in OFF.

2. Determine if any mismatch exists between reactor power and turbine power. If a mismatch exists, adjust turbine power to equal reactor power.

5.2.3 Subsequent Operator Actions:

1. Determine from symptoms and CEA position indications the cause of the inoperability or if the CEA is operable but misaligned, in accordance with Appendix "B".

2. Ensure automatic functions have initiated.

3. Refer to Plant Curve Book and obtain F_R^T value. /R1

4. Within 15 minutes (25 minutes if F_R^T <1.5), restore the CEA (per Appendix A) to within 7.0 inches of all other CEAs in its group or reduce power to <70% of RATED THERMAL POWER within one hour of misalignment. /R1

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0110030, REVISION 1
CEA OFF-NORMAL OPERATION AND REALIGNMENT

5.0 INSTRUCTIONS: (Cont.)

5.2 (Cont.)

5.2.3 (Cont.)

5. Within one hour:

a) Restore to operable status within its specified alignment requirements (within 7.0 inches of other CEA's in its group) per Appendix A.

OR

b) Declare CEA inoperable and assure Shutdown Margin requirement of T.S. 3.1.1.1 is satisfied. Operation in Modes 1 and 2 may continue pursuant to the requirements of T.S. 3.1.3.6 provided within one hour:

* CAUTION: Prior to performing steps 7.6.1 and 2, reduce power to <70% of the THERMAL POWER level prior to misalignment IF THE PRE-MISALIGNMENT ASI WAS MORE NEGATIVE THAN -0.15.

1. Align the remainder of the CEA's in the group to within 7.0 inches of the inoperable CEA while maintaining the allowable CEA sequence and insertion limits shown in T.S. Figure 3.1-2.

2. The Shutdown Margin requirement of Specification 3.1.1.1 is determined at least once per 12 hours.

OR

c) Be in Hot Standby within 6 hours. /R1

6. Determine Shutdown Margin within one hour after detection of an inoperable CEA to be greater than the Shutdown Margin specified in Technical Specification 3.1.1.1.

7. If excessive friction or mechanical interference prevents movement of the CEA, or the CEA is untrippable, be in Hot Standby in six hours. See OP #2-0030125, "Turbine Shutdown Full Load to Zero Load".

8. With more than one CEA inoperable or misaligned from any other CEA in its group by 15 inches (indicated position) or more, be in Hot Standby within 6 hours.

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0110030, REVISION 1
CEA OFF-NORMAL OPERATION AND REALIGNMENT

5.0 INSTRUCTIONS: (Cont.)

5.3 Dropped CEA

5.3.1 Immediate Automatic Action:

1. CEA motion inhibit.

5.3.2 Immediate Operator Action:

1. Immediately reduce turbine load to match the reactor power and to return the plant conditions to within LCO's.

5.3.3 Subsequent Operator Action:

1. Determine from symptoms and CEA position indications the cause of the inoperability or if the CEA is operable but misaligned, in accordance with Appendix "B". During the determination of the cause of the dropped CEA the reactor power shall not be increased above the value present at the time the dropped CEA occurred.

2. Ensure automatic functions have initiated.

3. Refer to Plant Curve Book and obtain F_R^T value. /R1

4. Within 15 minutes (25 minutes if F_R^T <1.5), restore the CEA (per Appendix A) to within 7.0 inches of all other CEA's in its group or reduce power to <70% of RATED THERMAL POWER within on hour of misalignment. /R1

5. Within one hour:

a) Restore to operable status within its specified alignment requirements (within 7.0 inches of other CEA's in its group) per Appendix A.

OR

b) Declare CEA inoperable and assure Shutdown Margin requirements of T.S. 3.1.1.1 are satisfied. Operation in Modes 1 and 2 may continue pursuant to the requirements of T.S. 3.1.3.6.

* CAUTION: Prior to performing steps 5.6.1 and 2 reduce power to <70% of the THERMAL POWER level prior to misalignment IF THE PRE-MISALIGNMENT ASI WAS MORE NEGATIVE THAN -0.15.

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0110030, REVISION 1
CEA OFF-NORMAL OPERATION AND REALIGNMENT

2

5.0 INSTRUCTIONS: (Cont.)

5.3 (Cont.)

5.3.3 (Cont.)

5. (Cont.)

b) (Cont.)

1. Within one hour align the remainder of the CEA's in the group to within 7.0 inches of the inoperable CEA while maintaining the allowable CEA sequence and insertion limits shown in T.S. Figure 3.1-2.

2. The Shutdown Margin requirement of Specification 3.1.1.1 is determined at least once per 12 hours.

OR

c) Be in Hot Standby within 6 hours. /R1

6. Determine Shutdown Margin within one hour after detection of an inoperable CEA to be greater than Shutdown Margin specified in Technical Specification 3.1.1.1.

7. If excessive friction or mechanical interference prevents movement of the CEA, or the CEA is untrippable, be in Hot Standby in six hours. See OP #2-0030125, "Turbine Shutdown Full Load to Zero Load".

8. With more than one CEAs inoperable or misaligned from any other CEA in its group by 15 inches (indicated position) or more, be in Hot Standby within 6 hours.

9. Upon ascertaining and correcting the cause for the dropped CEA, recovery of the CEA may be made.

CAUTION: The CEA should be recovered by a slow, smooth withdrawal using small increments of movement. Preferably, the movement increments should be three steps or less. The period of time for recovering the CEA should be approximately 10 minutes. Appropriate changes in RCS boron concentration should be made during the withdrawal of the CEA.

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0110030, REVISION 1
CEA OFF-NORMAL OPERATION AND REALIGNMENT

2

5.0 INSTRUCTIONS: (Cont.)

5.3 (Cont.)

5.3.3 (Cont.)

9. (Cont.)

NOTE: Following the return of the CEA to its group, operation should be maintained at the existing power level for at least one hour in order to allow assessment of resultant power distributions and/or azimuthal tilts.# Upon ascertaining that a normal power distribution is present and that the plant conditions are normal, power may then be raised to the desired operating power.

Notify Reactor Engineering Supervisor.

NOTE: It may be necessary to operate at this reduced power level for as long as 24 to 36 hours in order to reduce the azimuthal oscillation and the resulting values of F_R^T, T_q, F_{XY}^T, and ASI resulting from a dropped CEA.

6.0 REFERENCES:

6.1 St. Lucie Unit 2 Technical Specifications

6.2 CEDMCS Tech Manual

7.0 RECORDS REQUIRED:

7.1 Normal log entries

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0110030, REVISION 1
CEA OFF-NORMAL OPERATION AND REALIGNMENT

APPENDIX A - CEA REALIGNMENT

1.0 Limits and Precautions:

1.1 Regulating CEAs should be withdrawn in sequence and overlap between groups shall not exceed 40 percent.

1.2 Do not exceed a sustained SUR of 1.4 DPM (alarm 1.3 DPM).

1.3 Criticality shall be anticipated any time CEAs are being withdrawn.

1.4 If deviation between CEAs in any group approaches 3 inches, stop group withdrawal and realign CEAs.

1.5 Individual CEA positions within the group shall be determined at least once per 12 hours except when the CEA position deviation circuit is out of service, then verify CEA positions at least once every four hours.

1.6 CEAs shall be limited in physical insertion as shown by Technical Specification Figure 3.1-2 (insertion limit curves).

2.0 Instructions:

2.1 Alignment of a CEA which is below its group, prior to criticality:

1. Utilizing MANUAL SEQUENTIAL control, insert the misaligned group a minimum of 4 inches.

2. Utilizing MANAUAL INDIVIDUAL control, withdraw the low CEA to the group position.

3. Monitor the position of all CEAs in the group for proper alignment.

2.2 Alignment of a CEA which is above its group, prior to criticality:

1. Utilize MANUAL INDIVIDUAL control, and insert the high CEA to the group position.

2. Monitor the position of all CEAs in the group for proper alignment.

2

APPENDIX A - CEA REALIGNMENT (Cont.)

2.0 (Cont.)

2.3 Alignment of an above or below CEA with the reactor critical:

1. Utilize MANUAL INDIVIDUAL control to return the misaligned CEA to the group position.

2. If necessary, alternate between MANUAL INDIVIDUAL control of the misaligned CEA and MANUAL SEQUENTIAL control of its associated group to maintain the desired reactor power level.

3. Monitor the position of all CEAs in the group for proper alignment.

4. Utilize MANUAL GROUP control as required to readjust the group positions for proper automatic sequencing.

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0110030, REVISION 1
CEA OFF-NORMAL OPERATION AND REALIGNMENT

APPENDIX B - DROPPED CEA INVESTIGATION

1.0 Determine that the dropped CEA is functional, select Manual Individual (MI) on the Mode Select switch, select the affected CEA on the Individual CEA Selection switches, and select the group of the affected CEA on the Group Select switch. Momentarily press the Bypass Enable push button and press and hold the CMI Bypass push button. Withdraw the affected CEA until the Core Mimic DRC light and the Lower Electric Limit light both deenergize. Insert and withdraw the affected CEA and check for smooth operation and normal indications. Reactor power shall not be increased above the value present at the time the dropped CEA occurred. If the affected CEA is determined to be functional realign the CEA per the dropped CEA procedure.

2.0 Guidelines for Investigating Dropped CEAs:

Dropped CEAs have occurred from:

A. Tripped CEA Disconnect

B. Loss of CEA Subgroup logic function

Symptoms

A. 1. CEA Disconnect in OFF, red light off, green light on.

2. CEA Disable lights red for affected CEA.

B. Timer Failure lights red for affected CEA.

Trouble Shooting

A. Call I & C specialist in.

B. Connect visicorder to coil monitor of affected CEA.

C. Close/check closed CEA disconnect of affected CEA and record trace of UG.

D. Check trace for proper SCR firing and proper coil current.

* E. If D is not satisfactory, troubleshoot UG circuits.

* F. If D is satisfactory, attempt to withdraw the CEA while recording Coil Monitor trace. Check traces for SCR firing, coil current, and timing. Troubleshoot as required.

* Place Subgroup of affected CEA on maintenance bus prior to troubleshooting that affects any of the other Subgroup CEAs.

/R1

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0110030, REVISION 1
CEA OFF-NORMAL OPERATION AND REALIGNMENT

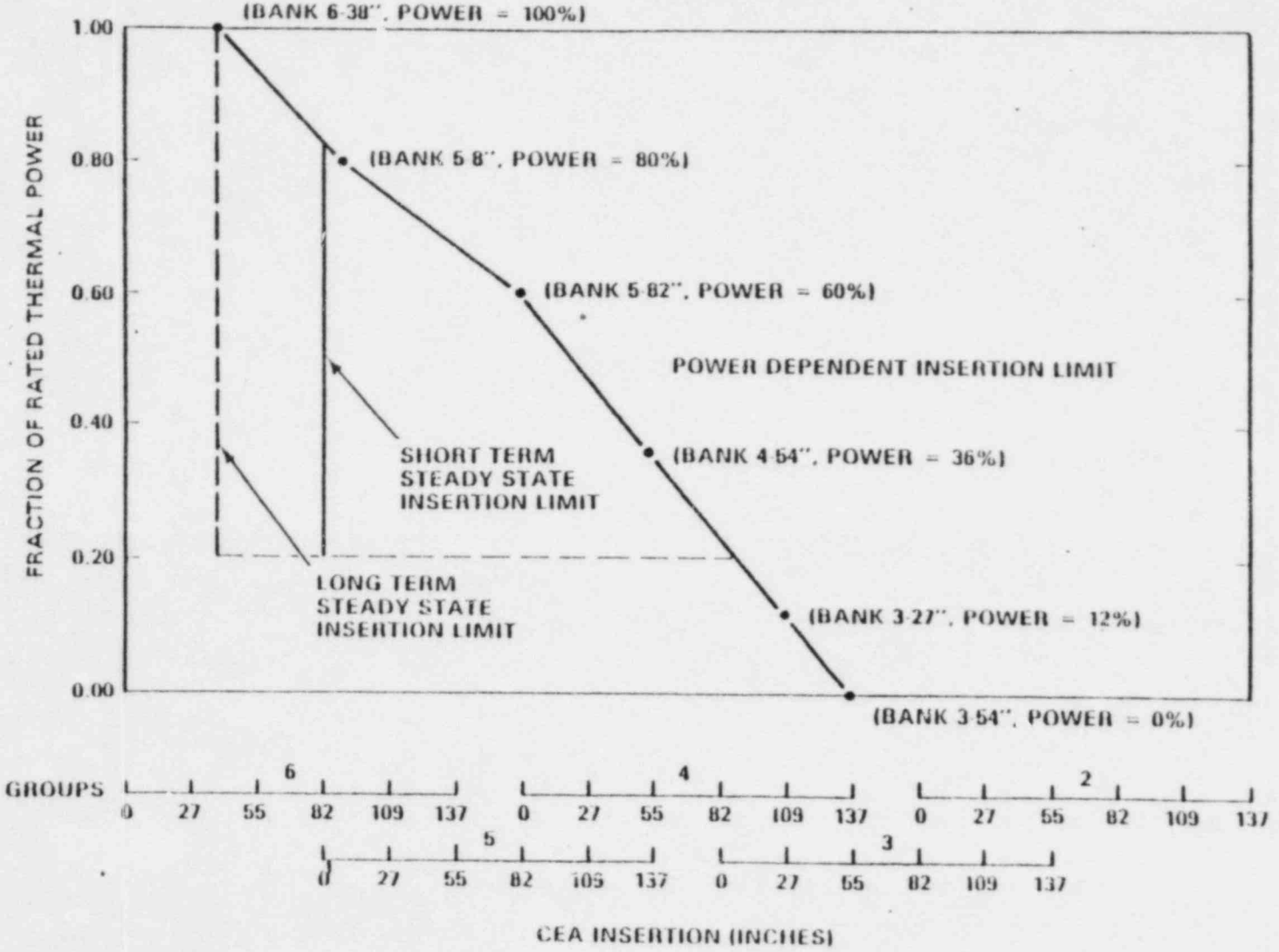


Figure 3.1-2
CEA insertion limits vs THERMAL POWER with four reactor coolant pumps operating

DOCUMENT REVISION DISTRIBUTION SHEET - UNIT II OFF NORMAL & EMERGENCY OPER. PROCEDURE

DOCUMENT TITLE EMERGENCY BORATION

DOCUMENT FILE NUMBER 2-0250030

DOCUMENT REVISION NUMBER 1

DOCUMENT DISTRIBUTED ON 4-22-83 (DATE)

DOCUMENT SENT TO:

2

COPY NO.	DOCUMENT HOLDER	TRANSMITTAL RETURNED	COPY NO.	DOCUMENT HOLDER	TRANSMITTAL RETURNED
	MASTER			UNCONTROLLED COPIES	
1	D. A. Sager				
2					
3				NRC - Region II	
4				Attn: EPPS Branch Chief	
5	N. C. Roos			H. Paduano - GO	
6	TSC			A. W. Bailey	
7				G. Anglehart - CE	
8					
9					
10	Control Room II			G. Regal	
11				Ugelow, Al —Backfit	
12				Training - Larry Baker	
13					
14					
15	Training			J. Spodick	
				T. Vogan - GO	
				G. J. Boissy	
				R. R. Jennings	
				H. M. Mercer	
				R. J. Frechette	
				Resident NRC	
				NRC - IE: HQ	
				Attn: Chief, Nuclear Response Branch	
				C. Burns - CE	

PROCESSED BY: _____ DATE _____

2

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0250030
REVISION 1

1.0 TITLE:

EMERGENCY BORATION

2.0 APPROVAL:

Reviewed by Facility Review Group February 9 1982

Approved by C. M. Wethy Plant Manager February 15 1982

Revision 1 Reviewed by FRG April 22 1983

Approved by L H Barrow for CMW April 22 1983

3.0 PURPOSE AND DISCUSSION:

This procedure provides instructions for the injection of concentrated boric acid solution into the Reactor Coolant System (RCS) via the Charging Pumps.

In the event that normal charging flow is unavailabe, flow can be directed to the Auxiliary HPSI header from the discharge of the Charging Pumps.

The Boron Concentration Control System is lined up to automatically emergency borate the RCS on a Safety Injection Actuation Signal (SIAS). When shutdown margin has been confirmed or the SIAS signal reset, it is desirable to restore the Boron Concentration Control System to the automatic make-up mode, or the Refueling Water Tank (RWT) to the suction of the Charging Pumps to prevent overborating. /R1

4.0 SYMPTOMS:

Any one of the following conditions requires emergency boration:

4.1 Unanticipated or uncontrolled RCS cooldown following a reactor trip as indicated by:

1. Reactor Low Tave-Tref alarm
2. Decreasing reactor coolant wide range temperature indication
3. Uncontrolled decrease of Pressurizer level or pressure
4. Uncontrolled decrease in steam pressure

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0250030, REVISION 1
EMERGENCY BORATION

2

4.0 SYMPTOMS: (Cont.)

4.2 Unexplained or uncontrolled reactivity increase as indicated by:

1. Abnormal Control Element Assembly insertion

2. Abnormal increase in reactor coolant temperature, Tave or reactor power

3. Abnormal increase in reactor power or count rate when shutdown

4.3 Loss of Shutdown Margin due to excessive Control Element Assembly insertion as indicated by:

1. Power dependent insertion (data processor) alarm

2. Power dependent insertion (ADS) alarm /R1

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0250030, REVISION 1
EMERGENCY BORATION

2

5.0 INSTRUCTIONS:

5.1 Immediate Automatic Actions

NONE

5.2 Immediate Operator Actions

5.2.1 Place Makeup Mode Select Switch in the MANUAL or BORATE position.

5.2.2 Verify V-2525 (Boron Load Control Valve) is closed.

5.2.3 Place either 2A or 2B Boric Acid Makeup Pump in the RUN position.

5.2.4 Place V-2514 (Emergency borate valve) in the OPEN position.

5.2.5 Close V-2650 (BAMT 2A Recir) and V-2651 (BAMT 2B Recir).

5.2.6 If V-2514 fails to open, open either V-2509 (BAMT 2A gravity feed) or V-2508 (BAMT 2B gravity feed) and close V-2501 (VCT outlet).

5.2.7 If emergency boration is warranted due to violation of Power Dependent Insertion Limit, observe Tave, Tref, and reactor power while borating the Reactor Coolant System sufficiently to insure restoration of shutdown margin and the clearing of PDIL alarms.

5.2.8 For other reactivity changes in Section 4.0 as boron is added, observe Tave, Tref, reactor power, and Control Element Assembly position until the reactivity excursion is under control.

5.3 Subsequent Actions

5.3.1 After the boration, place V-2514 in the CLOSED position. After verifying closure, position switch to the AUTO position.

5.3.2 Open V-2650/V-2651 B.A. Pump Recirc Valve(s).

5.3.3 If gravity feed was used, open V-2501 and close V-2508/V-2509.

5.3.4 Stop the BAM Pump and return the switch to the AUTO position.

5.3.5 Return Mode Selector Switch to the desired mode of operation.

5.3.6 Reopen V-2650 and V-2651.

5.3.7 Operation with V-2525 may be resumed if necessary.

/R1

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0250030, REVISION 1
EMERGENCY BORATION

6.0 REFERENCES:

6.1 St. Lucie Unit 2 FSAR, Chapter 9

6.2 C.E. Emergency Procedure F-EP-11

DOCUMENT REVISION DISTRIBUTION SHEET - UNIT II OFF NORMAL & EMERGENCY OPER. PROCEDURE

DOCUMENT TITLE Component Cooling Water OFF NORM CPS

DOCUMENT FILE NUMBER 2-0310030

DOCUMENT REVISION NUMBER 1

DOCUMENT DISTRIBUTED ON 4-22-83
DATE

DOCUMENT SENT TO:

2

COPY NO.	DOCUMENT HOLDER	TRANSMITTAL RETURNED	COPY NO.	DOCUMENT HOLDER	TRANSMITTAL RETURNED
	MASTER			UNCONTROLLED COPIES	
1	D. A. Sager				
2					
3				NRC - Region II	
4				Attn: EPPS Branch Chief	
5	N. G. Roos			H. Paduano - GO	
6	TSC			A. W. Bailey	
7				G. Anglehart - Cz	
8					
9					
10	Control Room II			G. Regal	
11				Ugelow, Al - Backfit	
12				Training - ERI	
13					
14					
15	Training			J. Spodick	
				T. Vogan - GO	
				G. J. Boissy	
				R. R. Jennings	
				H. M. Mercer	
				R. J. Frechette	
				Resident NRC	
				NRC - IE: HQ	
				Attn: Chief, Nuclear Response Branch	
				C. Burns - CE	

PROCESSED BY: _____ DATE _____

2

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT 2
OFF NORMAL OPERATING PROCEDURE NUMBER 2-0310030
REVISION 1

1.0 TITLE:

COMPONENT COOLING WATER - OFF NORMAL OPERATION

2.0 REVIEW AND APPROVAL:

Reviewed by Facility Review Group December 28 1982

Approved by J. H. Barrow (for) Plant Manager December 28 1982

Revision 1 Reviewed by FRG March 18 1983

Approved by O/L Barrow for Plant Manager April 22 1983

3.0 PURPOSE AND DISCUSSION:

3.1 This procedure provides instructions to re-establish Component Cooling Water flow or isolate affected headers or components in the event of a malfunction in the Component Cooling Water (CCW) System.

3.2 Any indications that a possible malfunction is occurring in the CCW System must be thoroughly investigated immediately.

4.0 SYMPTOMS:

4.1 Decrease in CCW Surge Tank level and/or Low CCW Tank Level alarm

4.2 Abnormal flows in headers as indicated by FIS-14-1A and FIS-14-1B

4.3 Low pressure in headers as indicated by PIS-14-8A and PIS-14-8B

4.4 High level in CCW Surge Tank

4.5 Increasing CCW temperature(s)

ST. LUCIE UNIT 2
OFF NORMAL OPERATING PROCEDURE NUMBER 2-0310030, REVISION 1
COMPONENT COOLING WATER - OFF NORMAL OPERATION

2

5.0 INSTRUCTIONS:

5.1 Immediate Automatic Actions

5.1.1 CCW Surge Tank vent (RCV-14-1) diverts to Chemical Drain Tank on high radioactivity in the CCW system.

5.1.2 HCV-14-8B and HCV-14-10 will auto close on low level in the CCW Surge Tank as sensed by LS-14-6B. This will isolate the "B" header from the "N" header.

5.1.3 HCV-14-8A and HCV-14-9 will auto close on low level in the CCW Surge Tank as sensed by LS-14-6A. This will isolate the "A" header from the "N" header.

5.1.4 A Reactor trip will occur on 2/4 logic on low flow from the combined CCW return from the Reactor Coolant Pumps. There is a ten minute time delay on this trip.

5.2 Immediate Operator Actions

None

5.3 Subsequent Action

5.3.1 Loss of 2A CCW Pump

1. Open MV-14-1 (2C CCW Pump disch to "A" hdr) and MV-14-3 (2C CCW Pump suction from "A" hdr).
2. Close MV-14-2 (2C CCW Pump disch to "B" hdr) and MV-14-4 (2C CCW Pump suction from "B" hdr).
3. Realign 4.16KV 2AB bus to the 2A3 4.16KV bus. /R1
4. Start 2C CCW Pump.
5. Verify that pressures and flows return to normal.
6. Realign 480V Load Center 2AB to the 2A2 Load Center and realign 2AB DC bus to the 2A DC bus within 2 hours. The alignment of the discharge valves shall be verified to be consistent with the appropriate power supply at least once per 24 hours. /R1

5.3.2 Loss of 2B CCW Pump

1. Verify that MV-14-2 (2C CCW Pump disch to "B" hdr) and MV-14-4 (2C CCW Pump suction from "B" hdr) are open.
2. Ensure 4.16KV bus 2AB is aligned to the 2B3 4.16KV bus. /R1
3. Start 2C CCW Pump.
4. Verify that pressures and flows return to normal.
5. Ensure 480 Load Center 2AB is aligned to the 2B2 Load Center and ensure 2AB DC bus is aligned to the 2B DC bus. The alignment of the discharge valves shall be verified to be consistent with the appropriate power supply at least once per 24 hours. /R1

ST. LUCIE UNIT 2
OFF NORMAL OPERATING PROCEDURE NUMBER 2-0310030, REVISION 1
COMPONENT COOLING WATER - OFF NORMAL OPERATION

2

5.0 INSTRUCTIONS: (Cont.)

5.3 (Cont.)

5.3.3 Loss of 2A CCW Heat Exchanger

1. Open MV-14-3 (2C CCW Pump suction from "A" hdr).
2. Verify that MV-14-2 (2C CCW disch to "B" hdr) is open.
3. Verify that MV-14-1 (2C CCW Pump disch to "A" hdr) is closed and start 2C CCW Pump.
4. Stop 2A CCW Pump.
5. If plant is in process of cooling down or heating up, isolate 2A SDC Heat Exchanger by closing MV-3517 (Primary side inlet) and HCV-14-3A on CCW side. Also close MV-1410 and MV-1412 which stops CCW flow through 2A and 2B Containment Fan Coolers.

   NOTE: This step should reduce CCW flows to within limits of one heat exchanger.

6. If plant is at power or hot shutdown, proceed to isolate 2A CCW Heat Exchanger by closing V-14156 (Inlet valve) and V-14166 (Outlet valve). If heat exchanger cannot be repaired within 72 hours be it at least Hot Standby within 6 hours and Cold Shutdown within the following 30 hours.

5.3.4 Loss of 2B CCW Heat Exchanger

1. Verify that MV-14-4 (2C CCW Pump suction from "B" hdr) is open.
2. Open MV-14-1 (2C CCW Pump disch to "A" hdr).
3. Close MV-14-2 (2C CCW Pump disch to "B" hdr) and start 2C CCW Pump.
4. Stop 2B CCW Pump.
5. If plant is in process of cooling down or heating up, isolate 2B SDC Heat Exchanger by closing MV-3658 (Primary side inlet) and HCV-14-3B on CCW side. Also close MV-1414 and MV-1416 which stops CCW flow through 2C and 2D Containment Fan Coolers.

   NOTE: This step should reduce CCW flows to within limits of one heat exchanger.

ST. LUCIE UNIT 2
OFF NORMAL OPERATING PROCEDURE NUMBER 2-0310030, REVISION 1
COMPONENT COOLING WATER - OFF NORMAL OPERATION

2

5.0 INSTRUCTIONS: (Cont.)

5.3 (Cont.)

5.3.4 (Cont.)

6. If plant is at power or hot shutdown, proceed to isolate 2B CCW Heat Exchanger by closing V-14160 (Inlet valve) and V-14177 (Outlet valve). If heat exchanger cannot be repaired within 72 hours, be in at least Hot Standby within 6 hours and Cold Shutdown within the following 30 hours.

5.3.5 Rupture of "A" Component Cooling Water Header

1. HCV-14-8A and HCV-14-9 ("A" hdr ties to non-essential hdr) will close automatically on low level (LS-14-6A) in the CCW Surge Tank. This isolates the ruptured header.

2. Stop 2A CCW Pump.

NOTE: CCW will be lost to:

2A HPSI Pump
2A and 2B Containment Fan Coolers
2A SDC Heat Exchanger
3A and 3C Control Room A.C. Units

3. If the plant is in a cooldown or heatup condition, the primary side of 2A SDC Heat Exchanger must be isolated by closing MV-3517 (primary side inlet).

5.3.6 Rupture of "B" Component Cooling Water Header

1. HCV-14-8B and HCV-14-10 ("B" hdr ties to non-essential hdr) will automatically close on low level (LS-14-6B) in the CCW Surge Tank. This isolates the ruptured header.

2. Stop 2B CCW Pump.

3. Close MV-14-17 and MV-14-19. Open MV-14-18 and MV-14-20. This will feed the Fuel Pool Heat Exchanger from the "A" Header.

NOTE: If the "A" header begins to de-pressurize after this evolution, the rupture is on the header to or from the Fuel Pool Heat Exchanger.

NOTE: CCW will be lost to:

2B HPSI Pump
2C and 2D Containment Fan Coolers
2B SDC Heat Exchanger
3B Control Room A.C. Unit
Fuel Pool Heat Exchanger

ST. LUCIE UNIT 2
OFF NORMAL OPERATING PROCEDURE NUMBER 2-0310030, REVISION 1
COMPONENT COOLING WATER - OFF NORMAL OPERATION

2

5.0 INSTRUCTIONS: (Cont.)

5.3 (Cont.)

5.3.6 (Cont.)

4. If the plant is in a cooldown or heat up condition, the primary side of 2B SDC heat Exchanger must be isolated by closing MV-3658 (Primary side inlet).

5.3.7 Loss of 2A Shutdown Cooling Heat Exchanger

1. Isolate the 2A SDC Heat Exchanger by closing:

   A. MV-3517
   B. MV-3456
   C. V-7161 (2A Hx outlet to spray hdr)
   D. V-7145 (2A CS pump disch)
   E. V-14348 (2A Hx CCW supply from "A" hdr)
   F. V-14365 (2A Hx CCW return from "A" hdr)

2. With the spray additive system inoperable, restore the system to OPERABLE status within 72 hours or be in at least Hot Standby within the next 6 hours; restore the spray additive system to OPERABLE status within the next 48 hours or be in Cold Shutdown within the following 30 hours.

5.3.8 Loss of 2B Shutdown Cooling Heat Exchanger

1. Isolate the 2B SDC Heat Exchanger by closing:

   A. MV-3658
   B. MV-3457
   C. V-7164 (2B Hx outlet to spray hdr)
   D. V-7130 (2B CS pump disch)
   E. V-14357 (2B Hx CCW supply from "B" hdr)
   F. V-14487 (2B Hx CCW return to "B" hdr)

2. With the spray additive system inoperable, restore the system to OPERABLE status within 72 hours or be in at least Hot Standby within the next 6 hours; restore the spray additive system to OPERABLE within the next 48 hours or be in Cold Shutdown within the following 30 hours.

ST. LUCIE UNIT 2
OFF NORMAL OPERATING PROCEDURE NUMBER 2-0310030, REVISION 1
COMPONENT COOLING WATER - OFF NORMAL OPERATION

2

5.0 INSTRUCTIONS: (Cont.)

5.3 (Cont.)

5.3.9 Loss of a Containment Fan Cooler

1. Isolate the affected Containment Fan Cooler by closing its associated inlet and outlet valves.

   2A Containment Fan Cooler

   MV-14-9 (Inlet valve)
   MV-14-10 (Outlet valve)

   2B Containment Fan Cooler

   MV-14-11 (Inlet valve)
   MV-14-12 (Outlet valve)

   2C Containment Fan Cooler

   MV-14-13 (Inlet valve)
   MV-14-14 (Outlet valve)

   2D Containment Fan Cooler

   MV-14-15 (Inlet valve)
   MV-14-16 (Outlet valve)

2. With one Containment Fan Cooler inoperable and both Containment Spray Systems operable, restore the inoperable Containment Fan Cooler to operable status in 30 days or be in hot Shutdown in the next 12 hours.

5.3.10 Rupture of Non-essential Component Cooling Water Header

1. HCV-14-8A and HCV-14-9 will close automatically on low level (LS-14-6A) in the CCW Surge tank. This isolates "A" header from "N" header.

2. HCV-14-8B and HCV-14-10 will close automatically on low level (LS-14-6B) in the CCW Surge tank. This isolates "B" header from "N" header.

3. A reactor trip will occur on 2 of 4 logic on low flow from the combined CCW return from the Reactor Coolant Pumps. There is a ten minute time delay on this trip.

4. As Reactor Coolant Pump seal temperature approaches 250°F or Reactor Coolant Pump bearing temperatures approaches 194°F, remove the RCPs from service.

ST. LUCIE UNIT 2
OFF NORMAL OPERATING PROCEDURE NUMBER 2-0310030, REVISION 1
COMPONENT COOLING WATER - OFF NORMAL OPERATION

2

5.0 INSTRUCTIONS: (Cont.)

5.3 (Cont.)

5.3.10 (Cont.)

5. Isolate letdown.

CAUTION: PRESSURIZER LEVEL WILL HAVE TO BE MONITORED CLOSELY.

6. Remove the following equipment from service:

A. 2A BA Concentrator
B. 2B BA Concentrator
C. Waste Concentrator
D. 2A Waste Gas Compressor
E. 2B Waste Gas Compressor
F. Sample Heat Exchangers

5.3.11 High Level in CCW Surge Tank

1. Check Surge Tank flow meter. If make up flow is indicated, close V-14100 (Make-up Isol) and check V-14101 (Alternate make-up supply) to be closed.

2. If high radiation is indicated in the CCW System, refer to Off-Normal OP #2-0210021, "Component Cooling Water - Excessive Activity".

5.3.12 Increasing CCW Temperature

1. Investigate and determine the cause of the increasing temperature. It may be either a component served by CCW or malfunction of ICW. If a problem with ICW is indicated, refer to Off-Normal OP #2-0640030, "ICW System - Off Normal Operation".

ST. LUCIE UNIT 2
OFF NORMAL OPERATING PROCEDURE NUMBER 2-0310030, REVISION 1
COMPONENT COOLING WATER - OFF NORMAL OPERATION

6.0 REFERENCES:

6.1 Ebasco P&ID 2998-G-083

6.2 CE P&ID E-13172-310-130

7.0 RECORDS REQUIRED:

7.1 Normal log entries

DOCUMENT REVISION DISTRIBUTION SHEET - UNIT II OFF NORMAL & EMERGENCY OPER. PROCEDURE

DOCUMENT TITLE Main Steam Line Break

DOCUMENT FILE NUMBER 2-0810040

DOCUMENT REVISION NUMBER 1

DOCUMENT DISTRIBUTED ON 4-25-83
DATE

DOCUMENT SENT TO:

2

COPY NO.	DOCUMENT HOLDER	TRANSMITTAL RETURNED	COPY NO.	DOCUMENT HOLDER	TRANSMITTAL RETURNED
	MASTER			UNCONTROLLED COPIES	
1	D. A. Sager				
2					
3				NRC - Region II	
4				Attn: EPPS Branch Chief	
5	N. G. Roos			H. Paduano - GO	
6	TSC			A. W. Bailey	
7				G. Anglehart - CE	
8					
9					
10	Control Room II			G. Regal	
11				Ugelow, Al —Backfit	
12				Training - Larry Baker	
13					
14					
15	Training			J. Spodick	
				T. Vogan - GO	
				G. J. Boissy	
				R. R. Jennings	
				M. M. Mercer	
				R. J. Frechette	
				Resident NRC	
				~~NRC - IE: HQ~~	
				Attn: Chief, Nuclear Response Branch	
				C. Burns - CE	

PROCESSED BY: _____ DATE _____

2

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040
REVISION 1

MAIN STEAM LINE BREAK

REV. 1 FRG. 4-22-83
Approval [signature] Plt.Mngr. 4-22-83

TOTAL NO. OF PAGES 19

2

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2
EMERGENCY PROCEDURE NUMBER 2-0810040
REVISION 1

1.0 SCOPE:

Provide operator actions to be taken when an uncontrolled steam release occurs from a steam generator.

2.0 SYMPTOMS:

NOTE: Figure 2.1, page 5, may assist in evaluating this event.

2.1	Loud noise audible in the control room	2.1 Indications Steam break outside containment
2.2	Continuously decreasing T_{AVE}	2.2 Indications Excess steam demand from secondary system TR-1111, TR-1121, TR-1120E /R1 2.2 Alarms K-25
2.3	Abnormally low pressure in one or both steam generators.	2.3 Indications PI-8023A,B,C,D PI-8013A,B,C,D PR-8013D, 8023D 2.3 Alarms P-17,P-19

2

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

2.0 SYMPTOMS: (Cont.)

2.4 Rapid decrease in S/G level	2.4	Indications LR-9013D/9023D /R1 LR-9011, 9021 LIC-9013-A,B,C,D LIC-9023-A,B,C,D LI-9012-1, 9022-1 /R1 LR-9012, 9022 /R1
	2.4	Alarms G-1, G-9
2.5 Reactor Trip Turbine Trip	2.5	Indications ADS Display (CEA's inserted) RPS-Trip units No. 1, 4, 7, or 9 RPS-TCB's Open Gen. Output = 0, WR-871, CEA Display (Core Mimic) /R1
	2.5	Alarms D-8, L-3, L-5, L-9, L-11, L-13, L-17, L-36, L-44 /R1
2.6 A. Increased steam flow and/or feed flow B. Decreased generator output	2.6	Indications Until MSIS occurs FR-8011,9011 FR-8021, 9021 FI-08-1A,1B, FI-09-1A,1B, WR-871 /R1
	2.6	Alarms G-17
2.7 Decreasing Pressurizer level and pressure	2.7	Indications LI-1110X,Y,LIC-1110X,Y PI-1102A,B,C,D PR-1100, LR-1110, LR1110X
	2.7	Alarms H-1, H-2, H-3, H-4, H-9, H-10, H-17, H-18 /R1
2.8 Containment Radiation monitors are normal	2.8	Indications NO hi radiation alarms from containment. Differentiates between LOCA and MSLB.
2.9 Hi Containment Pressure	2.9	Indications Break inside containment PIS-07-2A,2B,2C,2D
	2.9	Alarms P-13,P-23

2

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

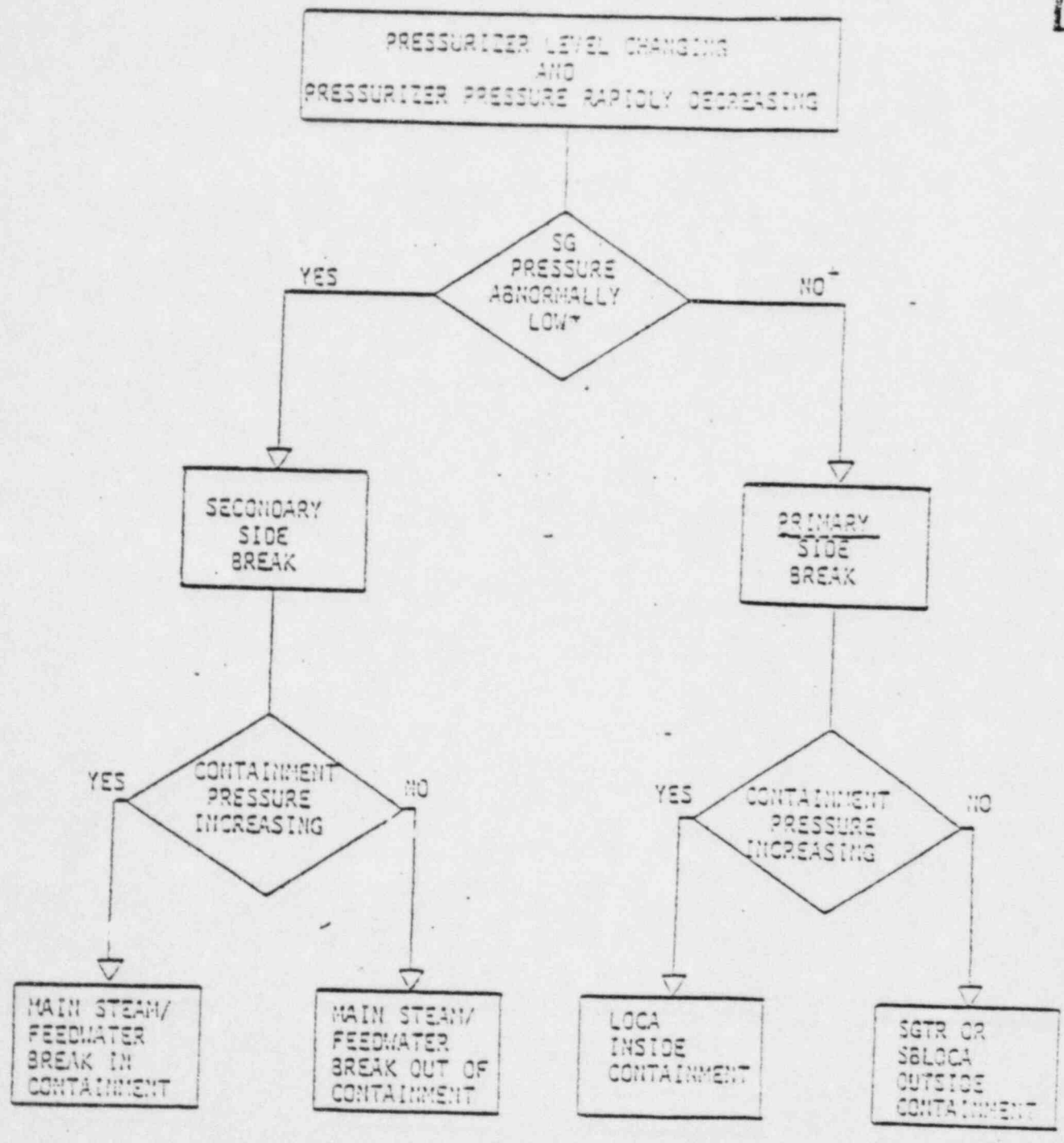
2.0 SYMPTOMS: (continued)

2.10 Containment Reactor Cavity Sump level increasing	2.10 Indications Break inside containment LIS-07-6,FR-07-3
	2.10 Alarms N-21,N-29
2.11 MSIS Actuated	2.11 Indications Equipment isolates as per Table I /R1
	2.11 Alarms P-7,P-9,P-17,P-19
2.12 SIAS, CIAS Actuated	2.12 Indications Equipment starts and isolates per Table II and Table III /R1
	2.12 Alarms R-6,R-16,R-26,Q-3,P-3, P-13,P-23
2.13 CSAS Actuated	2.13 Indications Equipment operates per Table IV /R1
	2.13 Alarms S-7,S-17 /R1

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

FIGURE 2.1

BREAK IDENTIFICATION CHART



*IN ONE OR BOTH STEAM GENERATORS

†MAY DECREASE SLIGHTLY AFTER TRIP

2

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

3.0 IMMEDIATE AUTOMATIC ACTION:

	AUTOMATIC ACTION		INITIATING EVENT	
3.1	Reactor Trip	3.1	S/G low press 626 psia decreasing	/R1
3.2	Turbine trip	3.2	Reactor trip bus low voltage	
3.3	Generator lock-out	3.3	Turbine trip	/R1
3.4	Auxiliaries change to Start-up transformer	3.4	From gen. lock-out	
3.5	MSIS	3.5	600 psia S/G press. decreasing or 5 psig cont. press increasing	
3.6	SIAS	3.6	1736 PSIA RCS press. decreasing or 5 psig cont. press increasing	/R1
3.7	CIAS	3.7	5 PSIG cont. press. increasing or Hi cont. radiation $\geq$ 10 R/HR or from SIAS actuation.	
3.8	CSAS	3.8	9.3 psig cont. press. concurrent with SIAS	/R1
3.9	AFAS (feeds only the non-faulted S/G)	3.9	S/G level < 20.6%	/R1

2

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

4.0 IMMEDIATE OPERATOR ACTION:

	ACTION	NOTES	
4.1	Carry out standard immediate operator actions for a reactor trip	4.1 If necessary, refer to RX Trip Procedure OP #2-0030130	/R1
4.2	Ensure SIAS actuates if if conditions require.	4.2 SIAS actuates on: 1736 psia low RCS press. 5 psig Hi cont. press.	/R1
	If SIAS actuates on low RCS pressure, after verification of all rods inserted > 5 sec., then stop all Reactor Coolant Pumps.		/R1
4.3	Ensure MSIS actuates if conditions require	4.3 MSIS actuates on: 600 psia low S/G press. 5 psig hi cont. press.	
4.4	Determine affected Steam Generator	4.4 Observe S/G pressures and levels	/R1
4.5	Ensure AFAS is establishing flow only to the non-effected generator.		

2

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

5.0 SUBSEQUENT ACTIONS:

CHECK

5.1 Use all available indications to determine if the RCS is in a sub-cooled or saturated condition. If saturated conditions occur, the operator must ensure that the RCP's are turned off, the SIS is providing makeup to the RCS, and the operable steam generator is removing heat from the RCS. ____ /R1

> NOTE: Information can be obtained from the QSPDS Display, RCS hot leg temperature, RCS cold leg temperature, incore thermocouple temperature, and RCS pressure to determine if the RCS is sub-cooled or saturated. An increase in temperature above the saturation temperature for the existing pressure is an indication of voiding in the RCS. (P-T Nomograph Available on RTGB-203) /R1

5.2 Check the ESFAS BYPASS STATUS BOARD (ensure equipment availability for auto functions). Refer to Tables to ensure the proper operation of engineered safety features as time and conditions permit. ____

5.3 Implement the Emergency Plan as necessary in accordance with EPIP 3100021E, "Duties and Responsibilities of the Emergency Coordinator". ____

5.4 Isolate steam generator blowdown; close FCV-23-3, 5, 4, 6 and sample FCV-23-7,9. ____

5.5 When S/G level rises > 39%, take control of aux. feed to halt further feeding of relatively cold water until cooldown transient has terminated ____

> NOTE: Erroneous indications may be observed > 15 minutes after a break inside containment.

5.6 When the cooldown has stopped and RCS temperature is above 400°F, reinitiate aux. feed flow to the non-faulted steam generator not exceeding 150 GPM for a period of 5 minutes. Maintain RCS temp. stable with atmospheric dumps on the non-faulted steam generator ____ /R1

5.7 Maintain hot leg temperature less than 520°F with auxiliary feed and steam dump to atmosphere. ____

> NOTE: Do not admit auxiliary feed flow to the faulted steam generator regardless of location of break.

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

5.0 SUBSEQUENT ACTIONS: (Cont.)

CHECK

5.8 When pressurizer level on control channels indicates 30% energize all pressurizer heaters to aid in increasing RCS pressure. ____

5.9 When pressurizer level indicates 40% secure all charging pumps. ____

5.10 As hot leg temperature is maintained < 520°F verify that pressurizer pressure stabilizes at approximately 1250 PSIA (shut off head of HPSI) ____ /R1

NOTE: Ensuring hot leg temperature less than 520°F and pressurizer pressure greater than 1250 psia ensures a margin of 50°F subcooled.

5.11 Stop emergency diesel generators if offsite power is available and feeding the emergency buses. ____

5.12 When containment pressure is < 9.3 PSIG /R1

a) Reset CSAS ____

b) Stop CS pumps ____

c) Close FCV-07-1A, 1B ____

5.13 OPEN ICW to TCW Heat Exchangers MV-21-3 and MV-21-2 ____

5.14 CLOSE CCW outlet from SDC Heat Exchangers, HCV-14-3A, 3B. ____

5.15 Restore CCW on the RCP's by performing the following steps:

5.15.1 Open the "N" header supply and return valves from A and B CCW header:

"OVERRIDE" HCV-8A, HCV-9 (A side) ____

"OVERRIDE" HCV-8B, HCV-10 (B side) ____

(Taking these valves to "OVERRIDE" position will open valves with a SIAS signal present.) /R1

5.15.2 Restore CCW to containment "N" header by opening containment isolation valves:

"OPEN/RESET" HCV-14-2 ____

"OPEN/RESET" HCV-14-6 ____

"OPEN/RESET" HCV-14-1 ____

"OPEN/RESET" HCV-14-7 ____

(Taking valves to "OPEN/RESET" position will override SIAS signal)

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

5.0 SUBSEQUENT ACTIONS: (continued)

5.15 (continued)

CHECK

5.15.3 Restore CCW to individual RCP's seal coolers by opening valves:

Open HCV-14-11A1 _____

Open HCV-14-11A2 _____

Open HCV-14-11B1 _____

Open HCV-14-11B2 _____ /R1

NOTE: It may be necessary to cycle these valves to restore flow.

5.16 When at least 20 degrees subcooling has been re-established, and control of pressure and level have been regained, the HPSI pumps can be secured. _____

5.17 Once control of the transient has been gained with normal pressure control, the safety injection signal may be reset by first key-blocking the ESFAS SIAS signal, then manually resetting the SIAS signal present by taking the channel control switches to the reset position. _____ /R1

5.18 Once SIAS signal has been reset, the CIAS ESFAS signal can be reset by taking the CIAS channel control switches to the reset position, allowing control of the letdown isolation valves. _____

5.19 When CIAS has been reset, open the letdown isolation valves, and re-establish charging and letdown per OP OP 2-0210030, "Charging and Letdown Off-Normal Procedure." _____

5.20 Resume forced cooling as soon as conditions permit.

5.21 Notify Chem. Dept. to sample RCS for indications of fuel failure. _____

5.22 Continue controlled cooldown in accordance with OP 0030127. _____

NOTE: If containment spray system has actuated, portions of the containment spray system will contain Hydrazine.

2

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

TABLE I

MAIN STEAM ISOLATION SIGNAL (MSIS)

	CONDITION	CHECK
One (1) Main Steam Line A ISOL. Valve HCV-08-1A	closed	____
One (1) Main Steam ISOL. Valve A bypass MV-08-1A	closed	____
Two (2) FW. DISCH. to S/G 2A HCV-09-1A, HCV-09-1B	closed	____
Two (2) FW. DISCH. to S/G 2B HCV-09-2A, HCV-09-2B	closed	____
One (1) Main Steam ISOL. Line B ISOL. Valve HCV-08-1B	closed	____
One (1) Main Steam ISOL. Valve B bypass MV-08-1B	closed	____

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

TABLE II

SAFETY INJECTION ACTUATION SIGNAL (SIAS)

	CONDITION	CHECK	
RTGB 206, Left to Right			
Two (2) CCW PPS (2A, 2B, or 2C)	On		/R1
Two (2) CCW to Fuel Pool HX Isolation Valves (MV-14-18, MV-14-17)	Closed		/R1
Four (4) CCW HDR Non-essential Isolation Valves (HCV-14-8A, HCV-14-8B, HCV-14-9, HCV-14-10)	Closed		
Two (2) CCW Outlet Valves from shutdown HX 2A, 2B (HCV-14-3A, HCV-14-3B)	Open		
Two (2) LPSI PPS	On		
Two (2) HPSI PPS	On		
Four (4) LPSI Header Valves to Loops (HCV-3615, HCV-3625, HCV-3635, HCV-3645)	Open		/R1
Eight (8) HPSI Header Valves to Loops (HCV-3617, HCV-3627, HCV-3637, HCV-3647 - Header A) (HCV-3616, HCV-3626, HCV-3636, HCV-3646 - Header B)	Open		/R1
Two (2) Hot Leg Injection Check Vlv. Leakage Valves. (V3572, V3571)	Closed		
Two (2) to RWT/VCT (I-SE-03-2A, I-SE-03-2B)	Closed		
Four (4) SI Tank Isolation Valves (V3614, V3624, V3634, V3644)	Open		
Four (4) SI Tank Fill/Drain Valves (I-SE-03-1A, I-SE-03-1B, I-SE-03-1C, I-SE-03-1D)	Closed		
Four (4) SI Check Leakage Test (HCV-3618, HCV-3628, HCV-3638, HCV-3648)	Closed		
Four (4) CCW To/From RCP's (HCV-14-1, HCV-14-2, HCV-14-7, HCV-14-6)	Closed		
Two (2) Intake Cooling Water, Lube Water to Circ. Water Pumps, Isolation Valves (MV-21-4A, MV-21-4B)	Closed		/R1

2

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

TABLE II
SAFETY INJECTION ACTUATION SIGNAL (SIAS)
(continued)

	CONDITION	CHECK
RTGB 205		
Two (2) Boric Acid Make-up Pumps 2A and 2B	Start	
Two (2) Boric Acid Make-up Tank Recirc Vlv's 2A (V-2650), 2B (V-2651)	Closed	
One (1) Boric Acid Make-up Vlv (V-2512)	Closed	
Two (2) Boric Acid Gravity Feed Vlv's (V-2508, V-2509)	Open	
One (1) Volume Control Tank Discharge Vlv. (V-2501)	Closed	
Two (2) Letdown Isolation Vlv's (V-2516, V-2515)	Closed	
Three Charging Pumps (2A, 2B and 2C)	Start Signal	
One (1) Boric Acid Make-up Flow Vlv (FCV-2210Y)	Closed	
Two (2) Containment Sump Isolation Valves (LCV-07-11A, LCV-07-11B)	Closed	
RTGB 202		
Two (2) Intake Cooling Wtr Pumps	On	
Two (2) Intake Cooling Wtr Isolation Valves (MV-21-3, MV-21-2)	Closed	
RTGB 201		
Two (2) Diesel Generators	On	

2

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

TABLE II

SAFETY INJECTION ACTUATION SIGNAL (SIAS)
(continued)

	CONDITION	CHECK
HVAC PANEL LEFT TO RIGHT		
Four (4) RAB Main Supply and ECCS Exhaust Fans (2-HVS-4A, 2-HVE-9A, 2-HVS-4B, 2-HVE-9B)	On	
Four (4) Containment Fan Coolers (2-HVS-1A, 2-HVS-1B, 2-HVS-1C, 2-HVS-1D)	On slow Speed	
Sixteen (16) ECCS Isolation Dampers (D1, D2, D3, D4, D5A, D6A, D7A, D8A, D9A, D12A, D5B, D6B, D7B, D8B, D9B and D12B)	Closed	/R1

NOTE
Any spare equipment that is running and not needed for controlling this incident should be STOPPED.

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

TABLE III

CONTAINMENT ISOLATION ACTUATION SIGNAL (CIAS)

	CONDITION	CHECK	
RTGB 206, Left to Right			
Two (2) to RWT/VCT (I-SE-03-2A, I-SE-03-2B)	Closed		/R1
Five (5) SI Tank Sample Isolation Valves (ISE-05-1A, ISE-05-1B, ISE-05-1C, ISE-05-1D, ISE-05-1E)	Closed		
Four (4) S/G Blowdown and two (2) S/G Sample Isolation Valves (Isolation FCV-23-3, FCV-23-5, FCV-23-4, FCV-23-6) (Sample FCV-23-7, 9)	Closed		/R1
Six (6) Containment Sample Isolation Valves (FCV-26-2, FCV-26-4, FCV-26-6, FCV-26-1, FCV-26-3, FCV-26-5)	Closed		/R1
RTGB 205			/R1
Two (2) Containment Sump Isolation Valves (LCV-07-11A, LCV-07-11B)	Closed		
Six (6) RCS and pressurizer Sample Isolation Valves (V5200, V5201, V5202, V5203, V5204, V5205)	Closed		
One (1) Primary Water Isolation (HCV-15-1)	Closed		
One (1) Instrument Air Isolation (HCV-18-1)	Closed		
One (1) N^2 Supply Isolation (V6741)	Closed		
Two (2) Waste Gas Isolation (V6750, V6718)	Closed		
Two (2) RCP Bleed-off Isolation (V2505, V2524)	Closed		
Two (2) RDT Isolation (V6341, V6342)	Closed		
Three (3) Letdown Isolation Valves (V2516, V2522, V2515)	Closed		
RTGB 201			
Two (2) Diesel Generators	On		

2

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

TABLE III

CONTAINMENT ISOLATION ACTUATION SIGNAL (CIAS)
(continued)

	CONDITION	CHECK	
HVAC Panel, Left to Right			
One (1) Shield Exhaust Fan and One (1) Control Room Emergency Filter Fan (2-HVE-13A, 2-HVE-6A)	On		/R1
Four (4) Control Room Isolation Valves (FCV-25-24, FCV-25-17, FCV-25-18, FCV-25-16)	Closed		
Six (6) Containment Purge Isolation Valves (FCV-25-1, FCV-25-3, FCV-25-5, FCV-25-6, FCV-25-4, FCV-25-2)	Closed		/R1
Three (3) Continuous Containment Purge Valves (FCV-25-20, FCV-25-26, FCV-25-21)	Closed		/R1
Two (2) SBVS Isolation Valves (FCV-25-32, FCV-25-33)	Open		/R1
Two (2) Fuel Handling Emergency Vent Valves (FCV-25-30, FCV-25-31)	Closed		/R1
One (1) Shield Exhaust Fan and One (1) Control Room Emergency Filter Fan (2-HVE-13B, 2-HVE-6B)	On		/R1
Four (4) Control Room Isolation Valves (FCV-25-25, FCV-25-14, FCV-25-15, FCV-25-19)	Closed		
Two (2) Containment Purge Exhaust Fans (2-HVE-8A, 2-HVE-8B)	Off		

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

TABLE IV

CONTAINMENT SPRAY ACTUATION SIGNAL (CSAS)

	CONDITION	CHECK	
Two (2) Containment Spray PPS. 2A, 2B	On		
Two (2) Containment Spray HDR. ISOL. Valves FCV-07-1A, 1B	Open		
Two (2) Hydrazine PP's 2A, 2B	On		/R1
Two (2) Hydrazine Pump Discharge Valves I-SE-07-3A, 3B	Open		

NOTE: Verify Flow on FI-07-1A, 1B

2

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

6.0 PRECAUTIONS:

A rupture of a steam line is assumed to include any accident which results in an uncontrolled steam release from a steam generator. The release can occur due to a break in a pipe line or from the malfunction of an atmospheric dump valve, steam dump and bypass valve or safety valve. The steam release results in an initial increase in steam flow which decreases during the accident as the steam pressure falls. The energy removal from the Reactor Coolant System causes a reduction of coolant temperature and pressure. This transient results in the RCS being at saturation conditions with the potential for void formations in the system. Operator actions should be directed toward establishing subcooled conditions in the Reactor Coolant System.

Core protection after a break would be provided by MSIS at 600 PSIA steam generator pressure or 5 PSIG containment pressure (break inside containment) and SIAS at 1736 PSIA pressurizer pressure or 5 PSIG containment pressure (break inside containment). /R1

All available indications should be used to aid in diagnosing the event since the accident may cause irregularities in a particular instrument reading. Critical parameters must be verified when one or more confirmatory indications are available. With the safety parameter display system (SPDS) operating normally, use the nomograph, in conjunction with the SPDS to eliminate dependence on a single instrument. With the SPDS inoperable refer to the nomograph utilizing control room indicators such as T_h, pressurizer pressure, and incore thermocouples to determine the margin to saturation. Subcooling margin can also be determined by subtracting hot leg temperature from pressurizer temperature.

An increase in temperature above the saturation temperature for the existing pressure is an indication of voiding in the RCS. If this occurs the operator must ensure that the RCP's are turned off, the SIS is providing makeup to the RCS, and that the operable steam generator is removing heat from the RCS.

2

ST. LUCIE UNIT NO. 2
EMERGENCY PROCEDURE NUMBER 2-0810040, REVISION 1
MAIN STEAM LINE BREAK

7.0 REFERENCES:

FSAR Sect. 6, 7, 15

Operating Procedure 0810040 (Unit #1)

C. E. Guidelines (CEN-152)

Draft of Nureg - 0799

8.0 RECORDS REQUIRED:

Normal log entry

Recorders covering transient conditions

9.0 APPROVAL:

Reviewed by Facility Review Group Oct. 26 1982

Approved by J. H. Barrow (for) Plant Manager Oct. 26 1982

Revision 1 Reveiwed by FRG April 22 1983

Approved by J H Barrow for Plant Manager 4-22 1983

LAST PAGE