ITEM # 2
COVER SHEET

-- INITIAL SUBMITTAL INFORMATION - ALL IN ONE ADAMS DOCUMENT

ST. LUCIE EXAM 2000-301
50-335 & 50-389

FEBRUARY 7 - 11, 2000

INITIAL SUBMITTAL

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RO WRITTEN EXAMINATION

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INITIAL SUBMITTAL
RO WRITTEN EXAMINATION

U.S. Nuclear Regulatory Commission
Site-Specific
Written Examination

Applicant Information

Name:	Region: II
Date:	Facility/Unit: St. Lucie Unit 1 and 2
License Level: RO	Reactor Type: CE
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected five hours after the examination starts.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

______________________________ Applicant's Signature

Results

Examination Value	100	Points
Applicant's Score	________	Points
Applicant's Grade	________	Percent

Question 1

A Waste Gas Decay Tank is to be released.

Which of the following conditions would prohibit releasing the tank?

A. The wind speed is varying by more than 5 mph.

B. The Waste Gas Radiation Monitor is inoperable.

C. The Waste Gas release flow meter is inoperable.

D. Both RAB Exhaust Fans HVE-10A and HVE-10B, are stopped.

Question 2

The selected Unit 1 Pressurizer Pressure controller PIC-1100X fails low. With no Operator action, and all systems in automatic, which of the following actions will occur?

A. Proportional and backup heaters full on, spray valves open, pressure decrease results in TMLP trip.

B. Proportional and backup heaters full off, spray valves closed, pressure decrease results in TMLP trip.

C. Proportional and backup heaters full on, spray valves closed, pressure increase results in high pressure reactor trip.

D. Proportional and backup heaters full off, spray valves open, pressure increase results in high pressure reactor trip.

Question 3

A loss of offsite power occurred from 100% power 30 minutes ago.

The following conditions exist:

- Both S/Gs are available with AFW flow of 150 GPM per S/G.
- RCS subcooling is 60°F.
- Average of Qualified CETs is 540°F.
- Loop T-hots are 530°F and rising slowly.
- Loop T-colds are 528°F and steady.
- 2A and 2B Steam Generator Pressures are 895 psia and steady.

Which of the following actions should be taken to enhance natural circulation?

A. Initiate Auxiliary Spray.

B. Throttle open the Atmospheric Dump Valves.

C. Throttle open the Auxiliary Feed Water control valves.

D. Turn on available pressurizer heaters.

Question 4

Given the following conditions:

- Unit 1 is operating at 25% power.
- All controls are in Manual Sequential.
- Group 7 control rods are at 45 inches.
- The operator is withdrawing Group 7 control rods.
- When the "in/out" switch is released, outward rod motion continues.
- Placing the mode selector in OFF has no effect.

With **no** Operator action which of the following will automatically trip the reactor?

A. Variable High Power

B. High Start Up Rate

C. Thermal Margin/Low Pressure

D. High Pressurizer Pressure

Question 5

Given the following conditions:

- Unit 2 is in Mode 5 on SDC preparing to heatup the RCS.
- Both Personnel airlock doors are open.
- A loss of shutdown cooling occurs and the Unit inadvertently enters Mode 4.

Which one of the following statements describes the status of containment integrity?

Containment integrity is:

A. not met. At least one airlock door must be maintained closed at all times.

B. not met. Both airlock doors must be maintained closed at all times.

C. not required in Mode 4.

D. not required if Unit re-enters Mode 5 within one hour.

Question 6

Unit 2 is in Mode 4 with the following conditions:

- RCS pressure 270 PSIA
- Both SDC Loops in service
- 2B1 and 2B2 RCP's operating
- 2B HPSI pump in standby for boration flowpath
- PLP 101 (RM-26-1) CCW Header A Radiation monitor in alarm

Which of the following identifies the component that is the likely source of the high CCW activity?

A. 2A LPSI Pump

B. 2B HPSI Pump

C. 2A Fuel pool Heat Exchanger

D. 2B SDC Cooling Heat Exchanger

Question 7

Unit 2 is operating at 80% power, 5000 EFPH, with the following conditions:

- Two charging pumps are operating.
- RCS Boron Concentration is 850 PPM.
- 2A BAMT concentration of 5525 PPM.
- V2514 emergency borate valve is open.
- 2A BAM pump is being cycled to facilitate a 30 MWE/min rapid downpower.

The RCO runs the 2A BAM pump one time for one minute and then stops it. Excluding the effects of Xenon, which of the following identifies the approximate final Tave?

(REFERENCES PROVIDED)

A. 565° F

B. 560° F

C. 553° F

D. 546° F

Question 8

Given the following conditions:

- A reactor trip occurred several minutes ago.
- All RCPs are in operation.
- RCS temperature: 520°F and slowly lowering.
- Pressurizer pressure: 1980 psia and slowly lowering.
- Pressurizer level: 36% and trending slowly downward.
- Subcooling: 100°F and slowly rising.
- Both SG levels: 10% narrow range and slowly lowering.
- Both SG pressures: 740 psia and slowly lowering.

Which one of the following actions would promptly stabilize the plant?

A. Raise the pressurizer level control setpoint.

B. Raise the pressurizer pressure control setpoint.

C. Increase Auxiliary Feedwater flow.

D. Close the Main Steam Isolation valves.

Question 9

At 50% power Unit 2 received the following annunciators on RTGB 201:

- B-14 4.16 KV 2A3 Δ current trip
- B-6 2A Emer. D/G Brk. Failure
- B-35 480V LC 2A5 UV/UV test/ground
- B-33 120V Vital Security/Fire Invtr. Trouble
- B-46 4.16 KV Emerg. SWGR. 2A3 UV/UV test
- B-28 480 V LC 2A2 UV/UV test ground
- B-48 4.16 KV SWGR./480V LC/MCC 2AB UV
- B-9 Pzr. HTR XFMR 2A3 Trouble
- B-39 480V MCC 2A5/2A6/2A8 Non-Ess. Sect. Lockout

Which of the below describes the status of the Reactor and the 2A Diesel Generator?

A. Reactor tripped and the 2A Diesel not start.

B. Reactor tripped and the 2A Diesel start and energize the 2A3 4.16 KV bus.

C. Reactor not tripped and the 2A Diesel not start

D. Reactor not tripped and the 2A Diesel start but not energize the 2A3 4.16 KV bus.

Question 10

Unit 1 Control Room has been evacuated due to a fire and all immediate actions have been complete. Pressurizer Pressure is being controlled by the RCO from the Hot Shutdown Control Panel (HSDCP).

Which of the following describes the Pressurizer Pressure range and the method to maintain these ranges?

	Range	Method
A.	1800-2300 psia, trending to 2225-2275 psia auxiliary spray.	heaters and
B.	1800-2300 psia, trending to 2225-2275 psia auxiliary spray.	main spray or
C.	1850-2250 psia, trending to 2200-2300 psia	heaters and main. spray
D.	1850-2250 psia, trending to 2200-2300 psia	auxiliary spray or PORV's.

Question 11

The following annunciators are received on Unit 2:

- L-36 TMLP channel trip
- L-40 NI channel inoperative
- L-43 Reactor power ratio deviation
- L-34 Nuclear / ΔT power channel deviation
- L-9 Reactor power high channel trip

Which of the below Nuclear Instrumentation systems has malfunctioned?

A. Startup Channel

B. Linear Range Safety Channel

C. Excore Neutron Monitoring

D. Wide Range Monitoring

Question 12

A Nuclear and Delta T Power Calibration was performed at 100% power. Calorimetric, Nuclear, DDPS and Delta T all agree within 0.2 %.

If the Unit is downpowered to a stable 50% power level, which of the below statements describes the adjustment that will be required when a new Nuclear and Delta T Power Calibration is performed?

Nuclear power will have to be adjusted:

A. upward to match DDPS power.

B. downward to match manual Calorimetric.

C. downward to null Nuclear Power-Delta T Power.

D. upward to null Nuclear Power-Delta T Power.

Question 13

Which of the below statements describes the reason for closing the Unit 2 MSR Block valves as part of Standard Post Trip Actions?

Prevent:

A. overcooling the RCS

B. losing condenser vacuum.

C. damaging LP turbine seals.

D. overpressurizing the MSR shell side

Question 14

A differential current lockout occurs on the 1A2 4.16KV bus at 32% power.

Which of the following describes the Plant response?

A. The 1A and 1B Condenser will lose equal amount of Circulating water flow but the Unit will have to be tripped due high ΔT across the condensers.

B. The 1A and 1B Condenser will lose equal amount of Circulating water flow, but due to reduced power, the Unit can remain operating.

C. The 1A Condenser will be without Circulating water flow and the Unit will have to be tripped due to high differential pressure between condensers.

D. The 1A Condenser will be without Circulating water flow, but due to reduced power the Unit can remain operating.

Question 15

Which of the following will immediately trip the reactor upon a loss of the 1A DC bus on Unit 1?

A. Low Flow due to loss of two Reactor Coolant Pumps.

B. SIAS signal, which opens the MG set output Breakers.

C. Turbine trip due to loss of 20 ET and 20 AST.

D. Two of four RPS channel trips opens 8 TCB's.

Question 16

Given the following conditions:

- Unit 1 tripped 15 minutes ago
- Pressurizer pressure is 2100 psia and slowly increasing
- Pressurizer level lowered to 25% and has slowly recovered to 29%

Which of the following is the condition of the Pressurizer heaters at this time? (ASSUME NO OPERATOR ACTION)

A. All heaters are energized.

B. All heaters are de-energized.

C. Only the backup heaters are energized.

D. Only the proportional heaters are energized.

Question 17

Unit 1 is in Mode 3. Which of the following will cause an actuation that will stop a running Containment purge fan (HVE 8A or 8B)?

A. Containment temperature of 120ºF.

B. Containment pressure increases to 5.5 psig

C. Containment high range radiation monitor fails to 500 Rem.

D. Containment radiation monitors (CIAS) increases to 1 R/Hr.

Question 18

Unit 2 is operating at 100% power with ESFAS Channel D Containment Pressure in trip due to PT 07-2D failing high. A loss of the MA instrument bus occurs.

Which of the following statements describes the response of the Containment Spray Actuation System (CSAS) and why?

CSAS is:

A. not actuated, only one of the four ESFAS channels will actuate.

B. not actuated, CSAS is energize to actuate.

C. actuated due to high containment pressure on two channels.

D. actuated due to a loss of the Instrument bus alone.

Question 19

Given the following conditions:

- Unit 2 is in Mode 6 with fuel movement in progress.
- The only available Instrument air Compressor, 2C, has tripped and has been off line for 90 minutes.
- The Service Air Compressor has been lined up to Instrument air since the loss of the 2C Compressor.
- Current Instrument air pressure is 98 psig and steady.

In accordance with 2-1010030 Loss of Instrument Air, which of the following describes the action to be taken as a result of Service Air being lined up to Instrument Air?

A. Stop fuel movement until a redundant source of instrument air can be established.

B. Blowdown the Instrument air header drains to remove oil, water, and crud build-up.

C. Install Diesel air compressor to augment the installed station air compressor.

D. Manually cross tie Instrument air to Unit 1 and isolate the Station air to Instrument air cross tie.

Question 20

Unit 2 is ready to cooldown to Shutdown Cooling entry conditions due to a Steam Generator tube rupture. The following are the plant conditions.

- RCS temperature is 532 ° F and stable.

Which of the following are the minimum actions necessary to use the SBCS to cooldown the RCS to **SDC** entry conditions?

A. Ensure the master controller (PIC 8010) in auto and the permissive switch is in auto. Open PCV 8805 by dialing down the setpoint from PIC 8010 to the desired cooldown rate.

B. Ensure the master controller (PIC 8010) in auto, and the permissive switch in auto. Place HIC 8801-8804 in manual and closed. Dial the setpoint down on PCV 8010 to the desired cooldown rate.

C. Place the permissive switch in manual, ensure the controller for PCV 8801 is in auto and dial the setpoint down on PCV 8801 to the desired cooldown rate.

D. Place the permissive switch in manual, place the controller for PCV 8801 in manual and open PCV 8801 to the desired cooldown rate.

Question 21

Due to a DEH computer malfunction, the control has swapped from Operator Auto to Manual.

Which of the following statements describes how the Governor Valves will operate during a down power from 100% power?

The Governor valves will operate in:

A. sequential, the same as in Operator Auto.

B. individually mode, as selected by the Operator from the DEH control panel.

C. single valve, with all the valves moving together.

D. single valve, with valves 3, 2 and 1 closing together prior to #4 closing.

Question 22

Unit 1 is heating up the RCS with the following conditions:

- RCS pressure 1500 psia
- RCS temperature 505° F

RCP status:

	RCP 1A1	RCP 1A2	RCP 1B1	RCP 1B2
Status	Off	Running	Running	Running
RCP controlled bleedoff flow	.8 GPM	.68 GPM	.9 GPM	.65 GPM
Middle cavity pressure	1000 psia	1020 psia	970 psia	950 psia
Upper cavity pressure	510 psia	490 psia	500 psia	515 psia
Controlled Bleedoff pressure	80 psia	75 psia	80 psia	85 psia
Controlled Bleedoff Temperature	220°F	195°F	205°F	230°F

Which of the below statements describes how the RCPs will be configured based on the above indications?
(REFERENCES PROVIDED)

A. Parameters are normal, the fourth RCP may be started

B. Stop the 1A2 RCP due to indications of seal failure.

C. Stop the 1B1 due to high controlled bleedoff flow

D. Stop the 1B2 within 10 minutes due to high Bleedoff temperature

Question 23

Given the following conditions:

- An unisolable ESDE has occurred outside the Containment on Unit 1
- The affected S/G has blown dry
- RCS temperature: 442° F
- RCS pressure: 1290 psia
- EOP-05 'Excess Steam Demand' is in use

Which of the following describes the operator actions required per 1-EOP-05 'Excess Steam Demand'?

A. Secure all running RCP's

B Stabilize RCS temperature and depressurize the RCS

C. Reduce RCS temperature to establish 20° F subcooled

D. Stabilize RCS pressure and temperature at current value

Question 24

Given the following conditions:

- 2-EOP-03 'Loss of Coolant Accident' has been implemented due to a small break LOCA and SIAS actuated
- All systems are operating as expected

Which of the following is the basis for maintaining a secondary heat sink?

A. To minimize boron stratification of the RCS.

B. RCS pressure may remain so high that cooling from the injection flow alone is inadequate to remove decay heat.

C. Reflux boiling is the primary means of heat removal prior to voiding in the hot legs.

D. To provide a means of RCS pressure control in the event main or auxiliary spray is not available.

Question 25

Unit 1 has implemented 1-EOP-04 'Steam Generator Tube Rupture'. Which of the following describes required S/G level control, if RCS pressure cannot be reduced to less than the affected S/G pressure?

A. Align blowdown to the main condenser.

B. Align blowdown to the Monitor Storage tanks.

C. Open the Main Steam drains and drain to the condenser sump.

D. Install drain hoses to the blowdown line and drain to RAB sumps.

Question 26

Which of the below statements descibes the instruments to be utilized to diagnose accident events and confirm safety functions?

A. Use only the qualified White Bezel instruments.

B. Use all instruments that suit the scale/range/response of the accident event that is occuring.

C. Use all safety related instruments and use the White Bezel instruments only if a hostile environment is known to exist for greater than 15 minutes.

D. Use the White Bezel instruments as a primary source of information and safety related instruments to confirm these indications.

Question 27

The crew brief is complete for the on coming RCO. In addition to the RCO chronological log, which other documents need to be reviewed?

A. Out of spec log readings and Night order book

B. Equipment out of service log and Operator status log

C. Equipment out of service log and Night order book

D. Out of spec log readings and Operator status log.

Question 28

In accordance with ADM. 0010120, 'Conduct of Operations' which of the following statements describes the policy for relief/turnover while performing a surveillance?

Relief/Turnover may only occur:

A. after the surveillance has been complete.

B. if the surveillance run will last >1 hour past turnover, and with approval of the ANPS.

C. if the surveillance is in a steady state condition and with approval of the ANPS.

D. if overtime guidelines will be exceeded for the individual responsible for the surveillance with approval of the ANPS.

Question 29

The following conditions exist on Unit 2 while at 70% power:

- 2A Main Feedwater Regulating valve (MFRV) is pinned open controlling S/G level at 65%.
- A transient occurs that results in Operators manually tripping the Unit due to high level in the 2A S/G

Which of the following should be performed IAW ONP 2-0700030, 'Main Feedwater' to control level in the 2A S/G?

A. Manually actuate AFAS 1.

B. Stop the 2A Main Feedwater pump.

C. Close the Main Feedwater block valve on the 2A S/G

D. Remove the pin and close the 2A Main Feedwater Regulating valve.

Question 30

Unit 1 is mitigating a LOCA and has implemented 1-EOP-03 Loss of Coolant Accident.

The following conditions exist:

- RCS pressure: 305 psia and stable
- RCS subcooling: 28 ºF subcooled
- Pressurizer level: 45% and stable
- 1A and 1B S/G levels: 42% wide range
- Reactor vessel level: sensors 4-8 covered
- RCP's: secured

All Charging pumps are running and the HPSI and LPSI pumps have been secured.

Which of the following would require reinitiating LPSI flow?

A. Both S/G levels decrease to 25% wide range.

B. The ANPS has directed two RCP's be restarted.

C. Pressurizer level decreases to 32%.

D. RCS pressure decreases to 180 psia.

Question 31

Given the following conditions:

- Unit 2 is at 100% power when LOOP and inadvertent SIAS occurs
- Both Diesel Generators started and loaded on their respective bus
- When the 2A Diesel breaker closed the feeder breaker to the 2A5 Load Center tripped.

Which of the following describes the status of the containment cooling system?

A. Four containment coolers in fast speed

B. Four containment coolers in slow speed

C. Three containment coolers in fast speed

D. Three containment coolers in slow speed

Question 32

Operators have implemented 1-EOP-03 'Loss of Coolant Accident' with the following conditions:

- RCS pressure: 440 psia lowering
- Pressurizer level: 12% rising
- Core exit CET's: 398 °F
- Containment pressure: 1.5 psig slowly going down
- Containment Temperature: 110 °F and lowering

Which of the following describes the correct Operator response?

A. Restart RCP's.

B. Throttle HPSI pumps.

C. Terminate Containment Spray.

D. Isolate the Safety Injection Tanks.

Question 33

Unit 1 is operating at 100% power steady state, when a loss of all charging occurs.

Which of the following describes the response of the CVCS, assuming no Operator actions?

Pressurizer Level will decrease:

A. with the letdown level control valves closing to minimum letdown flow at –2% deviation from setpoint.

B. with the letdown backpressure control valves closing to minimum letdown flow.

C. until letdown isolates on high Regenerative heat exchanger outlet temperature.

D. until –3% deviation from setpoint, at which time the first backup charging pump will start.

Question 34

Given the following conditions on Unit 2:

- A Large Break LOCA is in progress
- RWT level is 4 feet

ECCS equipment status is as follows:

- 2A and 2B HPSI pumps running
- 2A and 2B LPSI pumps off
- 2A Mini Flow isolation valves 3495 and 3459 open
- 2B Mini Flow isolation valves 3496 and 3660 closed

Assuming no Operator action, which of the following ECCS equipment failed to position itself to the proper position?

A. 2A and 2B HPSI pumps

B. 2A and 2B LPSI pumps

C. 2A Mini Flow isolation valves 3495 and 3459

D. 2B Mini Flow isolation valves 3496 and 3660

Question 35

Unit 1 is Operating at 100% power with the following conditions:

- RCS boron concentration: 500 PPM.
- VCT level: 41%,
- RCO has requested permission to blend the VCT to a level of 60%.
- 1A BAMT boron concentration: 5995

Which of the following identifies the blend to raise the VCT level to 60% using the 1A BAMT?

(REFERENCES PROVIDED)

A. 744 gallons water, 66 gallons boric acid

B. 620 gallons water, 42 gallons boric acid

C. 588 gallons water, 54 gallons boric acid

D. 551 gallons water, 87 gallons boric acid

Question 36

Which of the following describes why pressures and temperatures are monitored on idle AFW piping and pump casings?

A. AFW pump could be damaged due to casing material not designed for high temperatures.

B. AFW piping could be damaged due to water hammer.

C. AFW piping is not lagged and personnel could be injured

D. AFW suction pressure instrumentation could be damaged by high pressure.

Question 37

Annunciator K-26, 'CEDS Trouble/Continuous Gripper Voltage High', alarmed on Unit 1. CEA 56 was put on the hold bus 8 minutes after the alarm came in.

Which of the following describes the status of CEA 56?

A. CEA 56 will not de-energize on a reactor trip.
B. Any attempt to move CEA 56 will cause CEA 56 to drop.

C. Gripper coil damage has occurred due to the length of time to put the CEA 56 on the hold bus.

D. CEA 56 must be removed from the hold bus within 60 minutes to comply with Tech. Specs.

Question 38

Which of the following events would require transition from 2-EOP-01, 'Standard Post Trip Actions', to 2-EOP-02 'Reactor Trip Recovery'?

A. Pressurizer level stable at 18% with letdown isolated and all charging pumps running.

B. A Main Steam Safety Valve (MSSV) stuck open and reseated at 575 psia while in EOP-01.

C. MSIS has actuated for unknown reason with plant parameters normal.

D. A trip from 50% power with 2A Main Feedwater pump OOS and loss of 2B1 6.9 KV bus.

Question 39

Unit 2 Operators are using EOP-03 'Loss of Coolant Accident' to mitigate a small break LOCA with the following conditions:

- 2A and 2B AFW pumps: feeding respective S/G's at 160 GPM
- 2C AFW pump: secured
- 2A S/G level: 12% narrow range
- 2B S/G level: 10% narrow range

A loss of offsite power occurs with the 2A and 2B Diesel Generator supplying their respective busses.
Assuming no Operator actions, which of the following describes the status of the AFW system?

2A and 2B AFW pumps:

A. start immediately upon the Diesel breaker closing and the S/G's continue to be fed at 160 GPM.

B. start immediately upon the Diesel breaker closing and the S/G's will be fed at full flow.

C. start after a short time delay from the Diesel breaker closing and the S/G's continue to be fed at 160 GPM after the pumps start.

D. start after a short time delay from the Diesel breaker closing and the S/G's will be fed at full flow.

Question 40

Unit 2 is on Shutdown Cooling with the following conditions:

- RCS pressure: 100 psia and in solid pressure control
- 2A charging pump running
- RCS temperature: 120 ° F
- 2A SDC train: in service

A loss of Instrument air occurs. Assuming no Operator action, which of the following describes the plant response?

A. Shutdown cooling flow will be lost due to hot leg suction valve closure.

B. Shutdown cooling flow will increase due to FCV 3306 (flow control valve) failing open

C. RCS inventory will be lost due to SDC relief valves opening

D. RCS temperature will decrease due to HCV 3657 (temperature control valve) failing open

Question 41

Unit 2 is in Mode 3 with Main Feedwater in service maintaining S/G levels. In preparation for Unit start up, the Main Turbine is latched and then manually tripped.

Which of the following describes the status of Main Feedwater flow?

A. 15% bypass valves automatically controlling S/G levels.

B. 15% bypass valves supplying constant 5% flow.

C. Main Feed Reg. valves automatically controlling S/G levels.

D. Main Feed Reg. valves supplying constant 5% flow.

Question 42

Unit 2 is in Mode 3 performing a Reactor startup. The following conditions exist:

- Steam Bypass Control (SBCS) in Auto maintaining Tave 532 ° F.
- Steam pressure regulator PCV 12-29 (to the SJAE) fails closed.
- Condenser vacuum goes to 15 inches HG before the regulator can be bypassed and vacuum is now 9 inches HG.

Which of the following describes the status of the SBCS?

A. SBCS can maintain RCS temperature in manual only after depressing the 'Emergency off/Vacuum interlock pushbutton'

B. SBCS will maintain RCS temperature in automatic, with no Operator action.

C. SBCS permissive switch must be placed in manual, and the 'Emergency off/Vacuum interlock pushbutton' depressed to regain control of SBCS.

D. SBCS cannot be used in any mode until vacuum has reached 5 inches HG.

Question 43

Which of the following plant conditions will automatically close the Main Feedwater Isolations Valves on Unit 2 but not on Unit 1?

A. Steam Generator pressure decreases to 600 psia.

B. Steam Generator levels decrease to 10% narrow range.

C. RCS pressure decreases to 1500 psia.

D. Containment pressure increases to 5.5 psig.

Question 44

Which of the following would require the Operator to perform a CONTIGENCY ACTION while in 2-EOP-01 'Standard Post Trip Actions'?

A. CEA 24 is at 55 inches.

B. Containment temperature is 123 ° F.

C. The 2A Diesel is carrying the 2A3 4.16 KV bus.

D. The 1A S/G 15% Main Feedwater bypass valve is fully closed.

Question 45

Which QSPDS display will be affected if the heater on the HJTC #3 fails?

A. Reactor Vessel Level

B. Core Exit Temperature

C. Upper Head subcooling

D. Reactor Coolant System subcooling

Question 46

Operators are conducting a heatup on Unit 2.

The following conditions exist:

- RCS pressure: 1700 psia.
- RCS temperature: 480 ° F.
- 2A1, 2B1 and 2B2 RCP's are operating.
- A loss of the 2B1 6.9 KV bus occurs.

Which of the following statements describes the status of Pressurizer pressure control?

Pressurizer Pressure can:

A. only be controlled by the Auxiliary spray valves.

B. only be controlled by Main spray valve PCV 1100E.

C. be controlled by Main spray valves PCV 1100E and 1100F.

D. be controlled by Main spray valve PCV 1100E and Auxiliary spray valves.

Question 47

Unit 1 has shut down the plant due to a Steam Generator tube leak on the 1B S/G. ONP 1-0830030 'Steam Generator Tube Leak' is being implemented. Given the following conditions:

- One RCP in each loop is stopped
- RCS pressure: 2230 psia
- Tave: 530 ° F

Which of the following statements explains why one RCP in each loop was stopped?

A. To prevent fuel uplift.
B. To reduce heat input into the RCS.

C. To allow a greater cooldown rate.

D. To minimize leak flow into the affected S/G.

Question 48

A loss of Feedwater accident has occurred at the end of core cycle. When the Operator depressed the Reactor Trip pushbuttons, all CEA's remained fully withdrawn.

Which of the following describes the Plant response to this event?

	Reactor Power	Pressurizer Pressure	S/G Pressure
A.	Increasing	increasing,	increasing
B.	Increasing	decreasing	decreasing
C.	decreasing	increasing	increasing
D.	decreasing	decreasing	decreasing

Question 49

A Reactor Start-up is being performed on Unit 1. While withdrawing CEA's the RCO receives 2 pre-trips on High Start-up rate. CEA motion has stopped.

Which of the below interlocks has stopped CEA motion?

A. Auto Withdrawal Prohibit

B. CEA Withdrawal Prohibit

C. CEA Motion Inhibit

D. Low Power Automatic Withdrawal Prohibit

Question 50

An electrical transient has occurred on Unit 1 that caused four Reactor Trip Breakers to open. The Reactor has not tripped.

Which of the following components has de-energized and caused this transient?

A. A CEA MG Set

B. 120V Instrument Bus

C. An RPS "K" relay

D. 120V Vital AC bus

Question 51

Instrument air to 2A Component Cooling Water (CCW) Heat Exchanger temperature control valve, TCV-14-4A has been isolated.

Which ONE of the following correctly describes the response of the CCW system?

2A CCW Heat Exchanger outlet temperature will:

A. decrease because TCV-14-4A fully opens.

A. increase because TCV-14-4A fully closes.

C, remain the same because TCV-14-4A movement is restricted by a mechanical stop.

D. remain the same because TCV-14-4A actuator is pneumatically locked.

Question 52

On Unit 1, which of the below indications is indicative of fuel failure and will be seen on the letdown radiation monitor?

A. Iodine increase that remains significantly above prior levels during steady state operations.

B. An increase of 100/E bar.

C. Iodine increase concurrent with a Gross activity increase during a load change.

D. An increase in high energy gamma from N-16.

Question 53

Unit 1 is at 100% power. Pressurizer Code Safety valve V-1201 has been identified to be leaking and ONP 1-0120036, “Pressurizer Relief/Safety Valve” is being implemented.

Which of the following describes conditions that will require a controlled plant shutdown?

A. Any LED lit on the PORV/Safety Valve acoustic leakage monitor.

B. Leakage into the Pressurizer Quench Tank exceeds 10 GPM.

C. Pressurizer boron concentration cannot be maintained within 25 PPM of the RCS boron concentration.

D. More than four backup heaters are required to be on to maintain Pressurizer pressure.

Question 54

The following conditions exist on Unit 1:

- 1A Waste Monitor Tank is being released to the discharge canal
- Liquid Release monitor channel #43 is in high alarm
- FIC 6627X liquid release flow indicates full flow

Which of the following describes the immediate Operator action as addressed in ONOP 1-0510030, 'Uncontrolled Release of Radioactive Liquids'?

A. Stop the 1A Waste Monitor Pump.

B. Close the final effluent valve V-21462.

C. Close FCV-6627X.

D. Contact Chemistry to determine the validity of the alarm.

Question 55

The following conditions exist:

- Unit 2 has tripped from 100% power
- Multiple CEAs remain stuck out post trip
- A charging header rupture has occurred downstream of the Regen Heat Exchanger
- SIAS actuated

Which of the following describes the preferred method to regain the Reactivity Control Safety Function IAW 2-EOP-15, 'Functional Recovery'?

A. LPSI supplied by the RWT.

B. Depressurize to allow SIT discharge.

C. Charging through the HPSI header

D. Charging through the Auxiliary Spray Line

Question 56

Which of the following describes the significance of an asterisk (*) when used in an Emergency Operating Procedure?

An asterisk indicates a:

A. step that may be performed out of sequence.

B. step that requires a sign off or data sheet.

C. management directive or vendor recommendation.

D. regulatory commitment made by Technical Specifications.

Question 57

The following conditions exist on Unit 2 while at 100% power:

- A SGTR has occurred on 2A S/G
- 2A S/G has been isolated.
- The unit is cooling down on the 2B S/G.
- 2A S/G pressure: 850 psia.
- 2B S/G pressure: 575 psia.
- AFW automatically isolated to the 2B SG.

Which of the following is the correct method to re-establish feedwater flow to the 2B S/G?

A. Initiate AFAS 2 from RTGB 202.

B. Open the AFW valves to 2B S/G on RTGB 202.

C. Override the Main Feedwater Isolation valves and use Main Feedwater.

D. Actuate AFAS 2 from the AFAS panel.

Question 58

A Large Break LOCA occurred on Unit 2. The operators have secured two Reactor Coolant Pumps IAW 2-EOP-01, 'Standard Post Trip Actions'.

Which of the following parameters will require the securing of the two remaining Reactor Coolant Pumps after entering 2-EOP-03 'Loss of Coolant Accident'?

A. RCS Pressure

B. RCS Subcooled Margin

C. Hot Leg Temperature

D. Pressurizer level

Question 59

Unit 2 was shutdown due to an RCS leak estimated at 350 GPM. The crew has completed 2-EOP-01 'Standard Post trip Actions' and is reviewing the diagnostic flow chart to determine which EOP to implement. The following are the current plant conditions:

- 2A HPSI pump is out of service.
- 2B HPSI pump failed to start on SIAS or manually.
- All Charging pumps are operating.
- Pressurizer pressure: 900 slowly going down
- Thot: 529 ° F slowly going down
- Pressurizer level:15% slowly going up
- Pressure in both S/G's: 880 psia and both are steaming and feeding

Which of the following identifies the location of the loss of RCS inventory?

A. RCS vessel head

B. Letdown line in Containment.

C. Pressurizer surge line sample line

D. Pressurizer steam space sample line

Question 60

The following conditions exist:

- A total loss of feedwater has occurred on Unit 2.
- 2A S/G level: 15% WR.
- 2B S/G level: 15% WR.
- The ANPS has directed the implementation of RCS and Core Heat Removal, Success Path 4, 'Once-Through-Cooling' from 2-EOP-15 'Functional Recovery'

Which of the following describes the reason for implementing this Success Path?

15% Wide Range Level is minimum inventory to:

A. depressurize the RCS and allow the admission of safety injection flow.

B. depressurize the RCS and prevent a PTS event after re-pressurization following dryout.

C. maintain RCS temperature at current value in preparation for system line-up to once through cooling.

D. prevent dry out of S/G's to preclude feeding a dry S/G when feedwater is recovered.

Question 61

Given the following conditions:

- Unit 2 tripped, concurrent with a Loss of Offsite power
- Both Diesel Generators started and loaded on their respective bus.

Which of the following identifies the Safety Function that **CANNOT** be directly confirmed from the control room?

A. Reactivity control

B. Containment Isolation

C. Maintenance of Vital Auxiliaries

D. Containment Temperature, Pressure and Combustible gas

Question 62

Unit 1 is stable at 100% power with all systems in normal alignment. The ANPS has directed the RCO to perform an RCS leak rate surveillance IAW OP 1-0010125A, Data Sheet 1 'Reactor Coolant System Water Inventory Balance.'

Which of the following conditions will invalidate this surveillance once it has been started?

A. The RCO performs a 150 gallon blend to the VCT

B. The RCO drains the Quench tank from 60% to 57%

C. Charging pump seal leakage increases to 0.5 GPM

D. RCS cold leg temperature increases 2 degrees

Question 63

Which of the following Unit 1 events would automatically align a radiological release path to the liquid waste management system?

A. Failed Fuel

B. Steam Generator tube leak

C. RCP seal heat exchanger leak

D. Regenerative heat exchanger leak

Question 64

When performing a reactor startup on Unit 2, which of the following occurs at $\geq$10,000 cps?

A. Startup Rate Trip is enabled

B. Zero Power Mode Bypass is enabled

C. Startup Channels automatically de-energize

D. Wide Range Log Safety Channel shifts to Extended Range

Question 65

Unit 2 is at 100% power with all systems in normal configuration. A large tube leak occurs in the 2A1 RCP shaft seal heat exchanger.

Which of the following annunciators would **INITIALLY** be expected for this condition?

A. J-2, RCP 2A1 SEAL TROUBLE

B. J-11, RCP 2A1 COOLING WATER LOW FLOW

C. J-33, RCP SEAL COOLER VALVE CLOSED / PWR FAILURE

E. LA-10, CCW SURGE TANK COMPARTMENT A LEVEL LOW

Question 66

The loss of instrument air Off Normal Procedure (ONP 1-1010030, 'Loss of Instrument Air') directs the RCO to trip the Unit at what pressure?

A. 85 psig

B. 74 psig

C. 65 psig

D. 59 psig

Question 67

In preparations for entry into Mode 4, you have been requested to perform a line-up on the AFW system. Which of the below methods describes how to verify the 1A AFW discharge valve to be in the correct position?

A. Physical hands on check, slightly moving the valve closed then open, then back to the closed direction ¼ to ½ turn.

B. Physical hands on check, rotating the valve at least one turn fully closed, then fully open against the backseat.

C. Visual observation of the valve stem position.

D. Visual observation of the valve position mechanical pointer.

Question 68

I/C has requested a clearance to de-energize a component by removing of its fuses. Which of the following statements describes how the fuses are controlled according to ADM-09.08, 'Operations In-Plant Equipment Clearance Orders'?

A. By direction of the I/C work order.

B. Equipment clearance order tags placed on the fuses.

C. A non-tagged step in the Equipment clearance order.

D. Equipment clearance order tags placed on or close to the fuse holders.

Question 69

The 1A Diesel surveillance is being completed. As you are unloading the diesel, the KW chart recorder fails, indicating '0' KW.

Which of the following indication will be used to determine the Diesel Generator output prior to opening the generator output breaker?

A Ammeter on 1A3 4.16 KV bus.

B. Megawatt meter on the local Diesel panel.

C. Remote shutdown megawatt indication.

D. Red, Green, Amber light indication on RTGB Governor control switch.

Question 70

Unit 1 is at in hot standby with a vacuum in the condenser. The Condensate recirc regulator, FCV 12-1, goes full closed.

If FCV 12-1 remained closed, which of the following statements describes the plant response?

A. The running condensate pump will trip on low flow.

B. Degrading of condenser vacuum due to loss of condensate flow through the air ejector condenser.

C. Degrading of condenser vacuum due to loss of exhaust hood sprays.

D. Water hammer in the MSR reheater drain piping due to loss of quench water.

Question 71

Unit 2 is at 54% power and increasing at 2 MWe/min. Both Main Feedwater pumps and both Condensate pumps are in service, when the 2B Condensate pump trips.

Which of the following will be the initial plant response?

A. The 2B Main Feedwater pump trips on low suction pressure.

B. The 2B Main Feedwater pump trips on low suction flow.

C. Alarms only, capacity of one condensate pump is 55% power

D. The 2B Main Feedwater pump trips as a direct result of 2B Condensate pump trip.

Question 72

If occupied during activation of its respective fire suppression system, which of the following areas would be considered a life threatening environment?

A. Unit 1 Cable Spreading Room

B. Unit 1 Transformer Bay

C. Unit 2 Cable Spreading Room

D. Unit 2 Emergency Diesel Generator Building

Question 73

The following conditions exist:

- Unit 1 is at 80% power.
- The 1A Main Feedwater controller fails to control in Auto and the Operators have taken manual control of 1A Main Feedwater controller.

Which of the following conditions is the minimum requirement for the execution of a manual reactor and turbine trip?

A. Two of four narrow range steam generator level indications are $\leq$ 40% and decreasing.

B. Two of four wide range steam generator level indications are $\geq$ 80% and increasing.

C. Three of four RPS Steam Generator Water Low pretrips are illuminated.

D. Three of four narrow range Steam Generator level indications have reached the high level override setpoint.

Question 74

The following conditions exist at 0700:

- Unit 1 is cooling down for a refueling outage
- RCS temperature: 195°F
- Pressurizer pressure: 300 psia
- Both HPSI pumps have been disabled

If the maximum allowable Tech Spec cooldown rate is used during the remainder of the evolution, which of the following times is the earliest that RCS temperature can be at 125°F?

(REFERENCES PROVIDED)

A. 0745

B. 0800

C. 0845

D. 0900

Question 75

During a LOCA inside containment, which of the following chemicals is responsible for the production of hydrogen due to corrosion of containment structural metals?

A. Lithium

B. Boric acid

C. Trisodium Phosphate dodecahydrate

D. Sodium hydroxide/hydrazine

Question 76

During a LOCA, which of the following parameters monitored in EOP-03 'Loss of Coolant Accident' would provide positive indication that core uncovery was occurring?

A. Incore Neutron Flux

B. Excore Neutron Flux

C. Core Exit Thermocouples

D. Reactor Vessel Level

Question 77

The following conditions exist:

- 1B AFW Pump is OOS.
- Unit 1 tripped from 100% power.
- Two minutes after the trip the 1AB 125 VDC bus de-energized due to an electrical fault.
- Both Main Feedwater pumps tripped on low flow and will not restart.

Which of the following are Contingency Action steps that must be taken?

A. Close the PORV valves.

B. Secure one RCP in each loop.

C. Manually control Pressurizer heaters and spray.

D. Secure all RCPs within 10 minutes of the electrical fault

Question 78

Which of the following RPS reactor trip signals is specifically designed to prevent fuel centerline melting?

A. Local Power Density

B. Variable High Power

C. High Rate of Change

D. Thermal Margin/Low Pressure

Question 79

An off shift RCO is performing JPM's on the Diesel Generator as part of the annual Licensed Operator Requalification, when an ALERT EPIP classification on Unit 2 is declared.

Where will the RCO report to as a result of this Alert condition?

A. Training building

B. Operations support center

C. Jaycee park

D. Unit 2 Control room

Question 80

Unit 2 is in Mode 1 when the ANPO notifies the RCO that HVE-41A Intake Structure Ventilation Fan motor is smoking and the breaker has tripped.

What is the status of the 2A ICW pump, **immediately** upon discovery of the failed ventilation fan?

A. Operable as long as HVE-41B remains Operable

B. Operable as long as the ICW room temperature remains less than design temperature.

C. Inoperable until ICW room temperature can be proven to be maintained less than design temperature.

D. Inoperable until a temporary air moving system can be installed.

Question 81

A Steam Generator tube rupture has occurred on the 1A Steam Generator and Operators are performing a rapid downpower on Unit 1.

Which of the following Radiation Monitors will trend down, in proportion to the Reactor power decrease? (Assume S/G tube leak remains constant during the downpower)

A. Plant Vent

B. Main steam Line

C. Condenser Air Ejector

D. Steam Generator Blowdown

Question 82

A Reactor startup is being performed on Unit 1. The RO is withdrawing group 5 CEA's which are at 124 inches when CEA #10 stops moving.

Assuming the RO continues to withdraw group 5 and performs no other actions, which of the following interlocks will eventually stop CEA motion?

A. Upper Electrical Limit

B. Group Out of Sequence

C. Group Deviation

D. Upper Group Stop

Question 83

Given the following conditions:

- RCS Boron concentration: 654 PPM
- Pressurizer Boron concentration: 686 PPM
- Time (in min) to correct mismatch = [(Pzr ppm – RCS ppm) - 25 ppm] x 3
- All backup heaters are available
- PIC-1100X: selected

Which of the below statements describes the method and the minimum time to equalize the Pressurizer boron concentration to within 25 ppm of the RCS boron concentration.

Energize all backup heaters and

A. maintain PIC-1100X in auto at the current setpoint. Recirc for 32 minutes.

B. maintain PIC-1100X in auto at the current setpoint. Recirc for 21 minutes.

C. reduce setpoint on PIC-1100X . Recirc for 32 minutes.

D. reduce setpoint on PIC-1100X. Recirc for 21 minutes.

Question 84

Both Unit's have experienced a Station Blackout.

Which of the following is the minimum designed time each Unit's station batteries are capable of supporting the expected loads?

A. 4 hours

B. 10 hours

C. 14 hours

D. 24 hours

Question 85

The following conditions exist on Unit 2:

- Unit tripped from 80% power
- 2A and 2B S/G levels decreased to 10% narrow range and have recovered to 30% narrow range on all channels.

Assuming no operator action, which of the following describes the status of the Auxiliary Feedwater system?

A. The 2A, 2B and 2C Auxiliary Feedwater pumps are feeding at full flow.

B. The 2A and 2B Auxiliary Feedwater pumps are feeding at 150 gpm each.

C. The 2A, 2B and 2C Auxiliary Feedwater pumps have stopped and their discharge valves closed.

D, The 2A, 2B and 2C Auxiliary Feedwater pumps are running and their discharge valves closed.

Question 86

Unit 1 is at 100% steady state power. While performing the Area Radiation Monitoring Periodic Test, the Check Source pushbutton on the MA CIS channel readout module is depressed.

Which of the following correctly describes the response, of the system, if any?

A. The alarm setpoint is displayed.

B. Various A train CIS components actuate.

C. Containment Evacuation alarm actuates.

D. No response, check source is disabled during testing.

Question 87

Grid frequencies have dipped to 59.8 Hertz, and all four RPS low flow pre-trips are locked in.

Which of the following describes the effect on RCS parameters?

	DNBR	Delta T
A.	Decrease	Increase
B.	Decrease	Decrease
C.	Increase	Decrease
D.	Increase	Increase

Question 88

Which of the following describes the basis for the size difference between the Unit 1 and Unit 2 Condensate Storage Tanks (CST)?

Unit 2 CST volume:

A. was designed to supply a specified amount of makeup to Unit 1 in the event of total loss of AC power to Unit 1.

B. was designed to supply a specified amount of makeup to Unit 1 in the event of damage to Unit 1 CST.

C. is analyzed for a 8 hour hot standby period following a Loss of Offsite Power, Unit 1 is analyzed for a 4 hour period.

D. is analyzed for a cooldown to shutdown cooling entry conditions following a period of hot standby, Unit 1 is analyzed for hot standby only.

Question 89

The following conditions exist on Unit 2:

- The Unit has experienced a Safety Injection Actuation
- The SIAS signal has been reset

Which of the following describes the configuration of the Intake Cooling Water System (ICW) at this time?

MV-21-2 and MV-21-3 (Intake Cooling water valves to the TCW heat exchangers) are:

A. open and ICW flow is being supplied to the essential and non-essential headers.

B. open and ICW flow is being supplied to the essential header only.

C. closed and ICW flow is being supplied to the essential and non-essential headers.

D. closed and ICW flow is being supplied to the essential header only.

Question 90

A 35 gpm RCS leak is occurring on Unit 2. Which of the following describes the instrumentation available to determine the change in leak rate and possible location of the RCS leak?

	Change in leak rate	Location
A.	RCS leakage flow recorder FR-07-3	comparing the CIAS radiation monitor readings.
B.	RCS leakage flow recorder FR-07-3	sampling different atmospheric atmospheric locations in the Containment
C.	Cavity sump level, LI-07-6	sampling different atmospheric locations in the Containment.
D.	Cavity sump level LI-07-6	comparing the CIAS radiation monitor readings

Question 91

Unit 2 has experienced Loss of Coolant Accident concurrent with a Loss of Offsite power

Which of the following are the minimum actions necessary to reset the non-essential sections of 2B5, 2B6 and 2B8 MCC's?

A. Resetting SIAS.

B. Resetting CIAS.

C. Restoration of offsite power.

D. Restoration of offsite power and opening the Diesel output breaker.

Question 92

The fire computer is out of service on Unit 2.

In accordance with 0-ONP-79.01 'Fire Detection System' which of the following is the preferred method to monitor the status of Unit 2 fire alarms?

A. Monitor Unit 2 fire alarms using Unit 1 fire computer.

B. Assign an Operator to monitor Unit 2 local fire panels.

C. Notify the roving fire watch to monitor Unit 2 fire alarms.

D. Station an Operator at the Unit 2 master local fire alarm panel.

Question 93

Unit 2 is in mode 6, fuel movement in progress, when Shutdown Cooling is lost.

2-ONP-01.05, Plant Condition 5 - ,Shutdown Cooling in Service, Rx Head Removed, has been implemented.

If Shutdown Cooling cannot be restored, which of the following method of cooling the core will be implemented?

A. Steam Generator heat removal.

B. Feed and bleed to the RWT.

C. Cooling through the Fuel Pool Heat Exchanger.

D. Cooling through the Letdown Heat Exchanger.

Question 94

The following conditions exist:

- A 37 year old itinerant mechanic has arrived on site from Turkey Point
- He will work at St. Lucie for the remainder of the year
- His total lifetime effective dose equivalent (TEDE) is 33.5 REM
- His dose for this year is 0.5 REM

Which of the following is the MAXIMUM additional total effective dose equivalent (PSL limits) that he will be permitted to receive at PSL this year? (Assume no extensions)

A. 0.5 REM

B. 2.0 REM

C. 3.5 REM

D. 4.5 REM

Question 95

Unit 2 is at 100% power, steady state. A major leak has developed in the reference leg for the selected Pressurizer level transmitter LT-1110X

Which of the following describes the immediate indicated Pressurizer level indications and the response of the CVCS system?

	Indicated Pressuirzer level	CVCS response
A.	High	Letdown flow will decrease
B.	High	Letdown flow will increase
C.	Low	Letdown flow will decrease
D.	Low	Letdown flow will increase

Question 96

Unit 2 Reactor Vessel Level is at Mid Loop with the following conditions:

- The Unit has been shutdown 4 days
- RCS temperature: 130° F

Both SDC cooling trains are lost

Which of the following is the time to boil and the required makeup rate for boil off?

(REFERENCES PROVIDED, Fig. 1 and 2 from 2-0440030)

A. 8 minutes to boil, 90 GPM makeup rate

B. 8 minutes to boil, 75 GPM makeup rate

C. 11 minutes to boil, 60 GPM makeup rate

D. 11 minutes to boil, 40 GPM makeup rate

Question 97

When processing an RWP, which of the following is the MINIMUM criteria that requires pre-job ALARA review?

A. Dose estimate of the job exceeds one (1) Manrem.

B. Any work to be performed in a high radiation area.

C. Dose estimate of the job exceeds five (5) Manrem.

D. Any work that requires the use of a full-face respirator.

Question 98

At 100% power, which of the following conditions require a manual Reactor trip on
Unit 2?

A. Two CEA's have dropped to the bottom of the core.

B. Main Feedwater Regulating valve malfunction results in 2A S/G level increase to 75%.

C. Reactor Support Cooling fans HVE-3A and HVE-3B have been out of service for 60 minutes.

D. Containment temperature is 110ºF with two Containment Coolers out of service.

Question 99

Unit 1 is at 100% steady state power. The RCO is preparing to start the 1A EDG from the RTGB for a semi-annual surveillance run.

Which of the following parameters must be timed by the RCO to ensure the 1A EDG meets operability requirements?

A. KW loading

B. Output breaker closure

C. Current and Voltage

D. Frequency and Voltage

Question 100

Which of the following is the MAXIMUM total dose equivalent (TEDE) that an RCO can receive per 10CFR20 in a year? (Assume no emergencies)

A. 1 REM

B. 2.5 REM

C. 3.5 REM

D. 5 REM

INITIAL SUBMITTAL

ST. LUCIE EXAM 2000-301
50-335/2000-301 & 50-389/2000-301

FEBRUARY 7 - 11, 2000

INITIAL SUBMITTAL
SRO WRITTEN EXAMINATION

U.S. Nuclear Regulatory Commission
Site-Specific
Written Examination

Applicant Information

Name:	Region: II
Date:	Facility/Unit: St. Lucie Unit 1 and 2
License Level: SRO	Reactor Type: CE
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. The passing grade requires a final grade of at least 80.00 percent. Examination papers will be collected five hours after the examination starts.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

____

Applicant's Signature

Results

Examination Value	100	Points
Applicant's Score	________	Points
Applicant's Grade	________	Percent

Question 1

A Waste Gas Decay Tank is to be released.

Which of the following conditions would prohibit releasing the tank?

A. The wind speed is varying by more than 5 mph.

B. The Waste Gas Radiation Monitor is inoperable.

C. The Waste Gas release flow meter is inoperable.

D. Both RAB Exhaust Fans HVE-10A and HVE-10B, are stopped.

Question 2

A loss of offsite power occurred from 100% power 30 minutes ago.

The following conditions exist:

- Both S/Gs are available with AFW flow of 150 GPM per S/G.
- RCS subcooling is 60°F.
- Average of Qualified CETs is 540°F.
- Loop T-hots are 530°F and rising slowly.
- Loop T-colds are 528°F and steady.
- 2A and 2B Steam Generator Pressures are 895 psia and steady.

Which of the following actions should be taken to enhance natural circulation?

A. Initiate Auxiliary Spray.

B. Throttle open the Atmospheric Dump Valves.

C. Throttle open the Auxiliary Feed Water control valves.

D. Turn on available pressurizer heaters.

Question 3

Given the following conditions:

- Unit 1 is operating at 25% power.
- All controls are in Manual Sequential.
- Group 7 control rods are at 45 inches.
- The operator is withdrawing Group 7 control rods.
- When the "in/out" switch is released, outward rod motion continues.
- Placing the mode selector in OFF has no effect.

With **no** Operator action which of the following will automatically trip the reactor?

A. Variable High Power

B. High Start Up Rate

C. Thermal Margin/Low Pressure

D. High Pressurizer Pressure

Question 4

Given the following conditions:

- Unit 2 is in Mode 5 on SDC preparing to heatup the RCS.
- Both Personnel airlock doors are open.
- A loss of shutdown cooling occurs and the Unit inadvertently enters Mode 4.

Which one of the following statements describes the status of containment integrity?

Containment integrity is:

A. not met. At least one airlock door must be maintained closed at all times.

B. not met. Both airlock doors must be maintained closed at all times.

C. not required in Mode 4.

D. not required if Unit re-enters Mode 5 within one hour.

Question 5

Unit 2 is in Mode 4 with the following conditions:

- RCS pressure 270 PSIA
- Both SDC Loops in service
- 2B1 and 2B2 RCP's operating
- 2B HPSI pump in standby for boration flowpath
- PLP 101 (RM-26-1) CCW Header A Radiation monitor in alarm

Which of the following identifies the component that is the likely source of the high CCW activity?

A. 2A LPSI Pump

B. 2B HPSI Pump

C. 2A Fuel pool Heat Exchanger

D. 2B SDC Cooling Heat Exchanger

Question 6

Unit 2 is operating at 80% power, 5000 EFPH, with the following conditions:

- Two charging pumps are operating.
- RCS Boron Concentration is 850 PPM.
- 2A BAMT concentration of 5525 PPM.
- V2514 emergency borate valve is open.
- 2A BAM pump is being cycled to facilitate a 30 MWE/min rapid downpower.

The RCO runs the 2A BAM pump one time for one minute and then stops it. Excluding the effects of Xenon, which of the following identifies the approximate final Tave?

(REFERENCES PROVIDED)

A. 565° F

B. 560° F

C. 553° F

D. 546° F

Question 7

Given the following conditions:

- A reactor trip occurred several minutes ago.
- All RCPs are in operation.
- RCS temperature: 520°F and slowly lowering.
- Pressurizer pressure: 1980 psia and slowly lowering.
- Pressurizer level: 36% and trending slowly downward.
- Subcooling: 100°F and slowly rising.
- Both SG levels: 10% narrow range and slowly lowering.
- Both SG pressures: 740 psia and slowly lowering.

Which one of the following actions would promptly stabilize the plant?

A. Raise the pressurizer level control setpoint.

B. Raise the pressurizer pressure control setpoint.

C. Increase Auxiliary Feedwater flow.

D. Close the Main Steam Isolation valves.

Question 8

Unit 1 Control Room has been evacuated due to a fire and all immediate actions have been complete. Pressurizer Pressure is being controlled by the RCO from the Hot Shutdown Control Panel (HSDCP).

Which of the following describes the Pressurizer Pressure range and the method to maintain these ranges?

	Range	Method
A.	1800-2300 psia, trending to 2225-2275 psia	heaters and auxiliary spray.
B.	1800-2300 psia, trending to 2225-2275 psia	main spray or auxiliary spray.
C.	1850-2250 psia, trending to 2200-2300 psia	heaters and main spray
D.	1850-2250 psia, trending to 2200-2300 psia	auxiliary spray or PORV's.

Question 9

The following annunciators are received on Unit 2:

- L-36 TMLP channel trip
- L-40 NI channel inoperative
- L-43 Reactor power ratio deviation
- L-34 Nuclear / ΔT power channel deviation
- L-9 Reactor power high channel trip

Which of the below Nuclear Instrumentation systems has malfunctioned?

A. Startup Channel

B. Linear Range Safety Channel

C. Excore Neutron Monitoring

D. Wide Range Monitoring

Question 10

A Nuclear and Delta T Power Calibration was performed at 100% power. Calorimetric, Nuclear, DDPS and Delta T all agree within 0.2 %.

If the Unit is downpowered to a stable 50% power level, which of the below statements describes the adjustment that will be required when a new Nuclear and Delta T Power Calibration is performed?

Nuclear power will have to be adjusted:

A. upward to match DDPS power.

B. downward to match manual Calorimetric.

C. downward to null Nuclear Power-Delta T Power.

D. upward to null Nuclear Power-Delta T Power.

Question 11

Which of the below statements describes the reason for closing the Unit 2 MSR Block valves as part of Standard Post Trip Actions?

Prevent:

A. overcooling the RCS

B. losing condenser vacuum.

C. damaging LP turbine seals.

D. overpressurizing the MSR shell side

Question 12

A differential current lockout occurs on the 1A2 4.16KV bus at 32% power.

Which of the following describes the Plant response?

A. The 1A and 1B Condenser will lose equal amount of Circulating water flow but the Unit will have to be tripped due high ΔT across the condensers.

B. The 1A and 1B Condenser will lose equal amount of Circulating water flow, but due to reduced power, the Unit can remain operating.

C. The 1A Condenser will be without Circulating water flow and the Unit will have to be tripped due to high differential pressure between condensers.

D. The 1A Condenser will be without Circulating water flow, but due to reduced power the Unit can remain operating.

Question 13

Given the following conditions:

- Unit 1 tripped 15 minutes ago
- Pressurizer pressure is 2100 psia and slowly increasing
- Pressurizer level lowered to 25% and has slowly recovered to 29%

Which of the following is the condition of the Pressurizer heaters at this time? (ASSUME NO OPERATOR ACTION)

A. All heaters are energized.

B. All heaters are de-energized.

C. Only the backup heaters are energized.

D. Only the proportional heaters are energized.

Question 14

Unit 1 is in Mode 3. Which of the following will cause an actuation that will stop a running Containment purge fan (HVE 8A or 8B)?

A. Containment temperature of 120ºF.

B. Containment pressure increases to 5.5 psig

C. Containment high range radiation monitor fails to 500 Rem.

D. Containment radiation monitors (CIAS) increases to 1 R/Hr.

Question 15

Unit 2 is ready to cooldown to Shutdown Cooling entry conditions due to a Steam Generator tube rupture. The following are the plant conditions.

- RCS temperature is 532 ° F and stable.

Which of the following are the minimum actions necessary to use the SBCS to cooldown the RCS to **SDC** entry conditions?

A. Ensure the master controller (PIC 8010) in auto and the permissive switch is in auto. Open PCV 8805 by dialing down the setpoint from PIC 8010 to the desired cooldown rate.

B. Ensure the master controller (PIC 8010) in auto, and the permissive switch in auto. Place HIC 8801-8804 in manual and closed. Dial the setpoint down on PCV 8010 to the desired cooldown rate.

C. Place the permissive switch in manual, ensure the controller for PCV 8801 is in auto and dial the setpoint down on PCV 8801 to the desired cooldown rate.

D. Place the permissive switch in manual, place the controller for PCV 8801 in manual and open PCV 8801 to the desired cooldown rate.

Question 16

Unit 1 is heating up the RCS with the following conditions:

- RCS pressure 1500 psia
- RCS temperature 505° F

RCP status:

	RCP 1A1	RCP 1A2	RCP 1B1	RCP 1B2
Status	Off	Running	Running	Running
RCP controlled bleedoff flow	.8 GPM	.68 GPM	.9 GPM	.65 GPM
Middle cavity pressure	1000 psia	1020 psia	970 psia	950 psia
Upper cavity pressure	510 psia	490 psia	500 psia	515 psia
Controlled Bleedoff pressure	80 psia	75 psia	80 psia	85 psia
Controlled Bleedoff Temperature	220°F	195°F	205°F	230°F

Which of the below statements describes how the RCPs will be configured based on the above indications?
(REFERENCES PROVIDED)

A. Parameters are normal, the fourth RCP may be started

B. Stop the 1A2 RCP due to indications of seal failure.

C. Stop the 1B1 due to high controlled bleedoff flow

D. Stop the 1B2 within 10 minutes due to high Bleedoff temperature

Question 17

Given the following conditions:

- An unisolable ESDE has occurred outside the Containment on Unit 1
- The affected S/G has blown dry
- RCS temperature: 442° F
- RCS pressure: 1290 psia
- EOP-05 'Excess Steam Demand' is in use

Which of the following describes the operator actions required per 1-EOP-05 'Excess Steam Demand'?

A. Secure all running RCP's

B Stabilize RCS temperature and depressurize the RCS

C. Reduce RCS temperature to establish 20° F subcooled

D. Stabilize RCS pressure and temperature at current value

Question 18

Given the following conditions:

- 2-EOP-03 'Loss of Coolant Accident' has been implemented due to a small break LOCA and SIAS actuated
- All systems are operating as expected

Which of the following is the basis for maintaining a secondary heat sink?

A. To minimize boron stratification of the RCS.

B. RCS pressure may remain so high that cooling from the injection flow alone is inadequate to remove decay heat.

C. Reflux boiling is the primary means of heat removal prior to voiding in the hot legs.

D. To provide a means of RCS pressure control in the event main or auxiliary spray is not available.

Question 19

Unit 1 has implemented 1-EOP-04 'Steam Generator Tube Rupture'. Which of the following describes required S/G level control, if RCS pressure cannot be reduced to less than the affected S/G pressure?

A. Align blowdown to the main condenser.

B. Align blowdown to the Monitor Storage tanks.

C. Open the Main Steam drains and drain to the condenser sump.

D. Install drain hoses to the blowdown line and drain to RAB sumps.

Question 20

Which of the below statements descibes the instruments to be utilized to diagnose accident events and confirm safety functions?

A. Use only the qualified White Bezel instruments.

B. Use all instruments that suit the scale/range/response of the accident event that is occuring.

C. Use all safety related instruments and use the White Bezel instruments only if a hostile environment is known to exist for greater than 15 minutes.

D. Use the White Bezel instruments as a primary source of information and safety related instruments to confirm these indications.

Question 21

In accordance with ADM. 0010120, 'Conduct of Operations' which of the following statements describes the policy for relief/turnover while performing a surveillance?

Relief/Turnover may only occur:

A. after the surveillance has been complete.

B. if the surveillance run will last >1 hour past turnover, and with approval of the ANPS.

C. if the surveillance is in a steady state condition and with approval of the ANPS.

D. if overtime guidelines will be exceeded for the individual responsible for the surveillance with approval of the ANPS.

Question 22

Given the following conditions:

- Unit 2 is in day 5 of a refueling outage.
- The first stud and nut on the Reactor Vessel Head is less than fully tensioned.
- Channel A Startup Range Neutron Flux Monitor was just declared Out of Service.

Based on the above conditions, what is the mode of the Unit and what action is required?

A. Unit is in Mode 5, no action required.

B. Unit is in Mode 5, suspend Reactor Vessel head disassembly

C. Unit is in Mode 6, suspend Reactor Vessel Head disassembly.

D. Unit is in Mode 6, no action required.

Question 23

The Reactor Cavity sump flow is being monitored using Reactor Cavity Detection alarm N-46, 'Reactor Cavity Leakage High', due to Reactor Cavity FT 07-03 declared out of service.

If N-46 then goes into alarm due to a 2 GPM CCW leak in containment, which of the following statements describes the status of the reactor Cavity Flow Monitoring system?

A. Inoperable, confirmed leakage of any rate, disallows use of N-46 for Reactivity Cavity sump flow monitoring.

B. Inoperable, with the flow detection alarm N-46 in an alarm state, credit cannot be taken for this flow monitoring device.

C. Operable, as long as the leak rate remains below 10 GPM (High/High re-flash alarm of N-46), N-46 can be used to satisfy the flow monitoring requirement.

D. Operable, as long as annunciator N-29, 'Rx Cavity sump level High', is operable

Question 24

Which of the following situations would require implementation of AP-0010124, Temporary System Alteration?

A. Reactor Engineering has installed a reactivity computer in preparation for Low Power Physics testing.

B. A nuisance alarm on RTGB 203 is intentionally disabled for 10 days for the purpose of silencing it.

C. Electrical Department has lifted leads in RTGB 204 in order to make repairs to a Gland Steam regulator as directed by his NPWO.

D. I&C has lifted leads in the ESFAS cabinet to initiate a SIAS while assisting Operations in the performance of the Engineered Safeguards Test.

Question 25

Unit 1 ANPS has taken the turnover during a refueling outage with the following conditions:

- Mode 3 performing a controlled cooldown
- RCS Tave: 450° F.
- S/G pressure: 413 psia
- RCS pressure: 1280 psia

Fifteen minutes after the turnover a transient occurs that results in RCS pressure, temperature and S/G pressure falling rapidly.

What procedure and mitigation strategy should be implemented?

A. ONP-01.01, 'Plant Condition 1', 'S/G Heat Removal LTOP not in effect.' Attempt to isolate the affected S/G, maintain RCS subcooling 20-200° F.

B. ONP-01.02, 'Plant Condition 2', 'S/G Heat Removal LTOP in effect' Manually actuate MSIS and SIAS. Stabilize RCS temperature and pressure after the affected S/G has blown dry.

C. EOP-05, 'Excess Steam Demand' Manually actuate MSIS and SIAS. Stabilize RCS temperature and pressure after the affected S/G has blown dry.

D. EOP-15, 'Functional Recovery', Emergency borate, attempt to isolate the affected S/G, stabilize RCS temperature and pressure after the affected S/G has blown dry.

Question 26

Unit 1 is at 100% steady state power. Defective fuel has caused RCS activity to increase. The following are the results of Chemistry sampling over the past few days:

1-18-00 / 0700	.9 Uci/gram DE 131
1-20-00 / 0700	1.2 Uci/gram DE 131
1-22-00 / 0700	.8Uci/gram DE131
1-24-00 / 0700	75Uci/gram DE 131

Which of the following is the required operator response?

(REFERENCES REQUIRED)

A. Place the Unit in Hot Standby with Tave <500 °F by 1700 1-24-00.

B. Place the Unit in Hot Standby with Tave <500 °F by 1300 1-24-00.

C. Continue 100% power operation for up to 100 hours.

D. Reduce power to <76% and continue power operation indefinitely.

Question 27

Which of the following is the maximum number of consecutive days which may elapse between plant vital area access before unescorted access may be denied due to badge NON-use?

A. 14 days

B. 21 days

C. 30 days

D. 45 days

Question 28

Unit 1 Operators are responding to a dual event using 1-EOP-15 'Functional Recovery'. The following conditions exist:

- All CEA's: inserted
- 1A3 4.16 KV bus: powered by 1A diesel.
- 1B3 4.16 KV bus: powered from offsite
- Pressurizer level: 0
- Pressurizer pressure: 850 psia
- CET temperature highest per quadrant: 560 °F
- ECCS flow: 850 GPM
- Containment pressure: 2.5 psig.
- 1A S/G level: 10% Narrow range, steaming, with feed available.
- 1B S/G: isolated due to being faulted.

Which of the following identifies the Safety Function that should be addresses next?

(REFERENCES PROVIDED, Figure 2 EOP-99)

A. Maintenance of Vital Auxiliaries

B. RCS and Core Heat Removal

C. RCS pressure control

D. Containment Isolation.

Question 29

Unit 1 is mitigating a LOCA and has implemented 1-EOP-03 Loss of Coolant Accident.

The following conditions exist:

- RCS pressure: 305 psia and stable
- RCS subcooling: 28 ºF subcooled
- Pressurizer level: 45% and stable
- 1A and 1B S/G levels: 42% wide range
- Reactor vessel level: sensors 4-8 covered
- RCP's: secured

All Charging pumps are running and the HPSI and LPSI pumps have been secured.

Which of the following would require reinitiating LPSI flow?

A. Both S/G levels decrease to 25% wide range.

B. The ANPS has directed two RCP's be restarted.

C. Pressurizer level decreases to 32%.

D. RCS pressure decreases to 180 psia.

Question 30

Operators have implemented 1-EOP-15 'Functional Recovery' on Unit 1 due to a stuck open Main Steam Safety valve (MSSV) on the 1A S/G and a SGTR on the 1B S/G.

Which of the following describes the required Operator actions?

A. Isolate the 1A S/G. Use the 1B S/G for heat removal

B. Isolate the 1B S/G. Use the 1A S/G for heat removal

C. Isolate both S/G's. ECCS flow will be used for heat removal.

D. Do not isolate either S/G until the MSSV is gagged closed. Then isolate the 1B S/G and use the 1A S/G for heat removal.

Question 31

Operators have implemented 1-EOP-03 'Loss of Coolant Accident' with the following conditions:

- RCS pressure: 440 psia lowering
- Pressurizer level: 12% rising
- Core exit CET's: 398 °F
- Containment pressure: 1.5 psig slowly going down
- Containment Temperature: 110 °F and lowering

Which of the following describes the correct Operator response?

A. Restart RCP's.

B. Throttle HPSI pumps.

C. Terminate Containment Spray.

D. Isolate the Safety Injection Tanks.

Question 32

Unit 1 is operating at 100% power steady state, when a loss of all charging occurs.

Which of the following describes the response of the CVCS, assuming no Operator actions?

Pressurizer Level will decrease:

A. with the letdown level control valves closing to minimum letdown flow at –2% deviation from setpoint.

B. with the letdown backpressure control valves closing to minimum letdown flow.

C. until letdown isolates on high Regenerative heat exchanger outlet temperature.

D. until –3% deviation from setpoint, at which time the first backup charging pump will start.

Question 33

Given the following conditions on Unit 2:

- A Large Break LOCA is in progress
- RWT level is 4 feet

ECCS equipment status is as follows:

- 2A and 2B HPSI pumps running
- 2A and 2B LPSI pumps off
- 2A Mini Flow isolation valves 3495 and 3459 open
- 2B Mini Flow isolation valves 3496 and 3660 closed

Assuming no Operator action, which of the following ECCS equipment failed to position itself to the proper position?

A. 2A and 2B HPSI pumps

B. 2A and 2B LPSI pumps

C. 2A Mini Flow isolation valves 3495 and 3459

D. 2B Mini Flow isolation valves 3496 and 3660

Question 34

Annunciator K-26, 'CEDS Trouble/Continuous Gripper Voltage High', alarmed on Unit 1. CEA 56 was put on the hold bus 8 minutes after the alarm came in.

Which of the following describes the status of CEA 56?

A. CEA 56 will not de-energize on a reactor trip.
B. Any attempt to move CEA 56 will cause CEA 56 to drop.

C. Gripper coil damage has occurred due to the length of time to put the CEA 56 on the hold bus.

D. CEA 56 must be removed from the hold bus within 60 minutes to comply with Tech. Specs.

Question 35

Which of the following events would require transition from 2-EOP-01, 'Standard Post Trip Actions', to 2-EOP-02 'Reactor Trip Recovery'?

A. Pressurizer level stable at 18% with letdown isolated and all charging pumps running.

B. A Main Steam Safety Valve (MSSV) stuck open and reseated at 575 psia while in EOP-01.

C. MSIS has actuated for unknown reason with plant parameters normal.

D. A trip from 50% power with 2A Main Feedwater pump OOS and loss of 2B1 6.9 KV bus.

Question 36

Unit 2 Operators are using EOP-03 'Loss of Coolant Accident' to mitigate a small break LOCA with the following conditions:

- 2A and 2B AFW pumps: feeding respective S/G's at 160 GPM
- 2C AFW pump: secured
- 2A S/G level: 12% narrow range
- 2B S/G level: 10% narrow range

A loss of offsite power occurs with the 2A and 2B Diesel Generator supplying their respective busses.
Assuming no Operator actions, which of the following describes the status of the AFW system?

2A and 2B AFW pumps:

A. start immediately upon the Diesel breaker closing and the S/G's continue to be fed at 160 GPM.

B. start immediately upon the Diesel breaker closing and the S/G's will be fed at full flow.

C. start after a short time delay from the Diesel breaker closing and the S/G's continue to be fed at 160 GPM after the pumps start.

D. start after a short time delay from the Diesel breaker closing and the S/G's will be fed at full flow.

Question 37

Unit 2 is on Shutdown Cooling with the following conditions:

- RCS pressure: 100 psia and in solid pressure control
- 2A charging pump running
- RCS temperature: 120 ° F
- 2A SDC train: in service

A loss of Instrument air occurs. Assuming no Operator action, which of the following describes the plant response?

A. Shutdown cooling flow will be lost due to hot leg suction valve closure.

B. Shutdown cooling flow will increase due to FCV 3306 (flow control valve) failing open

C. RCS inventory will be lost due to SDC relief valves opening

D. RCS temperature will decrease due to HCV 3657 (temperature control valve) failing open

Question 38

Unit 2 is in Mode 3 with Main Feedwater in service maintaining S/G levels. In preparation for Unit start up, the Main Turbine is latched and then manually tripped.

Which of the following describes the status of Main Feedwater flow?

A. 15% bypass valves automatically controlling S/G levels.

B. 15% bypass valves supplying constant 5% flow.

C. Main Feed Reg. valves automatically controlling S/G levels.

D. Main Feed Reg. valves supplying constant 5% flow.

Question 39

Which of the following plant conditions will automatically close the Main Feedwater Isolations Valves on Unit 2 but not on Unit 1?

A. Steam Generator pressure decreases to 600 psia.

B. Steam Generator levels decrease to 10% narrow range.

C. RCS pressure decreases to 1500 psia.

D. Containment pressure increases to 5.5 psig.

Question 40

Which of the following would require the Operator to perform a CONTIGENCY ACTION while in 2-EOP-01 'Standard Post Trip Actions'?

A. CEA 24 is at 55 inches.

B. Containment temperature is 123 ° F.

C. The 2A Diesel is carrying the 2A3 4.16 KV bus.

D. The 1A S/G 15% Main Feedwater bypass valve is fully closed.

Question 41

Which QSPDS display will be affected if the heater on the HJTC #3 fails?

A. Reactor Vessel Level

B. Core Exit Temperature

C. Upper Head subcooling

D. Reactor Coolant System subcooling

Question 42

Operators are conducting a heatup on Unit 2.

The following conditions exist:

- RCS pressure: 1700 psia.
- RCS temperature: 480 ° F.
- 2A1, 2B1 and 2B2 RCP's are operating.
- A loss of the 2B1 6.9 KV bus occurs.

Which of the following statements describes the status of Pressurizer pressure control?

Pressurizer Pressure can:

A. only be controlled by the Auxiliary spray valves.

B. only be controlled by Main spray valve PCV 1100E.

C. be controlled by Main spray valves PCV 1100E and 1100F.

D. be controlled by Main spray valve PCV 1100E and Auxiliary spray valves.

Question 43

Unit 1 is experiencing a duel event with the following conditions:

- All Charging Pumps are inoperable
- RCS Temperature: 520 °F
- RCS Pressure: 980 psia
- Pressurizer Level: 25%
- Safety Injection flow: meeting Figure 2
- Both S/G's are at 40% Wide Range Level and are steaming and feeding

Which of the following Success Path will be implemented to meet the RCS Pressure Control Safety Function in accordance with 1-EOP-15 'Functional Recovery?'

A. Heaters and Spray

B. Safety Injection

C. Steam Generator Heat Removal

D. PORVs

Question 44

The 2B1 RCP seal bleedoff line has automatically isolated and is indicating '0' gpm flow. All other RCP's indicate normal seal bleedoff flow.

Which of the following describes what may have caused this no flow condition?

A. High flow in the bleedoff line.

B. High pressure in the bleedoff line.

C. An inadvertent CIAS.

D. High pressure in the Volume Control Tank.

Question 45

Which of the following conditions would require the Unit 1 operators to perform an Emergency Boration while in Mode 1?

A. Two CEA's are found to be mechanically bound and untrippable.

B. Two CEA's drop to the bottom of the core resulting in a violation of PDIL.

C. RCS temperature increases 2° F after placing a new CVCS Ion Exchanger in service.

D. RCS temperature decreases 4° F due to a leaking steam bypass control valve .

Question 46

Unit 1 is performing a downpower due to a loss of vacuum and has implemented ONP-1-0610031 Loss of Condenser Vacuum. As the downpower is progressing, vacuum is steady at 5.1 inches Hg. If vacuum is maintained at the current level during the downpower, when should the Turbine be manually tripped?

A. When 3 of 4 RPS channels Nuclear power indicate <11%.

B. When DMW-871 'Net Megawatts' on RTGB 101 indicate '0' net Megawatts.

C When ΔT power indicates 35%.

D. When NIS power indicates 30%

Question 47

Unit 1 has shut down the plant due to a Steam Generator tube leak on the 1B S/G. ONP 1-0830030 'Steam Generator Tube Leak' is being implemented. Given the following conditions:

- One RCP in each loop is stopped
- RCS pressure: 2230 psia
- Tave: 530 ° F

Which of the following statements explains why one RCP in each loop was stopped?

A. To prevent fuel uplift.
B. To reduce heat input into the RCS.

C. To allow a greater cooldown rate.

D. To minimize leak flow into the affected S/G.

Question 48

A loss of Feedwater accident has occurred at the end of core cycle. When the Operator depressed the Reactor Trip pushbuttons, all CEA's remained fully withdrawn.

Which of the following describes the Plant response to this event?

	Reactor Power	Pessurizer Pressure	S/G Pressure
A.	Increasing	increasing,	increasing
B.	Increasing	decreasing	decreasing
C.	decreasing	increasing	increasing
D.	decreasing	decreasing	decreasing

Question 49

Unit 2 is performing a controlled gaseous batch release of the 2A Gas Decay tank.

The following conditions are noted during the release.

- 2A Gas Decay Tank pressure slowly decreasing
- 2B Gas Decay Tank pressure slowly decreasing
- 2C Gas Decay Tank pressure stable

In accordance with Off-Normal Operating Procedure 2-0530030 'Waste Gas System', which of the following identifies the immediate Operator action?

A. Isolate the 2B Gas Decay tank.

B. Stop the Waste Gas compressors.

C. Terminate the 2A Gas Decay Tank release.

D. Check the waste gas valve line-up to the 2B Gas Decay Tank.

Question 50

Unit 2 has received the following Instrument air alarms:

- F-30 Unit 1 & 2 Inst. Air Tie Open
- F-5 Inst. Air Press Hi/Lo
- F-21 Inst. Air Compressor Auto start

Unit 1 has informed you they have an Instrument air leak and their Instrument air header pressure is 72 psig and slowly decreasing. Unit 2 Instrument air pressure is currently 78 psig and slowly decreasing.

Which of the following describes the status of the Instrument air cross-tie valve(s)?

A. PCV 18-5, Unit 1 supply from Unit 2 has not reached the pressure at which it should close.

B. PCV18-6, Unit 2 supply from Unit 1 has not reached the pressure at which it should close.

C. PCV 18-5, Unit 1 supply from Unit 2 and PCV 18-6, Unit 2 supply from Unit 1, have failed open due to low Instrument air pressure.

D. PCV 18-5, Unit 1 supply from Unit 2 has failed to close.
C. PCV 18-5, Unit 1 supply from Unit 2 and PCV 18-6, Unit 2 supply from Unit 1, have failed open due to low Instrument air pressure.

Question 51

An electrical transient has occurred on Unit 1 that caused four Reactor Trip Breakers to open. The Reactor has not tripped.

Which of the following components has de-energized and caused this transient?

A. A CEA MG Set

B. 120V Instrument Bus

C. An RPS "K" relay

D. 120V Vital AC bus

Question 52

During the implementation of 1-EOP-06, Total Loss of Feedwater, which of the following parameters would require **DIRECT** entry into RCS and Core Heat Removal, Success Path 4 (Once Through Cooling) of 1-EOP-15, 'Functional Recovery'?

A. RCS Cold Leg temperature

B. RCS subcooling

C. Reactor Vessel level

D. Steam Generator pressure

Question 53

Instrument air to 2A Component Cooling Water (CCW) Heat Exchanger temperature control valve, TCV-14-4A has been isolated.

Which ONE of the following correctly describes the response of the CCW system?

2A CCW Heat Exchanger outlet temperature will:

A. decrease because TCV-14-4A fully opens.

B. increase because TCV-14-4A fully closes.

C, remain the same because TCV-14-4A movement is restricted by a mechanical stop.

D. remain the same because TCV-14-4A actuator is pneumatically locked.

Question 54

On Unit 1, which of the below indications is indicative of fuel failure and will be seen on the letdown radiation monitor?

A. Iodine increase that remains significantly above prior levels during steady state operations.

C. An increase of 100/E bar.

D. Iodine increase concurrent with a Gross activity increase during a load change.

D. An increase in high energy gamma from N-16.

Question 55

The following conditions exist:

- Unit 2 has tripped from 100% power
- Multiple CEAs remain stuck out post trip
- A charging header rupture has occurred downstream of the Regen Heat Exchanger
- SIAS actuated

Which of the following describes the preferred method to regain the Reactivity Control Safety Function IAW 2-EOP-15, 'Functional Recovery'?

A. LPSI supplied by the RWT.

B. Depressurize to allow SIT discharge.

C. Charging through the HPSI header

D. Charging through the Auxiliary Spray Line

Question 56

Which of the following describes the significance of an asterisk (*) when used in an Emergency Operating Procedure?

An asterisk indicates a:

A. step that may be performed out of sequence.

B. step that requires a sign off or data sheet.

C. management directive or vendor recommendation.

D. regulatory commitment made by Technical Specifications.

Question 57

A Large Break LOCA occurred on Unit 2. The operators have secured two Reactor Coolant Pumps IAW 2-EOP-01, 'Standard Post Trip Actions'.

Which of the following parameters will require the securing of the two remaining Reactor Coolant Pumps after entering 2-EOP-03 'Loss of Coolant Accident'?

A. RCS Pressure

B. RCS Subcooled Margin

C. Hot Leg Temperature

D. Pressurizer level

Question 58

The following conditions exist:

- A total loss of feedwater has occurred on Unit 2.
- 2A S/G level: 15% WR.
- 2B S/G level: 15% WR.
- The ANPS has directed the implementation of RCS and Core Heat Removal, Success Path 4, 'Once-Through-Cooling' from 2-EOP-15 'Functional Recovery'

Which of the following describes the reason for implementing this Success Path?

15% Wide Range Level is minimum inventory to:

A. depressurize the RCS and allow the admission of safety injection flow.

B. depressurize the RCS and prevent a PTS event after re-pressurization following dryout.

C. maintain RCS temperature at current value in preparation for system line-up to once through cooling.

D. prevent dry out of S/G's to preclude feeding a dry S/G when feedwater is recovered.

Question 59

Given the following conditions:

- Unit 2 tripped, concurrent with a Loss of Offsite power
- Both Diesel Generators started and loaded on their respective bus.

Which of the following identifies the Safety Function that **CANNOT** be directly confirmed from the control room?

A. Reactivity control

B. Containment Isolation

C. Maintenance of Vital Auxiliaries

D. Containment Temperature, Pressure and Combustible gas

Question 60

Which of the following Unit 1 events would automatically align a radiological release path to the liquid waste management system?

A. Failed Fuel

B. Steam Generator tube leak

C. RCP seal heat exchanger leak

D. Regenerative heat exchanger leak

Question 61

When performing a reactor startup on Unit 2, which of the following occurs at $\geq$10,000 cps?

A. Startup Rate Trip is enabled

B. Zero Power Mode Bypass is enabled

C. Startup Channels automatically de-energize

D. Wide Range Log Safety Channel shifts to Extended Range

Question 62

Unit 2 is at 100% power with all systems in normal configuration. A large tube leak occurs in the 2A1 RCP shaft seal heat exchanger.

Which of the following annunciators would **INITIALLY** be expected for this condition?

A. J-2, RCP 2A1 SEAL TROUBLE

B. J-11, RCP 2A1 COOLING WATER LOW FLOW

C. J-33, RCP SEAL COOLER VALVE CLOSED / PWR FAILURE

E. LA-10, CCW SURGE TANK COMPARTMENT A LEVEL LOW

Question 63

In preparations for entry into Mode 4, you have been requested to perform a line-up on the AFW system. Which of the below methods describes how to verify the 1A AFW discharge valve to be in the correct position?

A. Physical hands on check, slightly moving the valve closed then open, then back to the closed direction ¼ to ½ turn.

B. Physical hands on check, rotating the valve at least one turn fully closed, then fully open against the backseat.

C. Visual observation of the valve stem position.

D. Visual observation of the valve position mechanical pointer.

Question 64

The 1A Diesel surveillance is being completed. As you are unloading the diesel, the KW chart recorder fails, indicating '0' KW.

Which of the following indication will be used to determine the Diesel Generator output prior to opening the generator output breaker?

A Ammeter on 1A3 4.16 KV bus.

B. Megawatt meter on the local Diesel panel.

C. Remote shutdown megawatt indication.

D. Red, Green, Amber light indication on RTGB Governor control switch.

Question 65

According to Unit 2 Technical Specifications, which of the following would require a Unit Shutdown? (assume Mode 1)

A. Letdown isolation valve 2515 packing leakage of 1.5 gpm.

B. 2A1 RCP bleedoff cavity leakage of 3 gpm to the VCT.

C. Primary to secondary leakage in the 2A Steam Generator of .52 gpm.

D RCS inventory balance data sheets indicate 2.5 gpm leakage into the quench tank

Question 66

The following conditions exist:

- Steam Generator Tube Rupture exists
- Affected S/G not yet isolated.

Which of the following conditions would require a Site Area Emergency declaration?

A. Increasing leak flow

B. Loss of offsite power

C. Increasing secondary radiation levels

D. Loss of a 120 VAC Instrument bus

Question 67

In accordance with ADM-11.03 "Temporary Change to Procedures" which of the below procedures may have a Temporary Change initiated?

A. Quality Instruction (QI).

B. Administrative Procedure (ADM).

C. Emergency Operating Procedure (EOP).

D. Off-Normal Operating Procedure (ONP)

Question 68

The Unit 1 SNPO has been designated as the fire team leader

Which of the following is the Operations Policy concerning the Unit 1 SNPO entering containment?

The Unit 1 SNPO can enter containment:

A. if a fire occurs inside containment

B. during day shift hours only

C. for a period of up to one hour

D. if no other non-brigade members are available

Question 69

Unit 1 is at in hot standby with a vacuum in the condenser. The Condensate recirc regulator, FCV 12-1, goes full closed.

If FCV 12-1 remained closed, which of the following statements describes the plant response?

A. The running condensate pump will trip on low flow.

B. Degrading of condenser vacuum due to loss of condensate flow through the air ejector condenser.

C. Degrading of condenser vacuum due to loss of exhaust hood sprays.

D. Water hammer in the MSR reheater drain piping due to loss of quench water.

Question 70

If occupied during activation of its respective fire suppression system, which of the following areas would be considered a life threatening environment?

A. Unit 1 Cable Spreading Room

B. Unit 1 Transformer Bay

C. Unit 2 Cable Spreading Room

D. Unit 2 Emergency Diesel Generator Building

Question 71

During a LOCA inside containment, which of the following chemicals is responsible for the production of hydrogen due to corrosion of containment structural metals?

A. Lithium

B. Boric acid

C. Trisodium Phosphate dodecahydrate

D. Sodium hydroxide/hydrazine

Question 72

The following conditions exist:

- 1B AFW Pump is OOS.
- Unit 1 tripped from 100% power.
- Two minutes after the trip the 1AB 125 VDC bus de-energized due to an electrical fault.
- Both Main Feedwater pumps tripped on low flow and will not restart.

Which of the following are Contingency Action steps that must be taken?

A. Close the PORV valves.

B. Secure one RCP in each loop.

C. Manually control Pressurizer heaters and spray.

D. Secure all RCPs within 10 minutes of the electrical fault

Question 73

Which of the following RPS reactor trip signals is specifically designed to prevent fuel centerline melting?

A. Local Power Density

B. Variable High Power

C. High Rate of Change

D. Thermal Margin/Low Pressure

Question 74

Unit 2 is in Mode 1 when the ANPO notifies the RCO that HVE-41A Intake Structure Ventilation Fan motor is smoking and the breaker has tripped.

What is the status of the 2A ICW pump, **immediately** upon discovery of the failed ventilation fan?

A. Operable as long as HVE-41B remains Operable

B. Operable as long as the ICW room temperature remains less than design temperature.

C. Inoperable until ICW room temperature can be proven to be maintained less than design temperature.

D. Inoperable until a temporary air moving system can be installed.

Question 75

Q100
The following conditions exist:

- A small break LOCA has occurred on Unit 1.
- 1-EOP-03, 'Loss of Coolant Accident' is being implemented.

Containment parameters are as follows:

- Temperature: 182°F
- Pressure: 12 psig
- Two Containment Coolers operating.
- One Containment spray Header is in service with 3000 gpm flow

Which of the following describes the status of Containment Temperature and Pressure safety function?

A. Containment Temperature and Pressure safety function is met.

B. Containment Temperature and Pressure safety function is not met. Start one additional Containment Cooler to meet the Safety Function.

C. Containment Temperature and Pressure safety function is not met. Increase spray header flow to 3200 gpm to meet the Safety Function.

D. Containment Temperature and Pressure safety function is not met. Place the other Containment spray header in service to meet the Safety function.

Question 76

Unit 2 has tripped from 60% power due to a Loss of Offsite power (LOOP). The following conditions exist:

Both Diesel Generators started and loaded on their respective bus.

- Pressurizer level has stabilized at 30%.
- The transient caused Pressurizer Pressure PIC 1100Y (non-selected) to fail high.

Which of the following describe the minimum action(s) necessary to regain the Pressurizer backup heaters?

A. Reset all the 480V backup heaters on RTGB 203.

B. Close A and B 4160 V Pressurizer heater transformer breakers and reset all the 480V backup heaters on RTGB 203.

C. Close A and B 4160 V Pressurizer heater transformer breakers and reset B1 and B4 480V backup heaters on RTGB 203.

D. Take the Pressurizer interlock bypass keyswitch to the 'Pressure' position and reset all the 480V backup heaters on RTGB 203.

Question 77

The following conditions exist:

- Unit 1 has tripped from 100% power due to a LOOP.
- Pressurizer Code safety valve, V-1202, was partially stuck open and is currently closed
- Both trains of SIAS has actuated and SI flow meets Figure 2 requirements
- Pressurizer pressure: 1025 psia.
- CET temperature: 539° F
- Pressurizer level: 80% and slowly going up

Which of the following describes the correct mitigation strategy in accordance with 1-EOP-03 'Loss of Coolant Accident'?

A. Maintain RCS temperature constant and take the pressurizer solid if necessary.

B. Maintain RCS temperature constant while reducing Pressurizer level to 27-35%.

C. Cooldown the RCS, but do not let the Pressurizer go solid.

D Cooldown the RCS and take the pressuirzer solid if necessary.

Question 78

A Steam Generator tube rupture has occurred on the 1A Steam Generator and Operators are performing a rapid downpower on Unit 1.

Which of the following Radiation Monitors will trend down, in proportion to the Reactor power decrease? (Assume S/G tube leak remains constant during the downpower)

A. Plant Vent

B. Main steam Line

C. Condenser Air Ejector

D. Steam Generator Blowdown

Question 79

Given the following conditions:

- RCS Boron concentration: 654 PPM
- Pressurizer Boron concentration: 686 PPM
- Time (in min) to correct mismatch = [(Pzr ppm – RCS ppm) - 25 ppm] x 3
- All backup heaters are available
- PIC-1100X: selected

Which of the below statements describes the method and the minimum time to equalize the Pressurizer boron concentration to within 25 ppm of the RCS boron concentration.

Energize all backup heaters and

A. maintain PIC-1100X in auto at the current setpoint. Recirc for 32 minutes.

B. maintain PIC-1100X in auto at the current setpoint. Recirc for 21 minutes.

C. reduce setpoint on PIC-1100X . Recirc for 32 minutes.

D. reduce setpoint on PIC-1100X. Recirc for 21 minutes.

Question 80

Both Unit's have experienced a Station Blackout.

Which of the following is the minimum designed time each Unit's station batteries are capable of supporting the expected loads?

A. 4 hours

B. 10 hours

C. 14 hours

D. 24 hours

Question 81

The following conditions exist on Unit 2:

- Unit tripped from 80% power
- 2A and 2B S/G levels decreased to 10% narrow range and have recovered to 30% narrow range on all channels.

Assuming no operator action, which of the following describes the status of the Auxiliary Feedwater system?

A. The 2A, 2B and 2C Auxiliary Feedwater pumps are feeding at full flow.

B. The 2A and 2B Auxiliary Feedwater pumps are feeding at 150 gpm each.

C. The 2A, 2B and 2C Auxiliary Feedwater pumps have stopped and their discharge valves closed.

D, The 2A, 2B and 2C Auxiliary Feedwater pumps are running and their discharge valves closed.

Question 82

Unit 1 is at 100% steady state power. While performing the Area Radiation Monitoring Periodic Test, the Check Source pushbutton on the MA CIS channel readout module is depressed.

Which of the following correctly describes the response, of the system, if any?

A. The alarm setpoint is displayed.

B. Various A train CIS components actuate.

C. Containment Evacuation alarm actuates.

D. No response, check source is disabled during testing.

Question 83

Which of the following describes the basis for the size difference between the Unit 1 and Unit 2 Condensate Storage Tanks (CST)?

Unit 2 CST volume:

A. was designed to supply a specified amount of makeup to Unit 1 in the event of total loss of AC power to Unit 1.

B. was designed to supply a specified amount of makeup to Unit 1 in the event of damage to Unit 1 CST.

C. is analyzed for a 8 hour hot standby period following a Loss of Offsite Power, Unit 1 is analyzed for a 4 hour period.

D. is analyzed for a cooldown to shutdown cooling entry conditions following a period of hot standby, Unit 1 is analyzed for hot standby only.

Question 84

The following conditions exist on Unit 2:

- The Unit has experienced a Safety Injection Actuation
- The SIAS signal has been reset

Which of the following describes the configuration of the Intake Cooling Water System (ICW) at this time?

MV-21-2 and MV-21-3 (Intake Cooling water valves to the TCW heat exchangers) are:

A. open and ICW flow is being supplied to the essential and non-essential headers.

B. open and ICW flow is being supplied to the essential header only.

C. closed and ICW flow is being supplied to the essential and non-essential headers.

D. closed and ICW flow is being supplied to the essential header only.

Question 85

A 35 gpm RCS leak is occurring on Unit 2. Which of the following describes the instrumentation available to determine the change in leak rate and possible location of the RCS leak?

	Change in leak rate	Location
A.	RCS leakage flow recorder FR-07-3	comparing the CIAS radiation monitor readings.
B.	RCS leakage flow recorder FR-07-3	sampling different atmospheric locations in Containment
C.	Cavity sump level, LI-07-6	sampling different atmospheric locations the Containment
D.	Cavity sump level LI-07-6	Comparing the CIAS radiation monitor readings

Question 86

Unit 2 has experienced Loss of Coolant Accident concurrent with a Loss of Offsite power

Which of the following are the minimum actions necessary to reset the non-essential sections of 2B5, 2B6 and 2B8 MCC's?

A. Resetting SIAS.

B. Resetting CIAS.

C. Restoration of offsite power.

D. Restoration of offsite power and opening the Diesel output breaker.

Question 87

The fire computer is out of service on Unit 2.

In accordance with 0-ONP-79.01 'Fire Detection System' which of the following is the preferred method to monitor the status of Unit 2 fire alarms?

A. Monitor Unit 2 fire alarms using Unit 1 fire computer.

B. Assign an Operator to monitor Unit 2 local fire panels.

C. Notify the roving fire watch to monitor Unit 2 fire alarms.

D. Station an Operator at the Unit 2 master local fire alarm panel.

Question 88

Unit 2 is in mode 6, fuel movement in progress, when Shutdown Cooling is lost.

2-ONP-01.05, Plant Condition 5 - ,Shutdown Cooling in Service, Rx Head Removed, has been implemented.

If Shutdown Cooling cannot be restored, which of the following method of cooling the core will be implemented?

A. Steam Generator heat removal.

B. Feed and bleed to the RWT.

C. Cooling through the Fuel Pool Heat Exchanger.

D. Cooling through the Letdown Heat Exchanger.

Question 89

The following conditions exist:

- A 37 year old itinerant mechanic has arrived on site from Turkey Point
- He will work at St. Lucie for the remainder of the year
- His total lifetime effective dose equivalent (TEDE) is 33.5 REM
- His dose for this year is 0.5 REM

Which of the following is the MAXIMUM additional total effective dose equivalent (PSL limits) that he will be permitted to receive at PSL this year? (Assume no extensions)

A. 0.5 REM

B. 2.0 REM

C. 3.5 REM

D. 4.5 REM

Question 90

Unit 2 is at 100% power, steady state. A major leak has developed in the reference leg for the selected Pressurizer level transmitter LT-1110X

Which of the following describes the immediate indicated Pressurizer level indications and the response of the CVCS system?

	Indicated Pressuirzer level	CVCS response
A.	High	Letdown flow will decrease
B.	High	Letdown flow will increase
C.	Low	Letdown flow will decrease
D.	Low	Letdown flow will increase

Question 91

Unit 2 Reactor Vessel Level is at Mid Loop with the following conditions:

- The Unit has been shutdown 4 days
- RCS temperature: 130° F

Both SDC cooling trains are lost

Which of the following is the time to boil and the required makeup rate for boil off?

(REFERENCES PROVIDED, Fig. 1 and 2 from 2-0440030)

A. 8 minutes to boil, 90 GPM makeup rate

B. 8 minutes to boil, 75 GPM makeup rate

C. 11 minutes to boil, 60 GPM makeup rate

D. 11 minutes to boil, 40 GPM makeup rate

Question 92

When processing an RWP, which of the following is the MINIMUM criteria that requires pre-job ALARA review?

A. Dose estimate of the job exceeds one (1) Manrem.

B. Any work to be performed in a high radiation area.

C. Dose estimate of the job exceeds five (5) Manrem.

D. Any work that requires the use of a full-face respirator.

Question 93

Unit 1 is at 100% steady state power. The RCO is preparing to start the 1A EDG from the RTGB for a semi-annual surveillance run.

Which of the following parameters must be timed by the RCO to ensure the 1A EDG meets operability requirements?

A. KW loading

B. Output breaker closure

C. Current and Voltage

D. Frequency and Voltage

Question 94

Which of the following area radiation levels is the maximum which is allowed to be unlocked?

A. 900 mrem/hr at 30 cm (12 inches)

B. 1200 mrem/hr at 30 cm (12 inches)

C. 900 mrem/hr at 100 cm (39 inches)

D. 1200 mrem/hr at 100 cm (39 inches)

Question 95

Which of the following is the MAXIMUM total dose equivalent (TEDE) that an RCO can receive per 10CFR20 in a year? (Assume no emergencies)

A. 1 REM

B. 2.5 REM

C. 3.5 REM

D. 5 REM

Question 96

Unit 1 is at 100% power when the following cabinets simutaneously lose power:

- A Channel RPS
- A Channel ESFAS
- A Channel AFAS

Which of the following identifies the equipment that has been de-energized?

A. Vital AC Bus

B. Instrument Bus

C. SAS Inverter

D. QSPDS Inverter

Question 97

Unit 1 has implemented 1-EOP-03.'LOCA.' Which of the following describes the criteria for securing Containment Spray following a large break LOCA?

In accordance with 1-EOP-03, which of the following criteria can Containment Spray may be secured.

Containment pressure is less than:

A. 10 psig, with the Engineering Manager concurrence.

B. 5.5 psig, with the Nuclear Plant Supervisor concurrence.

C. 5 psig, with Technical Support Center concurrence.

D. 3.5 psig, with Recovery Manager concurrence.

Question 98

Given the following conditions on Unit 1:

- 1B and 1BB Battery chargers are both in service tied to the 1B DC bus.

If the 1B Battery charger is then removed from service, which of the following is correct response of the 1BB Battery charger's voltage and amps?

	Voltage	Amps
A.	decrease	decrease.
B.	increase	remain the same
C.	remain the same	increase
D.	remain the same	remain the same

Question 99

Which of the following describes the criteria that meets Reactivity Control safety function upon entering 1-EOP-10 'Station Blackout'?

Reactor power less than $5X10^{-4}$%, stable or decreasing and:

A. all CEA's fully inserted

B. maximum of 1 CEA not fully inserted.

C. startup rate negative or zero.

D. emergency boration in progress.

Question 100

Unit 2 is in Mode 3 with the following conditions:

- Pressurizer pressure is 2250 psia.
- 2A iodine removal pump was recently declared out of service due to a burned motor.
- 2B Diesel Generator has just been declared out of service due to a broken oil line.

In accordance with Technical Specifications which of the following describes the status of the iodine removal system.

A. The iodine removal system is inoperable, but not required until Mode 2.

B. With the 2B iodine removal pump available, the iodine removal system is considered operable.

C. The iodine removal system can be declared operable when the 2A Diesel Generator is run for operability check.

D. The iodine removal system can be declared operable when the 2A iodine removal pump is returned to service.

INITIAL SUBMITTAL

ST. LUCIE EXAM 2000-301
50-335/2000-301 & 50-389/2000-301

FEBRUARY 7 - 11, 2000

INITIAL DRAFT OUTLINE SUBMITTAL
LETTER FROM J A STALL, VP, ST. LUCIE TO HAROLD O CHRISTENSE
ES-201-2 - Exam Outline Quality Checklist
Scenarios 1, 2, and 3
Security Agreements
ES-301-5 - Transient & Event Checklist
ES-301-1 - Administrative Topics Outline
ES-301-2 Control Room Systems & Facility Walk-Through Test Outline
ES-401-3 - PWR SRO Examination Outline
ES-401-5 Generic Knowledge & Abilities Outline
ES-401-4 - PWR RO Exam Outline
ES-401-5 - Generic Knowledge & Abilities Outline

Charlie Payne

FPL

Florida Power & Light Company, 6351 S. Ocean Drive, Jensen Beach, FL 34957

November 24, 1999

L-99-249
10 CFR 55.40
10 CFR55.5

Regional Administrator, Region II
U. S. Nuclear Regulatory Commission
Attn: Mr. Harold O. Christensen
Chief, Operator Licensing and
Human Performance Branch
Atlanta, GA 30303

Re: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
February 2000 Initial License
Operator Examination Outline

This letter documents approval of the proposed Florida Power & Light Company (FPL) examination outline and examination quality checklists as requested by NRC letter dated October 7, 1999. I am the authorized representative of the facility licensee. The examination outline is for the initial operator license examination that is scheduled to be administered in February 2000. To ensure examination security, the information will be shipped via Federal Express directly to the NRC Senior License Examiner by the St. Lucie Training Department Exam Coordinator on November 24, 1999.

Should you require any additional information, please contact Mr. Mark Shepherd at (561) 467-7093.

Very truly yours,

J. A. Stall
Vice President
St. Lucie Plant

JAS/GRM

Facility: St. Lucie (00-301) Date of Examination: 2-10-00

Item	Task Description	Initials a	Initials b*	Initials c
1. WRITTEN	a. Verify that the outline(s) fit(s) the appropriate model per ES-401.	TB	L	
	b. Assess whether the outline was systematically prepared and whether all knowledge and ability categories are appropriately sampled.	TB	L	
	c. Assess whether the outline over-emphasizes any systems, evolutions, or generic topics.	TB	L	
	d. Assess whether the repetition from previous examination outlines is excessive.	TB	L	
2. SIM	a. Using Form ES-301-5, verify that the proposed scenario sets cover the required number of normal evolutions, instrument and component failures, and major transients.	TB	L	
	b. Assess whether there are enough scenario sets (and spares) to test the projected number and mix of applicants in accordance with the expected crew composition and rotation schedule without compromising exam integrity; ensure each applicant can be tested using at least one new or significantly modified scenario, that no scenarios are duplicated from the applicants' audit test(s)*, and scenarios will not be repeated over successive days.	TB	L	
	c. To the extent possible, assess whether the outline(s) conform(s) with the qualitative and quantitative criteria specified on Form ES-301-4 and described in Appendix D.	TB	L	
3. W/T	a. Verify that: (1) the outline(s) contain(s) the required number of control room and in-plant tasks, (2) no more than 30% of the test material is repeated from the last NRC examination, (3)* no tasks are duplicated from the applicants' audit test(s), and (4) no more than 80% of any operating test is taken directly from the licensee's exam banks.	TB	L	
	b. Verify that: (1) the tasks are distributed among the safety function groupings as specified in ES-301, (2) one task is conducted in a low-power or shutdown condition, (3) 40% of the tasks require the applicant to implement an alternate path procedure, (4) one in-plant task tests the applicant's response to an emergency or abnormal condition, and (5) the in-plant walk-through requires the applicant to enter the RCA.	TB	L	
	c. Verify that the required administrative topics are covered, with emphasis on performance-based activities.	TB	L	
	d. Determine if there are enough different outlines to test the projected number and mix of applicants and ensure that no items are duplicated on successive days.	TB	L	
4. GENERAL	a. Assess whether plant-specific priorities (including PRA and IPE insights) are covered in the appropriate exam section.	TB	L	
	b. Assess whether the 10 CFR 55.41/43 and 55.45 sampling is appropriate.	TB	L	
	c. Ensure that K/A importance ratings (except for plant-specific priorities) are at least 2.5.	TB	L	
	d. Check for duplication and overlap among exam sections.	TB	L	
	e. Check the entire exam for balance of coverage.	TB	L	
	f. Assess whether the exam fits the appropriate job level (RO or SRO).	TB	L	

	Printed Name / Signature	Date
a. Author	TIM BOLANDER / [signature]	11-24-99
b. Facility Reviewer(*)	Ron Lauver / [signature]	11-24-99
c. Chief Examiner		
d. NRC Supervisor		

(*) Not applicable for NRC-developed examinations.

Facility: St. Lucie   Scenario No.: 1   Op-Test No.: 1

Objectives: To evaluate the students ability to implement the ONOPs for various instrument and component failures; perform a normal plant power reduction; and to execute the EOPs for a Small Break LOCA combined with a Loss of Offsite Power and subsequent total loss of High Pressure Safety Injection. (Functional Recovery)

Initial Conditions: Unit 2 is at 100% power MOC

Turnover: The plant is operating at 100% power, MOC. The 2B Heater Drain Pump has developed a discharge flange leak and management has made the decision to reduce power to 90% in order to facilitate repairs. 2A Emergency Diesel Generator is out of service for relay replacement, expected back in four hours. 2A Auxiliary Feedwater Pump is out of service for bearing replacement, not expected back this shift. Chemistry reports a .5 GPD tube leak in the 2A Steam Generator. Severe thunderstorms have been forcasted for St. Lucie and Martin counties. Instructions to the shift is to reduce power to 90% and remove the 2B Heater Drain Pump from service.

Preexisting Malfunctions: 2B HPSI pump becomes air bound 10 minutes after SIAS

Event No.	Malf. No.	Event Type*	Event Description
1	0	R-RO N-BOP	Power decrease from 100% to 90% Place Pressurizer on Recirc
2	1	C-BOP	DEH power supply failure, turbine control swaps to manual, 2B heater drain pump trips two minutes later
3	2	I-RO	PT-1100X setpoint (selected pressurizer pressure controller) drifts high
4	3	I-BOP	LT-9011(2A steam generator level controller) fails high
5	4	C-RO	Reference leg for LT-1110X ruptures (common leg failure)
6	5	M-RO M-BOP	Small break LOCA, Loss of Offsite Power on reactor trip
7	6	C	2B HPSI pump becomes air bound 10 minutes after SIAS, loss of all High Pressure Safety Injection

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Facility: St. Lucie   Scenario No.: 2   Op-Test No.: 2

Objectives: To evaluate the students ability to implement the ONOPs for various instrument and component failures; perform a normal plant power reduction; and to execute the EOPs for an Excess Steam Demand combined with loss of two of three Auxiliary Feedwater Pumps and total loss of Instrument Air.

Initial Conditions: Unit 2 is at 100% power MOC

Turnover: The plant is operating at 100% power, MOC. The 2B Main Feedwater Pump has developed a crack in an oil line and is leaking approximately .3 GPM. Maintenance is standing by and adding oil as needed. Management is in the process of evaluating the problem and will make a decision within the next hour whether or not to reduce power and repair the leak. 2B Auxiliary Feedwater Pump is out of service for bearing replacement, not expected back this shift. The Steam Jet Air Ejector Radiation Monitor is out of service, not expected back this shift. Chemistry reports a .5 GPD tube leak in the 2A Steam Generator. Severe thunderstorms have been forcasted for St. Lucie and Martin counties. Instructions to the shift are to maintain 100% power.

Preexisting Malfunctions: 2C Auxiliary Feedwater pump trips 10 minutes after AFAS actuation.
HCV-09-1A and HCV-09-1B fail to close on AFAS/MSIS

Event No.	Malf. No.	Event Type*	Event Description
1	1	C-BOP	PCV-8801 (Steam bypass control valve) drifts open
2	0	R-RO N-BOP	Power reduction to 45% Place Pressurizer on Recirc
3	2	I-RO	HIC-1100 (pressurizer spray controller) input fails high
4	3	C-RO	LCV-2110P (pressurizer level control valve) fails open, V 2515 fails to close on high temperature
5	0	N-BOP	Restoration of charging and letdown
6	4	I-BOP	PT-10-8 (condenser vacuum pressure transmitter) sensing line failure
7	5	M-RO M-BOP	Reactor trip on loss of vacuum, V-8201 and V-8202 (2A S/G main steam safety valves) stick fully open on the reactor trip
8	6	C	Loss of instrument air on reactor trip
9	7	C	2C Auxiliary Feedwater pump trips 10 minutes after AFAS

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Facility: St. Lucie Scenario No.: Backup 3 Op-Test No.: 3

Objectives: To evaluate the students ability to implement the ONOPs and take manual control of systems due to various instrument and component failures; perform a normal plant power increase; and to execute the EOPs for a Loss of Offsite Power with loss of both Emergency Diesel Generators (Station Blackout)

Initial Conditions: Unit 2 is at 30% power BOC

Turnover: The plant is operating at 30% power, BOC. The unit is returning from a 30 day refueling outage and has been on a chemistry hold. Chemistry has given the approval to continue the power ascension to 100%. 2A Emergency Diesel Generator has just been taken out of service to replace a defective relay, expected back in four hours. Reactor Reg #2 is out of service, I&C is troubleshooting. Instructions to the shift is to increase power to 100%.

Preexisting Malfunctions: 2B EDG trips 15 minutes after LOOP
FCV-9021 failed as is (manual control available)

Event No.	Malf. No.	Event Type*	Event Description
1	0	R-RO N-BOP	Power increase from 30% to 100% Place MSR's in service
2	1	I-RO	TE-1111Y (Rx Reg Thot input) fails high
3	2	C-BOP	LCV-9006 (2B 15% bypass valve) drifts open
4	3	I-BOP	FR-8011 (2A steam generator steam flow transmitter) drifts high
5	4	C-RO	PCV-1100E (Pressurizer spray valve) fails open
6	5	M-RO M-BOP	Loss of offsite power
7	6	C	2B EDG trips 15 minutes after LOOP (Station Blackout)
8		N	Crosstie 4.16 KV power with Unit 1

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

1. Pre-Examination

I acknowledge that I have acquired specialized knowledge about the NRC licensing examinations scheduled for the week(s) of 6-28 99 as of the date of my signature. I agree that I will not knowingly divulge any information about these examinations to any persons who have not been authorized by the NRC chief examiner. I understand that I am not to participate in any instruction, evaluation, or other training-related activities involving those applicants scheduled to be administered these licensing examinations from this date until completion of examination administration. I further understand that violation of the conditions of this agreement may result in cancellation of the examinations and/or an enforcement action against me or the facility licensee. I will immediately report to facility management or the NRC chief examiner any indications or suggestions that examination security may have been compromised.

2. Post-Examination

To the best of my knowledge, I did not divulge to any unauthorized persons any information concerning the NRC licensing examinations administered during the week(s) of ________ . From the date that I entered into this security agreement until the completion of examination administration, I did not participate in any training-related activities involving those applicants who were administered these licensing examinations.

	PRINTED NAME	JOB TITLE / RESPONSIBILITY	SIGNATURE (1)	DATE	SIGNATURE (2)	DATE
1.	K. KORTH	ANPS ~~[illegible]~~ AHA exam review	[signature]	5-7-99	[signature]	
2.	Winston A. Ryley	RCO / Validation	[signature]	5-7-99		
3.	Adam J. Scales	Asst OPS Supervisor / Review	[signature]	5-10-99		
4.	Jeff Folden	ANPS / Review	[signature]	5-10-99		
5.	C.D. LADD	OPS. SUPV / REVIEW APPROVE	[signature]	5/10/99		
6.	M.H. Allen	ops mgr / Review exam	[signature]	5/10/99		
7.	Gary Hollinger	Asst. Trng Mgr. / Operation Trng Oversight	[signature]	5/12/99		
8.	Jim McNary	SPEAKOUT	[signature]	08/04/99		
~~9.~~	~~Ron Lauver~~	~~Training~~		9-16-99		
10.						

1. Pre-Examination

I acknowledge that I have acquired specialized knowledge about the NRC licensing examinations scheduled for the week(s) of 6-28 99 as of the date of my signature. I agree that I will not knowingly divulge any information about these examinations to any persons who have not been authorized by the NRC chief examiner. I understand that I am not to participate in any instruction, evaluation, or other training-related activities involving those applicants scheduled to be administered these licensing examinations from this date until completion of examination administration. I further understand that violation of the conditions of this agreement may result in cancellation of the examinations and/or an enforcement action against me or the facility licensee. I will immediately report to facility management or the NRC chief examiner any indications or suggestions that examination security may have been compromised.

2. Post-Examination

To the best of my knowledge, I did not divulge to any unauthorized persons any information concerning the NRC licensing examinations administered during the week(s) of ________ . From the date that I entered into this security agreement until the completion of examination administration, I did not participate in any training-related activities involving those applicants who were administered these licensing examinations.

	PRINTED NAME	JOB TITLE / RESPONSIBILITY	SIGNATURE (1)	DATE	SIGNATURE (2)	DATE
1.	T. BOLANDER	AUTHOR	T. Bolander	1-4-99		
2.	R.A. WALKER		L.A. Walker	2-10-99		
3.	W.C. Miller	Reviewer	W.C. Miller	2-11-99		
4.	JEFFREY FOX	REVIEWER	[illegible]	11 FEB 99		
5.	GEORGE LOREE	SIMULATOR STAFF	[illegible]	22 MAR 99		
6.	C.D Marple	REVIEWER.	C Marple	3/31/99		
7.	Jim Fiori	WRITTEN EXAM RO	[illegible]	4-22-99		
8.	Carlos de la Guardia		[illegible]	4-22-99		
9.	L. Church (Leonard)	OPS RTTC / operation	[illegible]	4/22/99		
10	LARRY RICH	OPS TRAINING SUPV.	[illegible]	4/22/99		

1. Pre-Examination

I acknowledge that I have acquired specialized knowledge about the NRC licensing examinations scheduled for the week(s) of 2/7/00 as of the date of my signature. I agree that I will not knowingly divulge any information about these examinations to any persons who have not been authorized by the NRC chief examiner. I understand that I am not to instruct, evaluate, or provide performance feedback to those applicants scheduled to be administered these licensing examinations from this date until completion of examination administration, except as specifically noted below and authorized by the NRC.Furthermore, I am aware of the physical security measures and requirements (as documented in the facility licensee's procedures) and understand that violation of the conditions of this agreement may result in cancellation of the examinations and/or an enforcement action against me or the facility licensee. I will immediately report to facility management or the NRC chief examiner any indications or suggestions that examination security may have been compromised.

2. Post-Examination

To the best of my knowledge, I did not divulge to any unauthorized persons any information concerning the NRC licensing examinations administered during the week(s) of ________. From the date that I entered into this security agreement until the completion of examination administration, I did not instruct, evaluate, or provide performance feedback to those applicants who were administered these licensing examinations, except as specifically noted below and authorized by the NRC.

	PRINTED NAME	JOB TITLE / RESPONSIBILITY	SIGNATURE (1)	DATE	SIGNATURE (2)	DATE	NOTE
1.	Jeffrey Fox	Instructor/Exam Reviewer	[signature]	18 Nov 99			
2.	Richard Bretton	Instructor / Exam Review	[signature]	11-18-99			
3.	W.C. Miller	Instructor/Exam Review	W.C. Miller	11-18-99			
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							

NOTES:

1. Pre-Examination

I acknowledge that I have acquired specialized knowledge about the NRC licensing examinations scheduled for the week(s) of ~~2-10-99~~ 2-7-00 as of the 11-18-99 date of my signature. I agree that I will not knowingly divulge any information about these examinations to any persons who have not been authorized by the NRC chief examiner. I understand that I am not to instruct, evaluate, or provide performance feedback to those applicants scheduled to be administered these licensing examinations from this date until completion of examination administration, except as specifically noted below and authorized by the NRC.Furthermore, I am aware of the physical security measures and requirements (as documented in the facility licensee's procedures) and understand that violation of the conditions of this agreement may result in cancellation of the examinations and/or an enforcement action against me or the facility licensee. I will immediately report to facility management or the NRC chief examiner any indications or suggestions that examination security may have been compromised.

2. Post-Examination

To the best of my knowledge, I did not divulge to any unauthorized persons any information concerning the NRC licensing examinations administered during the week(s) of ________. From the date that I entered into this security agreement until the completion of examination administration, I did not instruct, evaluate, or provide performance feedback to those applicants who were administered these licensing examinations, except as specifically noted below and authorized by the NRC.

	PRINTED NAME	JOB TITLE / RESPONSIBILITY	SIGNATURE (1)	DATE	SIGNATURE (2)	DATE	NOTE
1.	M.D.Shepherd	Ops Trng Supv	[signature]	9.29.99			
2.	Ron Lauver	Ops Trng Instructor	[signature]	9-30-99			
3.	Robert W. Lindsey	Training Manager	[signature]	10/21/99			
4.	Brian Nichols	SRCO	[signature]	11/2/99			
5.	Andrew Terezakis	ANPS	[signature]	11/4/99			
6.	Jeff McKenzie	RCO	[signature]	11/4/99			
7.	R G West	PGM	[signature]	11/12/99			
8.	JA STALL	VP	[signature]	11/18/99			
9.	J.CHARLES COUTURE	OPS TRAINING INSTRUCTOR	[signature]	23NOV99			
10.	JAMES MARTIN	TRNG SIMULATOR SUPV	[signature]	11/23/99			
11.		ADMIN. CLERK / COPY					
12.		OPS INSTRUCTOR / VALIDATE					
13.		OPS MANAGER / VALIDATE					
14.							
15.							

NOTES:

OPERATING TEST NO: 1 SRO-U1

Applicant Type	Evolution Type	Minimum Number	Scenario Number 1	2	3	4
RO	Reactivity	1				
	Normal	1				
	Instrument	2				
	Component	2				
	Major	1				
SRO-I As RO	Reactivity	1				
	Normal	0				
	Instrument	1				
	Component	1				
	Major	1				
SRO-I As SRO	Reactivity	0				
	Normal	1				
	Instrument	1				
	Component	1				
	Major	1				
SRO-U	Reactivity	0	1			
	Normal	1	1			
	Instrument	1	3,4			
	Component	1	2,5,7			
	Major	1	6			

Instructions:

(1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.

(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.

Author: ______________________

Chief Examiner: ______________________

OPERATING TEST NO: 1 SRO-I

Applicant Type		Evolution Type	Minimum Number	Scenario Number 1	2	3	4
RO		Reactivity	1				
		Normal	1				
		Instrument	2				
		Component	2				
		Major	1				
SRO-I	As RO	Reactivity	1	1			
		Normal	0				
		Instrument	1	3			
		Component	1	5			
		Major	1	6			
	As SRO	Reactivity	0		2		
		Normal	1		2,5		
		Instrument	1		3,6		
		Component	1		1,4, 8,9		
		Major	1		7		
SRO-U		Reactivity	0				
		Normal	1				
		Instrument	1				
		Component	1				
		Major	1				

Instructions:
(1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.

Author: ______________________

Chief Examiner: ______________________

OPERATING TEST NO: 1 SRO-U2

Applicant Type		Evolution Type	Minimum Number	Scenario Number 1	2	3	4
RO		Reactivity	1				
		Normal	1				
		Instrument	2				
		Component	2				
		Major	1				
SRO-I	As RO	Reactivity	1				
		Normal	0				
		Instrument	1				
		Component	1				
		Major	1				
	As SRO	Reactivity	0				
		Normal	1				
		Instrument	1				
		Component	1				
		Major	1				
SRO-U		Reactivity	0	1			
		Normal	1	1			
		Instrument	1	3,4			
		Component	1	2,5,7			
		Major	1	6			

Instructions:

(1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.

(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.

Author: ______________________

Chief Examiner: ______________________

OPERATING TEST NO: 1 RCO

Applicant Type	Evolution Type	Minimum Number	Scenario Number 1	2	3	4
RO	Reactivity	1	1			
	Normal	1		2,5		
	Instrument	2	3	6		
	Component	2	5	8		
	Major	1	6	7		
SRO-I As RO	Reactivity	1				
	Normal	0				
	Instrument	1				
	Component	1				
	Major	1				
SRO-I As SRO	Reactivity	0				
	Normal	1				
	Instrument	1				
	Component	1				
	Major	1				
SRO-U	Reactivity	0				
	Normal	1				
	Instrument	1				
	Component	1				
	Major	1				

Instructions

(1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.

(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.4.d) but must be significant per Section C.2.a of Appendix D.

Author: ______________________

Chief Examiner: ______________________

Facility: St. Lucie (00-301) Scenario No.: 1 Op-Test No.: 1
Date of Exam: 2/7-9-00

Objectives: To evaluate the students ability to implement the ONOPs for various instrument and component failures; perform a normal plant power reduction; and to execute the EOPs for a Small Break LOCA combined with a Loss of Offsite Power and subsequent total loss of High Pressure Safety Injection. (Functional Recovery)

Initial Conditions: Unit 2 is at 100% power MOC

Turnover: The plant is operating at 100% power, MOC. The 2B Heater Drain Pump has developed a discharge flange leak and management has made the decision to reduce power to 90% in order to facilitate repairs. 2A Emergency Diesel Generator is out of service for relay replacement, expected back in four hours. 2A Auxiliary Feedwater Pump is out of service for bearing replacement, not expected back this shift. Chemistry reports a .5 GPD tube leak in the 2A Steam Generator. Severe thunderstorms have been forcasted for St. Lucie and Martin counties. Instructions to the shift is to reduce power to 90% and remove the 2B Heater Drain Pump from service.

Preexisting Malfunctions: 2B HPSI pump becomes air bound 10 minutes after SIAS

Event No.	Malf. No.	Event Type*	Event Description
1	0	R-RO N-BOP N-BOP	Power decrease from 100% to 90% Place Pressurizer on Recirc Start Second Charging Pump
2	1	C-BOP C-BOP	DEH power supply failure, turbine control swaps to manual, 2B heater drain pump trips two minutes later
3	2	I-RO	PT-1100X setpoint (selected pressurizer pressure controller) drifts high
4	3	I-BOP	LT-9011(2A steam generator level controller) develops noise signal causing the valve to cut-off feedwater flow
5	4	C-RO	Reference leg for LT-1110X ruptures (common leg failure) Starts RCS leak
6	5	M-RO M-BOP	Small break LOCA, Loss of Offsite Power on reactor trip
7	6	C	2B HPSI pump becomes air bound 10 minutes after SIAS, loss of all High Pressure Safety Injection until vented.

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Facility: St. Lucie (00-301) Scenario No.: 2 Op-Test No.: 1
Date of Exam: 2/7-9-00

Objectives: To evaluate the students ability to implement the ONOPs for various instrument and component failures; perform a normal plant power reduction; and to execute the EOPs for an Excess Steam Demand combined with loss of two of three Auxiliary Feedwater Pumps and total loss of Instrument Air.

Initial Conditions: Unit 2 is at 100% power MOC

Turnover: The plant is operating at 100% power, MOC. The 2B Main Feedwater Pump has developed a crack in an oil line and is leaking approximately .3 GPM. Maintenance is standing by and adding oil as needed. Management is in the process of evaluating the problem and will make a decision within the next hour whether or not to reduce power and repair the leak. 2B Auxiliary Feedwater Pump is out of service for bearing replacement, not expected back this shift. The Steam Jet Air Ejector Radiation Monitor is out of service, not expected back this shift. Chemistry reports a .5 GPD tube leak in the 2A Steam Generator. Severe thunderstorms have been forcasted for St. Lucie and Martin counties. Instructions to the shift are to maintain 100% power.

Preexisting Malfunctions: 2C Auxiliary Feedwater pump trips 10 minutes after AFAS actuation.
HCV-09-1A and HCV-09-1B fail to close on AFAS/MSIS

Event No.	Malf. No.	Event Type*	Event Description
1	1	C-BOP	PCV-8801 (Steam bypass control valve) drifts open
2	0	R-RO N-BOP	Power reduction to 45% Place Pressurizer on Recirc
3	2	C-RO	LCV-2110P)pressurizer level control valve) fails open. V2515 (letdown isolation valve) does not close automatically on high temperature* *(high temperature may not reach setpoint, may be transparent, not counted)
4	3	N-BOP	Restoration of Charging and letdown
5	0	I-RO	HIC-1100 (pressurizer spray controller) input fails high
6	4	I-BOP	PT-10-8 (condenser vacuum pressure transmitter) sensing line failure
7	5	M-RO M-BOP	Reactor trip on loss of vacuum, V-8201 and V-8202 (2A S/G main steam safety valves) stick fully open on the reactor trip
8	6	C	Loss of instrument air on reactor trip. Loss of CCW to RCP's, all must be tripped in 10 minutes
9	7	C	2C Auxiliary Feedwater pump trips 10 minutes after AFAS

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Facility: St. Lucie (00-301) Scenario No.: Backup 3 Op-Test No.: 1
Date of Exam: 2/7-9-00

Objectives: To evaluate the students ability to implement the ONOPs and take manual control of systems due to various instrument and component failures; perform a normal plant power increase; and to execute the EOPs for a Loss of Offsite Power with loss of both Emergency Diesel Generators (Station Blackout)

Initial Conditions: Unit 2 is at 30% power BOC

Turnover: The plant is operating at 30% power, BOC. The unit is returning from a Plant trip four days ago after reaching 100% power. Plant power has just been secured at 300 MW to prepare for placing MSRs inservice. 2A Emergency Diesel Generator has just been taken out of service to replace a defective relay, expected back in four hours. Reactor Reg #2 is out of service, I&C is troubleshooting. Instructions to the shift is to increase power to 100%.

Preexisting Malfunctions: 2B EDG trips 15 minutes after LOOP

Event No.	Malf. No.	Event Type*	Event Description
1	0	R-RO N-BOP	Power increase from 30% to 100% Initiate placing MSR's in service
2	1	I-RO	TE-1111Y (Rx Reg Thot input) fails high
3	2	C-BOP	LCV-9006 (2B 15% bypass valve) drifts open
4	3	I-BOP	FR-8011 (2A steam generator steam flow transmitter) drifts high requiring placing FIC-9011 in Manual to avoid a plant trip
5	4	C-RO	PCV-1100E (Pressurizer spray valve) fails open
6	5	M-RO M-BOP	Loss of offsite power Manually open ADV's, start AFW flow to S/G's
7	6	C	2B EDG trips 15 minutes after LOOP (Station Blackout)
8		N	SBO Crosstie 4.16 KV power with Unit 1

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Facility: St. Lucie
Examination Level (circle one): RO / SRO

Date of Examination: 2/7/00
Operating Test Number: 1

Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	Plant Parameter Verification K2.17 - 3.7 / 4.4	JPM / Perform Estimated Critical Condition Calculation Unit 1
	Overtime Guidelines K2.1.1 - 3.7/3.8	Question 1/ Evaluate Overtime Guidelines
		Question 2/ Minimum level of approval for deviation
A.2	Surveillance Procedures K2.2.12 - 3.0/3.4	JPM / Verify Boric Acid Makeup Tank Operability
A.3	Knowledge of 10 CFR 20 and facility radiation control requirements K2.3.1 - 2.6 / 3.0	Question 1 / Determine Posting Requirements from a Survey
		Question 2 / When an area is posted for Airborne Radioactivity
A.4	Knowledge of the emergency plan K2.4.29 - 2.6/4.0 (RO Only)	JPM / Complete the State of Florida Notification Form
A.4	Knowledge of the Emergency Plan. K2.4.44-2.1/4.0 (SRO Only)	JPM / Determine Protective Action Recommendations

Facility: St. Lucie
Exam Level (circle one): RO / SRO(I) / SRO(U)

Date of Examination: 2/7/00
Operating Test No.: 1

B.1 Control Room Systems

System / JPM Title	Type Code*	Safety Function
a. RPS 012 / Perform a Logic Matrix Test Unit 2 (15 minutes)	M, S, A	07
b. ECCS 006 / Fill a Safety Injection Tank Unit 2 (15 minutes)	N, S	03
c. RHRS 005 / Respond to an "A" SDC Loop Suction Valve Closure while on SDC (20 minutes) (SRO-U)	D, S, L	04P
d. AFW 061 / Manually Actuate AFAS Unit 2 (10 minutes)	D, S, A	04S
e. CRDS 001 / Recover a Slipped CEA Unit 2 (15 minutes) (SRO-U)	N, S, A	01
f. HRPS 028 / Operate the Hydrogen Recombiner Unit 1 (10 minutes)	N, C	05
g. ECCS 006 / Initiate Hot and Cold Leg Injection Unit 1 (20 minutes) (SRO-U)	N, C	02

B.2 Facility Walk-Through

a. HRPS 028 / Hydrogen Purge System Operation Unit 1 (20 Minutes) (SRO-U)	D, R	05
b. SFPCS 033 / Makeup to the Spent Fuel Pool Unit 1 (20 minutes)	N, R	08
c. EDG 064 / Locally Start the 1B EDG During a Station Blackout (15 minutes) (SRO-U)	M, A	06

* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA

ES-401 Facility: St. Lucie	PWR SRO Examination Outline Date of Exam: 2-10-00	Form ES-401-3 Exam Level:SRO

Tier	Group	K/A Category Points											Point Total
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	
1. Emergency & Abnormal Plant Evolutions	1	4	5	2				4	5			4	24
	2	1	2	3				2	4			4	16
	3	1						1				1	3
	Tier Totals	6	7	5				7	9			9	43
2. Plant Systems	1	2	1	2	2	1	2	2	2	2	2	1	19
	2	2	1	2	1	2	1	2	1	2	2	1	17
	3	1		1			1			1			4
	Tier Totals	4	2	5	3	4	4	4	2	5	5	2	40

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	
	5	4	4	4	17

Note:
1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the "Tier Totals" in each K/A category shall not be less than two).
2. Actual point totals must match those specified in the table.
3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.

6.* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.

7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the RO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

ES-401 PWR SRO Examination OutlineForm ES-401-3
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Exam
000001 Continuous Rod Withdrawal / I	X						AK1.20 - Operational implications of Cont. Rod Withdrawal to rod worth	3.3	B
000003 Dropped Control Rod / I		X					AK2.05 - Interrelations between dropped rod and CR power supplies	2.8	B
000005 Inoperable/Stuck Control Rod / I						X	G2.4.11 - Knowledge of abnormal condition procedures	3.6	S
000011 Large Break LOCA / III				X			EA1.03 - Ability to monitor the securing of RCPs as it applies to LBLOCA	4.0	B
000015/17 RCP Malfunctions / IV		X			X		AK2.07-Interrelations between RCP malfunctions and RCP seals AA2.01 - Ability to determine cause of RCP failure	2.9 3.5	B S
BW/E09; CE/A13; W/E09&E10 Natural Circ. / IV			X			X	AK3.2 - Knowledge of Natural Circulation procedures G2.4.6 - Knowledge of symptom based EOP strategies	3.4 4.0	B S
000024 Emergency Boration / I				X			AA1.16 - Ability to monitor Tavg meters during EB	3.2	B
000026 Loss of Component Cooling Water / VIII					X		A2.01 - ability to interpret location of CCW leak	3.5	B
000029 Anticipated Transient w/o Scram / I	X						EK1.01 - Knowledge of operational imlications of reactor nucleonics and thermodynamics during an ATWS	3.1	B
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / IV	X					X	AK1.01 - Operational implications: steam line rupture / PTS G2.4.9 - Knowledge of low power mitigation strategies	4.4 3.9	B S
CE/A11; W/E08 RCS Overcooling - PTS / IV		X					AK1.2 - Knowledge of procedures associated with RCS overcooling	3.3	B
000051 Loss of Condenser Vacuum / IV					X		AA2.02 - Reactor trip requirements due to Loss of Condenser Vacuum	4.1	S
000055 Station Blackout / VI			X				EK3.01 - Length of time for which battery capacity is designed	3.4	B
000057 Loss of Vital AC Elec. Inst. Bus / VI					X		AA2.15 - Ability to determine that a loss of AC has occurred	4.1	S
000062 Loss of Nuclear Service Water / IV				X			AA1.06 - Ability to monitor control of flow rate by components cooled by SWS	2.9	B
000067 Plant Fire On-site / IX						X	G2.4.27 - Knowledge of Fire in the Plant procedures	3.5	B
000068 (BW/A06) Control Room Evac. / VIII				X			AA1.28 - Ability to monitor pressurizer pressure during control room evac.	4.0	B
000069 (W/E14) Loss of CTMT Integrity / V		X					AK2.03 - Knowledge of interrelations between loss of integrity and containment airlocks	2.9	B
000074 (W/E06&E07) Inad. Core Cooling / IV	X						EK1.03 - Knowledge of processes of removing decay heat from the core.	4.9	B
000076 High Reactor Coolant Activity / IX		X			X		AK2.01 - Knowledge of interrelations between high RCS activity and process monitors AA2.02 - Ability to determine corrective actions required for high activity	3.0 3.4	B S
K/A Category Totals:	4	5	2	4	5	4	Group Point Total:		24

ES-401 PWR SRO Examination Outline Form ES-401-3
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Exam
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / I				X			EA1.3 - ability to monitor desired operating results as they apply to RTR	3.8	B
000008 Pressurizer Vapor Space Accident / III					X		AA2.14 - ability to monitor RCS saturation monitor during vapor space accident	4.4	S
000009 Small Break LOCA / III						X	G2.4.21 - Knowledge of parameters and logic used to assess safety functions	4.3	S
000022 Loss of Reactor Coolant Makeup / II			X				AK3.02 - Knowledge of actions contained in EOP for loss of charging	3.8	B
000025 Loss of RHR System / IV		X					AK2.02 - Knowledge of interrelation between loss of RHR and LPSI pump	3.2	B
000027 Pressurizer Pressure Control System Malfunction / III					X		AA2.10 - Ability to interpret PZR heater de-energized condition	3.6	S
000032 Loss of Source Range NI / VII		X					Ak2.01 - Knowledge of power supplies at it applies to loss of SR NI	3.1	B
000033 Loss of Intermediate Range NI / VII									
000037 Steam Generator Tube Leak / III			X				AK3.08 - Knowledge of the reason for securing RCPs during a SGTL	4.3	B
000038 Steam Generator Tube Rupture / III				X			EA1.39 - Ability to operate feed and bleed as it applies to SGTR	3.7	B
000054 (CE/E06) Loss of Main Feedwater / IV						X	G2.4.6 - Knowledge of symptom based EOP strategies	4.0	S
000058 Loss of DC Power / VI						X	G2.4.18 - Knowledge of the specific bases for EOPs	3.6	B
000060 Accidental Gaseous Radwaste Rel. / IX					X		AA2.05 - Automatic safety actions have occurred as a result of a high ARM signal	4.2	S
000061 ARM System Alarms / VII	X						AK1.01 - Knowledge of detector limitations	2.9	B
000065 Loss of Instrument Air / VIII					X		AA2.01 - Ability to interpret cause and effect of I/A low pressure alarm	3.2	S
CE/E09 Functional Recovery			X			X	EA2.2 - Facilities heat removal systems during FR G2.4.22 - Knowledge of prioritizing safety functions during emergency ops	4.2 4.0	B S
K/A Category Point Totals:	1	2	3	2	4	4	Group Point Total:		16

ES-401 PWR SRO Examination OutlineForm ES-401-3
Emergency and Abnormal Plant Evolutions - Tier 1/Group 3

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Exam
000028 Pressurizer Level Malfunction / II	X						AK1.01 - Knowledge of operational implications of PZR reference leak abnormalities	3.1	B
000036 (BW/A08) Fuel Handling Accident / VIII									
000056 Loss of Off-site Power / VI				X			AA1.10 - Ability to monitor motor driven AFW pumps during Loss of Offsite Power	4.3	B
CE/A16 Excess RCS Leakage / II						X	G2.1.12 - Ability to apply Tech Specs for a system	4.0	S
K/A Category Point Totals:	1			1		1	Group Point Total:		3

ES-401 PWR SRO Examination OutlineForm ES-401-3
Plant Systems - Tier 2/Group 1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Exam
001 Control Rod Drive						X						K6.03 - Knowledge of effect of loss of TCBs	4.2	B
003 Reactor Coolant Pump		X										K2.01 - Knowledge of RCP power supplies	3.1	B
004 Chemical and Volume Control			X									K3.07 - Knowledge of CVCS malfunction effect on PZR level and pressure	4.1	B
013 Engineered Safety Features Actuation				X						X		K4.05 - Knowledge of spray actuation reset A4.03 - Ability to monitor ESFAS initiation	4.2 4.7	B B
014 Rod Position Indication								X				A2.02 – Loss of power to the RPSI	3.6	S
015 Nuclear Instrumentation					X				X			K5.19 - Operational implications / NIs and heat balance A3.02 - Ability to monitor annunciator and alarm signals	3.2 3.9	B B
017 In-core Temperature Monitor						X						K6.01 - Knowledge of effect of sensor or detector malfunction	3.0	B
022 Containment Cooling							X					A1.01 - ability to monitor changes in containment temperature associated with operation of CCS	3.7	B
026 Containment Spray								X				A2.08 – Safe securing of containment spray when it can be done	3.7	S
056 Condensate											X	G2.1.12 - Ability to apply Tech Specs to systems	4.0	B
059 Main Feedwater				X					X			K4.18 - Knowledge of automatic reduction of FW on plant trip A3.06 - Ability to monitor feedwater isolation	3.0 3.3	B B
061 Auxiliary/Emergency Feedwater							X					A1.01 - Ability to predict changes in S/G levels	4.2	B
063 DC Electrical Distribution	X											K1-03 – Battery charger and battery	3.5	S
068 Liquid Radwaste	X											K1.07 - Knowledge of sources liquid wastes to LRS	2.9	B
071 Waste Gas Disposal			X									K3.04 - Knowledge of loss or malfunction of WGS will have on ventilation systems	2.9	B
072 Area Radiation Monitoring										X		A4.03 - Ability to operate check source for operability	3.1	B
K/A Category Point Totals:	2	1	2	2	1	2	2	2	2	2	1	Group Point Total:		19

ES-401 PWR SRO Examination OutlineForm ES-401-3
Plant Systems - Tier 2/Group 2

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Exam
002 Reactor Coolant									X			A3.01 - Ability to monitor auto operation of RCS leakage detection system	3.9	B
006 Emergency Core Cooling										X		A4.07- Ability to manually operate ECCS pumps and valves	4.4	B
010 Pressurizer Pressure Control							X					A1.01 - Ability to predict changes in RCS and PZR boron conc. when operating PCS	2.9	B
011 Pressurizer Level Control						X						K6.03 - Knowledge of relationship between PZR level and heater control circuit	3.3	B
012 Reactor Protection					X							K5.02 - Knowledge of operational implications of power density	3.3	B
027 Containment Iodine Removal											X	G2.1.12 – Ability to Apply TS to a system	4.0	S
028 Hydrogen Recombiner and Purge Control					X							K5.03 - Knowledge / sources of H2 in containment	3.6	B
029 Containment Purge	X											K1.03 - Knowledge of relationship between CPS and Engineered Safeguards	3.8	B
033 Spent Fuel Pool Cooling	X											K1.02 - Knowledge of relationship between RHRS and SFPCS	2.7	B
035 Steam Generator								X				A2.01 - Ability to predict impacts and mitigate consequences of faulted steam generators	4.6	S
039 Main and Reheat Steam			X									K3.05 - Knowledge /MRSS malfunction on RCS	3.7	B
055 Condenser Air Removal			X									K3.01 - Knowledge / loss of CARS on condenser	2.7	B
062 AC Electrical Distribution				X								K4.04 - Knowledge / DC bus designed trips	2.9	B
064 Emergency Diesel Generator							X					A1.08 - Ability / maintain minimum load on EDG to prevent motoring	3.4	B
073 Process Radiation Monitoring										X		A4.01 - Ability / monitor effluent release	3.9	B
075 Circulating Water		X										K2.03 - Knowledge / bus power supplies to SWS	2.7	B
079 Station Air														
086 Fire Protection									X			A3.02 - Ability / monitor actuation of FPS	3.3	B
103 Containment														
K/A Category Point Totals:	2	1	2	1	2	1	2	1	2	2	1	Group Point Total:		17

ES-401 PWR SRO Examination OutlineForm ES-401-3
Plant Systems - Tier 2/Group 3

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Exam
005 Residual Heat Removal	X											K1.04 - Knowledge / Interrelations between RHRS and CVCS	3.1	B
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water			X									K3.03 - Knowledge / loss of CCW effect on RCPs	4.2	B
041 Steam Dump/Turbine Bypass Control						X						K6.03 - Knowledge / controllers and positioners	2.9	B
045 Main Turbine Generator														
076 Service Water									X			A3.02 - Ability / monitor auto operation of SWS regarding emergency heat loads	3.7	B
078 Instrument Air														
K/A Category Point Totals:	1		1			1			1			Group Point Total:		4

ES-401 Facility: St. Lucie	Generic Knowledge and Abilities Outline (Tier 3) Date of Exam: 2-10-99 Exam Level: SRO	Form ES-401-5

Category	K/A #	Topic	Imp.	Exam
Conduct of Operations	2.1.13	Knowledge of facility requirements for controlling vital access	2.9	S
	2.1.22	Ability to determine Mode of Operation	3.3	S
	2.1.12	Ability to apply Technical specifications to a system	4.0	S
	2.1.29	Knowledge of how to conduct and verify valve lineups	3.3	B
	2.1.3	Knowledge of Shift Turnover practices	3.4	B
	Total			
Equipment Control	2.2.17	Knowledge of the process of managing maintenance activities	3.5	S
	2.2.11	Knowledge of the process for controlling temporary changes	3.4	S
	2.2.3	Knowledge between differences in Units	3.3	B
	2.2.12	Knowledge of surveillance procedures	3.4	B
	Total			
Radiation Control	2.3.2	Knowledge of facility ALARA program	2.9	B
	2.3.1	Knowledge of 10CFR20 and related facility requirements	3.0	S
	2.3.4	Knowledge of exposure limits	3.1	B
	2.3.1	Knowledge of 10CFR20 and related facility requirements	3.0	B
	Total			
Emergency Procedures and Plan	2.4.26	Knowledge of facility fire protection requirements (fire brigade)	3.3	S
	2.4.41	Knowledge of the EAL thresholds and classifications	4.1	S
	2.4.3	Ability to identify post-accident instrumentation	3.8	B
	2.4.19	Knowledge of EOP layout, symbols and icons	3.7	B
	Total			17
Tier 1 Target Point Total (RO/SRO)				13/17

Facility: St. Lucie Date of Exam: 2-10-00 Exam Level: RO

Tier	Group	K/A Category Points K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Point Total
1. Emergency & Abnormal Plant Evolutions	1	2	4	3				3	2			2	16
	2	3	3	3				3	3			2	17
	3	1						1				1	3
	Tier Totals	6	7	6				7	5			5	36
2. Plant Systems	1	3	2	2	2	3	2	2	1	2	3	1	23
	2	2	2	2	2	1	1	2	2	2	2	2	20
	3	1		1		1	1		1	1	1	1	8
	Tier Totals	6	4	5	4	5	4	4	4	5	6	4	51

3. Generic Knowledge and Abilities	Cat 1	Cat 2	Cat 3	Cat 4	13
	4	3	3	3	

Note:
1. Ensure that at least two topics from every K/A category are sampled within each tier (i.e., the Tier Totals in each K/A category shall not be less than two).
2. Actual point totals must match those specified in the table.
3. Select topics from many systems; avoid selecting more than two or three K/A topics from a given system unless they relate to plant-specific priorities.
4. Systems/evolutions within each group are identified on the associated outline.
5. The shaded areas are not applicable to the category/tier.
6.* The generic K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.
7. On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings for the RO license level, and the point totals for each system and category. K/As below 2.5 should be justified on the basis of plant-specific priorities. Enter the tier totals for each category in the table above.

ES-401 PWR RO Examination OutlineForm ES-401-4
Emergency and Abnormal Plant Evolutions - Tier 1/Group 1

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Exam
000005 Inoperable/Stuck Control Rod / I									
000015/17 RCP Malfunctions / IV		X					K2.07 - Interrelations between RCP malfunctions and RCP seals	2.9	B
BW/E09; CE/A13; W/E09&E10 Natural Circ. / IV			X				AK3.2 - Knowledge of Natural Circulation procedures	2.9	B
000024 Emergency Boration / I				X			AA1.16 - Ability to monitor Tavg meters during EB	3.3	B
000026 Loss of Component Cooling Water / VIII					X		A2.01 - ability to interpret location of CCW leak	2.9	R
000027 Pressurizer Pressure Control System Malfunction / III						X	G2.1.28 - Knowledge of the purpose and function of major system controls	3.2	R
000040 (BW/E05; CE/E05; W/E12) Steam Line Rupture - Excessive Heat Transfer / IV	X						AK1.01 - Operational implications: steam line rupture / PTS	4.1	B
CE/A11; W/E08 RCS Overcooling - PTS / IV		X					AK1.2 - Knowledge of procedures associated with RCS overcooling	3.0	B
000051 Loss of Condenser Vacuum / IV			X				K3.01 - Knowledge of loss of steam dump capability on loss of vacuum	2.8	R
000055 Station Blackout / VI			X				EK3.01 - Length of time for which battery capacity is designed	2.7	B
000057 Loss of Vital AC Elec. Inst. Bus / VI					X		AA2.19 - Auto actions that occur on loss of electrical bus	4.0	R
000062 Loss of Nuclear Service Water / IV				X			AA1.06 - Ability to monitor control of flow rate by components cooled by SWS	2.9	B
000067 Plant Fire On-site / IX						X	G2.4.27 - Knowledge of Fire in the Plant procedures		R
000068 (BW/A06) Control Room Evac. / VIII				X			AA1.28 - Ability to monitor pressurizer pressure during control room evac.	3.8	B
000069 (W/E14) Loss of CTMT Integrity / V		X					AK2.03 - Knowledge of interrelations between loss of integrity and containment airlocks	2.8	B
000074 (W/E06&E07) Inad. Core Cooling / IV	X						EK1.03 - Knowledge of processes of removing decay heat from the core.	4.5	B
000076 High Reactor Coolant Activity / IX		X					AK2.01 - Knowledge of interrelations between high RCS activity and process monitors	2.6	B
K/A Category Totals:	2	4	3	3	2	2	Group Point Total:		16

ES-401 PWR RO Examination OutlineForm ES-401-4
Emergency and Abnormal Plant Evolutions - Tier 1/Group 2

E/APE # / Name / Safety Function	K1	K2	K3	A1	A2	G	K/A Topic(s)	Imp.	Exam
000001 Continuous Rod Withdrawal / I	X						AK1.20 - Operational implications of Cont. Rod Withdrawal to rod worth	3.1	B
000003 Dropped Control Rod / I		X					AK2.05 - Interrelations between dropped rod and CR power supplies	2.5	B
000007 (BW/E02&E10; CE/E02) Reactor Trip - Stabilization - Recovery / I				X			EA1.3 - ability to monitor desired operating results as they apply to RTR	3.3	B
000008 Pressurizer Vapor Space Accident / III						X	GG2.4.4 - Ability to recognize entry conditions to ONPs and EOPs	4.0	R
000009 Small Break LOCA / III					X		EA2.02 - Ability to interpret possible leak paths as they apply to SBLOCA	3.5	R
000011 Large Break LOCA / III				X			EA1.03 - Ability to monitor the securing of RCPs as it applies to LBLOCA	4.0	B
000022 Loss of Reactor Coolant Makeup / II			X				AK3.02 - Knowledge of actions contained in EOP for loss of charging	3.5	B
000025 Loss of RHR System / IV		X					AK2.02 - Knowledge of interrelation between loss of RHR and LPSI pump	3.2	B
000029 Anticipated Transient w/o Scram / I	X						EK1.01 - Knowledge of operational imlications of reactor nucleonics and thermodynamics during an ATWS	2.8	B
000032 Loss of Source Range NI / VII		X					Ak2.01 - Knowledge of power supplies at it applies to loss of SR NI	2.7	B
000037 Steam Generator Tube Leak / III			X				AK3.08 - Knowledge of the reason for securing RCPs during a SGTL	4.1	B
000038 Steam Generator Tube Rupture / III				X			EA1.39 - Ability to operate feed and bleed as it applies to SGTR	3.6	B
000054 (CE/E06) Loss of Main Feedwater / IV					X		AA2.01 - Ability to determine reactor trip in regard to loss of MFW	4.3	R
000058 Loss of DC Power / VI						X	G2.4.18 - Knowledge of the specific bases for EOPs	2.7	B
000059 Accidental Liquid RadWaste Rel. / IX					X		AA2.05 - Ability to monitor auto actions as a result of high PRM alarm	3.6	R
000060 Accidental Gaseous Radwaste Rel. / IX									
000061 ARM System Alarms / VII	X						AK1.01 - Knowledge of detector limitations	2.5	B
CE/E09 Functional Recovery			X				EA2.2 - Facilities heat removal systems during FR	3.7	B
K/A Category Point Totals:	3	3	3	3	3	2	Group Point Total:		17

ES-401 PWR RO Examination OutlineForm ES-401-4
Emergency and Abnormal Plant Evolutions - Tier 1/Group 3

E/APE # / Name / Safety Function	K 1	K 2	K 3	A 1	A 2	G	K/A Topic(s)	Imp.	Exam
000028 Pressurizer Level Malfunction / II	X						AK1.01 - Knowledge of operational implications of PZR reference leak abnormalities	2.8	B
000036 (BW/A08) Fuel Handling Accident / VIII									
000056 Loss of Off-site Power / VI				X			AA1.10 - Ability to monitor motor driven AFW pumps during Loss of Offsite Power	4.3	B
000065 Loss of Instrument Air / VIII									
CE/A16 Excess RCS Leakage / II						X	G2.2.12 - Knowledge of surveillance procedures	3.0	R
K/A Category Point Totals:	1			1		1	Group Point Total:		3

ES-401 PWR RO Examination OutlineForm ES-401-4
Plant Systems - Tier 2/Group 1

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp	exam
001 Control Rod Drive	X					X						K1.05 - CRDS interface with NIs and RPS K6.03 - Knowledge of effect of loss of TCBs	3.2 3.7	R B
003 Reactor Coolant Pump		X			X							K2.01 - Knowledge of RCP power supplies K5.01 - Relationship of RCS flow rate and core operating parameters	3.1 3.3	B R
004 Chemical and Volume Control			X							X		K3.07 - Knowledge of CVCS malfunction effect on PZR level and pressure A4.04 - Ability / calculation of boron concentration change	3.8 3.2	B R
013 Engineered Safety Features Actuation				X						X		K4.05 - Knowledge of spray actuation reset A4.03 - Ability to monitor ESFAS initiation	4.0 4.5	B B
015 Nuclear Instrumentation					X				X			K5.19 - Operational implications / NIs and heat balance A3.02 - Ability to monitor annunciator and alarm signals	2.9 3.7	B B
017 In-core Temperature Monitor						X		X				K6.01 - Knowledge of effect of sensor or detector malfunction A2.02 - Ability to predict core damage (ICM)	2.7 3.6	B R
022 Containment Cooling		X					X					A1.01 - ability to monitor changes in containment temperature associated with operation of CCS K2.01 - Knowledge of power supply to coolers	3.6 3.0	B R
056 Condensate	X										X	K1.03 - Knowledge of interrelations with MFW G2.1.12 - Ability to apply Tech Specs to systems	2.6 2.9	R B
059 Main Feedwater				X					X			K4.18 - Knowledge of automatic reduction of FW on plant trip A3.06 - Ability to monitor feedwater isolation	2.8 3.2	B B
061 Auxiliary/Emergency Feedwater					X		X					K5.05 - Knowledge of implications of water hammer A1.01 - Ability to predict changes in S/G levels	2.7 3.9	R B
068 Liquid Radwaste	X											K1.07 - Knowledge of sources liquid wastes to LRS	2.7	B
071 Waste Gas Disposal			X									K3.04 - Knowledge of loss or malfunction of WGS will have on ventilation systems	2.7	B
072 Area Radiation Monitoring										X		A4.03 - Ability to operate check source for operability	3.1	B
K/A Category Point Totals:	3	2	2	2	3	2	2	1	2	3	1	Group Point Total:		23

ES-401 PWR RO Examination OutlineForm ES-401-4
Plant Systems - Tier 2/Group 2

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp	exam
002 Reactor Coolant									X		X	A3.01 - Ability to monitor auto operation of RCS leakage detection system G2.1.12 - Ability to apply TS to a system	3.7 2.9	B R
006 Emergency Core Cooling										X		A4.07- Ability to manually operate ECCS pumps and valves	4.4	B
010 Pressurizer Pressure Control							X					A1.01 - Ability to predict changes in RCS and PZR boron conc. when operating PCS	2.8	B
011 Pressurizer Level Control						X						K6.03 - Knowledge of relationship between PZR level and heater control circuit	2.9	B
012 Reactor Protection					X							K5.02 - Knowledge of operational implications of power density	3.1	B
014 Rod Position Indication				X								K4.05 - Knowledge of rod block interlocks	3.1	R
026 Containment Spray		X										K2.01 - Knowledge of power supplies to CSS	3.4	R
029 Containment Purge	X											K1.03 - Knowledge of relationship between CPS and Engineered Safeguards	3.6	B
033 Spent Fuel Pool Cooling	X											K1.02 - Knowledge of relationship between RHRS and SFPCS	2.5	B
035 Steam Generator											X	G2.4.24 - Knowledge /loss of CW procedures	3.3	R
039 Main and Reheat Steam			X									K3.05 - Knowledge /MRSS malfunction on RCS	3.6	B
055 Condenser Air Removal			X									K3.01 - Knowledge / loss of CARS on condenser	2.5	B
062 AC Electrical Distribution								X				A2.04 - Ability /impact of deenergizing a bus	3.1	R
063 DC Electrical Distribution				X								K4.04 - Knowledge / DC bus designed trips	2.6	B
064 Emergency Diesel Generator							X					A1.08 - Ability / maintain minimum load on EDG to prevent motoring	3.1	B
073 Process Radiation Monitoring										X		A4.01 - Ability / monitor effluent release	3.9	B
075 Circulating Water		X										K2.03 - Knowledge / bus power supplies to SWS	2.6	B
079 Station Air								X				A2.01 - Ability / predict impacts of crosstie to IA	2.9	R
086 Fire Protection									X			A3.02 - Ability / monitor actuation of FPS	2.9	B
K/A Category Point Totals:	2	2	2	2	1	1	2	2	2	2	2	Group Point Total:		20

ES-401 PWR RO Examination OutlineForm ES-401-4
Plant Systems - Tier 2/Group 3

System # / Name	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	G	K/A Topic(s)	Imp.	Exam
005 Residual Heat Removal	X											K1.04 - Knowledge / Interrelations between RHRS and CVCS	2.9	B
007 Pressurizer Relief/Quench Tank														
008 Component Cooling Water			X									K3.03 - Knowledge / loss of CCW effect on RCPs	4.1	B
027 Containment Iodine Removal					X							K5.03 - Knowledge / sources of H2 in containment	2.9	B
028 Hydrogen Recombiner and Purge Control														
034 Fuel Handling Equipment														
041 Steam Dump/Turbine Bypass Control						X						K6.03 - Knowledge / controllers and positioners	2.7	B
045 Main Turbine Generator								X				A2.17 - Ability / predict impacts of DEH malfunction	2.7	R
076 Service Water									X			A3.02 - Ability / monitor auto operation of SWS regarding emergency heat loads	3.7	B
078 Instrument Air										X		A4.01 - Ability to monitor instrument air in the control room	3.1	R
103 Containment											X	G2.1.7 - ability to make operational judgements based on operating characteristics and instrument interpretation	3.7	R
K/A Category Point Totals:	1		1		1	1		1	1	1	1	Group Point Total:		8

Facility: St. Lucie Date of Exam: 2-10-00 Exam Level: RO

Category	K/A #	Topic	Imp.	Exam
Conduct of Operations	2.1.1	Knowledge of Conduct of Operations	3.7	R
	2.1.29	Knowledge of how to conduct and verify valve lineups	3.4	B
	2.1.3	Knowledge of Shift Turnover practices	3.0	R
	2.1.3	Knowledge of Shift Turnover practices	3.0	B
	Total			
Equipment Control	2.2.3	Knowledge between differences in Units	3.1	B
	2.2.13	Knowledge of clearance and tagging procedures	3.6	R
	2.2.12	Knowledge of surveillance procedures	3.0	B
	Total			
Radiation Control	2.3.4	Knowledge of exposure limits	2.5	B
	2.3.1	Knowledge of 10 CFR 20 and facility related requirements	2.6	B
	2.3.2	Knowledge of facility ALARA program	2.5	B
	Total			
Emergency Procedures and Plan	2.4.3	Ability to identify post-accident instrumentation	3.5	B
	2.4.19	Knowledge of EOP layout, symbols and icons	2.7	B
	2.4.29	Knowledge of the emergency plan	2.6	R
	Total			13
Tier 1 Target Point Total (RO/SRO)				13/17

INITIAL SUBMITTAL

ST. LUCIE EXAM 2000-301
50-335/2000-301 & 50-389/2000-301

FEBRUARY 7 - 11, 2000

INITIAL SUBMITTAL JPMS

ADMINISTRATIVE JPMs/QUESTIONS
SIMULATOR JPMs
IN-PLANT JPMs

St. Lucie Plant USNRC Initial License Exam

Administrative JPM's/Questions

Simulator JPM's

In-Plant JPM's

Facility: St. Lucie 00-301
Examination Level (circle one): RO / SRO

Date of Examination: 2/7-9-00
Operating Test Number: 1

Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	Plant Parameter Verification K2.17 - 3.7 / 4.4	JPM / Perform Estimated Critical Condition Calculation Unit 1
	Overtime Guidelines K2.1.1 - 3.7/3.8	Question 1/ Evaluate Overtime Guidelines
		Question 2/ Minimum level of approval for deviation
A.2	Surveillance Procedures K2.2.12 - 3.0/3.4	JPM / Verify Boric Acid Makeup Tank Operability
A.3	Knowledge of 10 CFR 20 and facility radiation control requirements K2.3.1 - 2.6 / 3.0	Question 1 / Determine Posting Requirements from a Survey
		Question 2 / When an area is posted for Airborne Radioactivity
A.4	Knowledge of the emergency plan K2.4.29 - 2.6/4.0	JPM / Complete the State of Florida Notification Form
A.4	Knowledge of the Emergency Plan. K2.4.44-2.1/4.0 (SRO Only)	JPM / Determine Protective Action Recommendations

Facility: St. Lucie
Exam Level (circle one): RO / SRO(I) / SRO(U)

Date of Examination: 2/7-9-00
Operating Test No.: 1

B.1 Control Room Systems

System / JPM Title	Type Code*	Safety Function
a. RPS 012 / Perform a Logic Matrix Test Unit 2 (15 minutes)	M, S, A	07
b. ECCS 006 / Fill a Safety Injection Tank Unit 2 (15 minutes)	N, S	03
c. RHRS 005 / Respond to an "A" SDC Loop Suction Valve Closure while on SDC (20 minutes) (SRO-U)	D, S, L	04P
d. AFW 061 / Manually Actuate AFAS Unit 2 (10 minutes)	D, S, A	04S
e. CRDS 001 / Recover a Slipped CEA Unit 2 (15 minutes) (SRO-U)	N, S, A	01
f. HRPS 028 / Operate the Hydrogen Recombiner Unit 1 (10 minutes)	N, C	05
g. ECCS 006 / Initiate Hot and Cold Leg Injection Unit 1 (20 minutes) (SRO-U)	N, C	02

B.2 Facility Walk-Through

a. CONTAINMENT 103 / Reopen Primary Sample Valves U-2 (15 Minutes) (SRO-U) **OR** CONTAINMENT103 / Restore CCW to RCP's U-1 (10 Minutes) (SRO-U)	D, R	05
b. SFPCS 033 / Makeup to the Spent Fuel Pool Unit 1 (20 minutes)	N, R	08
c. EDG 064 / Locally Start the 1B EDG During a Station Blackout (15 minutes) (SRO-U)	M, A	06

* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA

REGION II
INITIAL LICENSE EXAMINATION
ADMINISTRATIVE
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

PERFORM AN ECC UNIT 1

CANDIDATE ____

EXAMINER ____

REGION II
INITIAL LICENSE EXAMINATION
ADMINISTRATIVE
JOB PERFORMANCE MEASURE
ST LUCIE NUCLEAR PLANT

KA Statement: Ability to evaluate plant performance and make operational judgements based on operating characteristics, reactor behavior and instrument interpretation

KA #: K2.1.7 - 3.7 / 4.4

Facility JPM #: New

Task Standard: Using the conditions provided, perform an Estimated Critical Condition calculation

Preferred Evaluation Location:

Simulator ______ Control Room __X__ NTC __X__

Preferred Evaluation Method:

Perform __X__ Simulate ____

References: NOP-1-0030122, "Reactor Startup", Appendix C, St. Lucie Unit 1 Plant Physics Curves

Validation Time __20 minutes__

Candidate: ____________________________ Time Start ________
Name Time Finish ________

Performance Rating: Sat ______ Unsat ______

Examiner: ________________________ **Signature:** __________________
Name

Reference Material Needed:

ECC worksheet, St. Lucie Unit 1 Plant Physics Curves

Read to Candidate

Directions to candidate for Administrative JPMs:

I will explain the initial conditions and state the task to be performed. You will be allowed the use of any reference needed to complete the task. Ensure you indicate to me when you finish your assigned task by returning the material needed for the task that I provided you.

Initial Conditions: Unit 1 is in hot standby (NOT/NOP) at 1000 EFPH. The reactor tripped from 100% power, ARO, 14 hours ago. Boron concentration at the time of the trip was 997 ppm, present boron concentration is 1040 ppm.

Initiating Cues: The ANPS has directed you to perform an ECC for a reactor startup that will take place in 4 hours. (Assume 60" on Group 7)

CANDIDATE CUE SHEET

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

Unit 1 is in hot standby (NOT/NOP) at 1000 EFPH. The reactor tripped from 100% power, ARO, 14 hours ago. Boron concentration at the time of the trip was 997 ppm, present boron concentration is 1040 ppm.

INITIATING CUE:

The ANPS has directed you to perform an ECC for a reactor startup that will take place in 4 hours. (Assume 60" on Group 7)

Answer Key

	Column 1 values	Column 2 values	Difference
Power Defect	1390 PCM	N/A	+1390 PCM
Xenon Worth	2427 PCM	2703 PCM	-276 PCM
Sam/Nep Worth	754 PCM	770 PCM	-16 PCM
Boron Worth	8514 PCM	8881 PCM	367 PCM
CEA Reactivity	8139 PCM	7292 PCM	- 347 PCM
Net Reactivity			+384 PCM
Total Change in Boron			+45 PPM
ECC Boron Concentration			+1085 PPM

CEA position at -1000 PCM (mode 2 entry)	30" on group 5
CEA position at +500 PCM	137' on group 7 (ARO)
CEA position at -500 PCM	60" on group 6

APPENDIX C
ESTIMATED CRITICAL CONDITIONS AND INVERSE COUNT RATE RATIO
(Page 8 of 9)

ECC CALCULATION WORKSHEET

Unit No.: ________ Startup No.: ________ Date of ECC: ___/___/___ Exposure: ________ EFPH

PARAMETER	COLUMN 1 CONDITIONS PRIOR TO SHUTDOWN TIME 1: Date:___/___/___ Time:________		COLUMN 2 ESTIMATED CRITICAL CONDITIONS TIME 2: Date:___/___/___ Time:________		Difference (PCM)	Sign Determination
POWER DEFECT	At __% power Figure A.1	____ PCM	N/A	N/A	(+)____ PCM	(+) Always
Xenon Worth	From DDPS PID 746 or Figure A.4	____ PCM	From Figure A.4 or as provided by R.E.	____ PCM	( )____ PCM	(+) If Column 1 is greater than Column 2 (-) If Column 1 is less than Column 2
Samarium and Neptunium Worth	From Figure A.5	____ PCM	From Figure A.5 or as provided by R.E.	____ PCM	( )____ PCM	
Boron Worth (Note 1)	____PPM times ____Boron Worth From Figure A.8	____ PCM	Present Boron Conc ____ PPM times ____ Boron Worth From Figure A.8	____ PCM	( )____ PCM	
CEA Reactivity Worth	Group___withdraw to___inches Use Figure A.6 or A.7	____ PCM	Group___ withdrawn to ____ inches Use Figure A.6 or A.7 (Note 2)	____ PCM	( )____ PCM	(-) If Column 1 is greater than Column 2 (+) If Column 1 is less than Column 2
Net Reactivity	Total up the reactivities in the Difference column and enter the value here. Observe signs. →				( )____ PCM	
Total Change in Boron	$\frac{\text{Net Reactivity}}{\text{Col. 2 Boron Worth}} = \frac{(\ )\ (PCM)}{(PCM/PPM)}$ →				( )____ PPM	If sign is +, Borate If sign is -, Dilute
Estimated Critical Boron Concentration	$\frac{}{\text{Present RCS Boron}} + \frac{(\ )}{(\text{Total Change in Boron})}$ →				( )____ PPM	(Note 3)

CEA Position at -1000 PCM from ECC = _____ Inches withdrawn on Group _____ Startup (Mode 2) entry point
CEA Position at +500 PCM from ECC = _____ Inches withdrawn on Group _____
CEA Position at -500 PCM from ECC = _____ Inches withdrawn on Group _____

APPENDIX C
ESTIMATED CRITICAL CONDITIONS AND INVERSE COUNT RATE RATIO
(Page 9 of 9)

ECC CALCULATION WORKSHEET
(continued)

NOTES:

1. If the difference in time between when the boron sample was drawn and the time of shutdown exceeds 24 hours, contact Reactor Engineering.

2. The critical CEA position has been verified to be above PDIL (COLR Figure 3.1-2, Plant Physics Curve Book, Appendix E)______(initials).

3. The ECC Boron Concentration must meet or exceed the boron concentration requirements for shutdown margin with CEAs at Column 2 position in accordance with 1-NOP-100.04, "Surveillance Requirements for Shutdown Margin, Modes 2, 3, 4 and 5, Subcritical." /R12B

Prepared by: ______________________
RCO

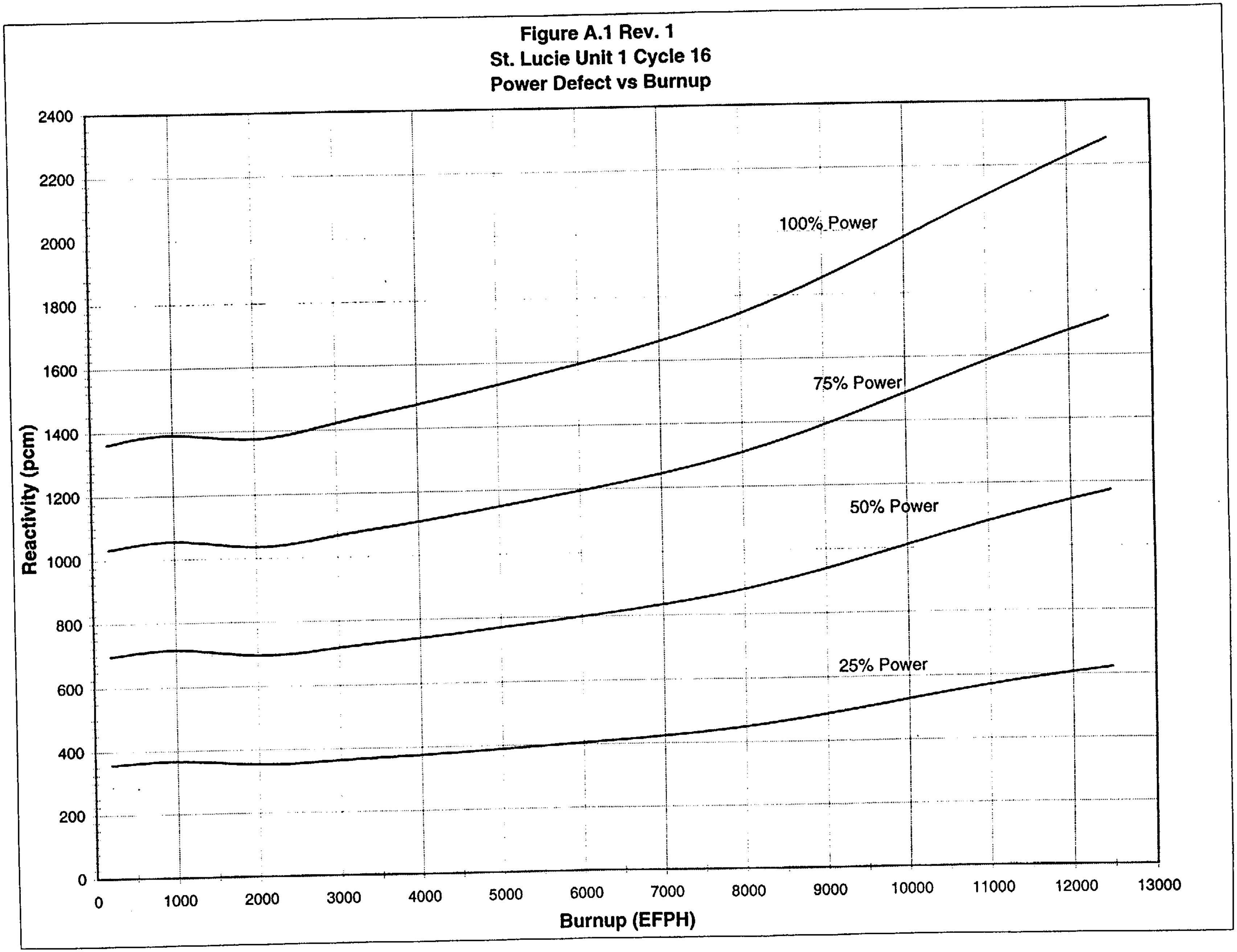
Independently Verified by: ______________________
Reactor Engineering

Reviewed by: ______________________
Reactivity Manager

Approved by: ______________________
NPS or ANPS

ACTUAL CRITICAL CONDITIONS	
Date of Criticality	___/___/___
Time (24 hour clock)	______
CEA Group/Position (inches)	___/___
RCS Boron Concentration (PPM)	______
Xenon Worth (PID 746 or Fig A.4)	______
T-avg (°F)	______
Reactor Power (%)	______

END OF APPENDIX C



Date Of Update
10/ 7 / 99

References: PSL-1FJF-99-122 Rev. 0 Attach. 1 Page 1
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 2

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Figure A.1

Rev. 1 Page 1 of 5

St. Lucie Unit 1 Cycle 16

Power Defect vs Burnup

HOURS	100%	75%	50%	25%
200	1362	1033	699	358
300	1367	1036	702	359
400	1372	1040	705	360
500	1378	1045	708	362
600	1382	1049	711	364
700	1385	1052	713	365
800	1388	1054	715	366
900	1389	1055	716	367
1000	1390	1056	716	367
1100	1389	1055	716	366
1200	1387	1054	714	365
1300	1385	1051	712	364
1400	1383	1049	710	362
1500	1381	1046	707	360
1600	1378	1043	704	358
1700	1376	1040	701	357
1800	1375	1038	699	355
1900	1374	1036	697	354
2000	1374	1036	696	353
2100	1376	1036	696	353
2200	1378	1037	697	353
2300	1382	1039	698	353
2400	1386	1042	700	354
2500	1391	1046	702	355
2600	1397	1050	705	357
2700	1402	1054	708	358
2800	1408	1059	711	360
2900	1414	1063	714	361

References: PSL-1FJF-99-122 Rev. 1 Attach. 1 Page 2
PSL-ENG-SEFJ-99-014 Rev. 1 Attach. 1 Page 3

Figure A.1

St. Lucie Unit 1 Cycle 16

Power Defect vs Burnup

HOURS	100%	75%	50%	25%
3000	1421	1068	717	363
3100	1426	1072	720	364
3200	1432	1076	722	366
3300	1438	1080	725	367
3400	1443	1084	727	368
3500	1448	1088	730	369
3600	1454	1092	732	370
3700	1459	1096	735	372
3800	1464	1099	737	373
3900	1469	1103	739	374
4000	1475	1107	742	375
4100	1480	1111	744	376
4200	1486	1115	747	378
4300	1491	1119	750	379
4400	1497	1123	752	380
4500	1503	1127	755	382
4600	1508	1132	758	383
4700	1514	1136	761	384
4800	1520	1140	764	386
4900	1526	1145	767	387
5000	1532	1149	770	389
5100	1538	1154	773	390
5200	1544	1158	776	392
5300	1550	1163	778	393
5400	1556	1167	781	395
5500	1562	1172	784	396
5600	1568	1176	787	398
5700	1574	1181	790	399
5800	1580	1185	793	401
5900	1586	1190	796	402

References: PSL-1FJF-99-122 Rev. 1 Attach. 1 Page 3
PSL-ENG-SEFJ-99-014 Rev. 1 Attach. 1 Page 4

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Figure A.1

Rev. 1 Page 3 of 5

St. Lucie Unit 1 Cycle 16

Power Defect vs Burnup

HOURS	100%	75%	50%	25%
6000	1593	1194	799	404
6100	1599	1199	803	406
6200	1605	1203	806	407
6300	1612	1208	809	409
6400	1618	1213	812	411
6500	1625	1218	815	413
6600	1632	1223	819	414
6700	1639	1228	822	416
6800	1646	1233	826	418
6900	1653	1238	830	420
7000	1660	1244	833	423
7100	1668	1249	837	425
7200	1675	1255	841	427
7300	1683	1261	845	429
7400	1691	1267	850	432
7500	1699	1273	854	434
7600	1708	1280	859	437
7700	1717	1286	863	440
7800	1726	1293	868	443
7900	1735	1300	873	446
8000	1744	1307	879	449
8100	1754	1315	884	452
8200	1764	1322	889	455
8300	1774	1330	895	459
8400	1785	1338	901	462
8500	1795	1346	907	466
8600	1806	1355	913	470
8700	1817	1363	920	473
8800	1829	1372	926	477
8900	1840	1381	933	481

References: PSL-1FJF-99-122 Rev. 1 Attach. 1 Page 4
PSL-ENG-SEFJ-99-014 Rev. 1 Attach. 1 Page 5

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Figure A.1

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St. Lucie Unit 1 Cycle 16

Power Defect vs Burnup

HOURS	100%	75%	50%	25%
9000	1852	1390	939	485
9100	1864	1399	946	489
9200	1876	1409	953	494
9300	1888	1418	960	498
9400	1901	1428	967	502
9500	1913	1437	974	506
9600	1926	1447	981	511
9700	1938	1457	989	515
9800	1951	1467	996	519
9900	1964	1477	1003	524
10000	1977	1487	1010	528
10100	1990	1497	1018	532
10200	2003	1507	1025	537
10300	2015	1517	1032	541
10400	2028	1527	1039	545
10500	2041	1536	1046	549
10600	2054	1546	1053	553
10700	2067	1556	1060	558
10800	2079	1566	1067	562
10900	2092	1575	1074	566
11000	2105	1585	1081	570
11100	2117	1594	1088	573
11200	2129	1604	1095	577
11300	2142	1613	1101	581
11400	2154	1622	1108	585
11500	2166	1631	1114	588
11600	2178	1641	1120	592
11700	2190	1650	1127	595
11800	2202	1659	1133	599
11900	2214	1667	1139	602

References: PSL-1FJF-99-122 Rev. 1 Attach. 1 Page 5
PSL-ENG-SEFJ-99-014 Rev. 1 Attach. 1 Page 6

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Figure A.1

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St. Lucie Unit 1 Cycle 16

Power Defect vs Burnup

HOURS	100%	75%	50%	25%
12000	2226	1676	1145	605
12100	2238	1685	1151	609
12200	2249	1694	1157	612
12300	2261	1702	1163	615
12400	2273	1711	1169	618
12480	2282	1719	1174	621

Date Of Update 10 / 7 / 99

References: PSL-1FJF-99-122 Rev. 1 Attach. 1 Page 6
PSL-ENG-SEFJ-99-014 Rev. 1 Attach. 1 Page 7

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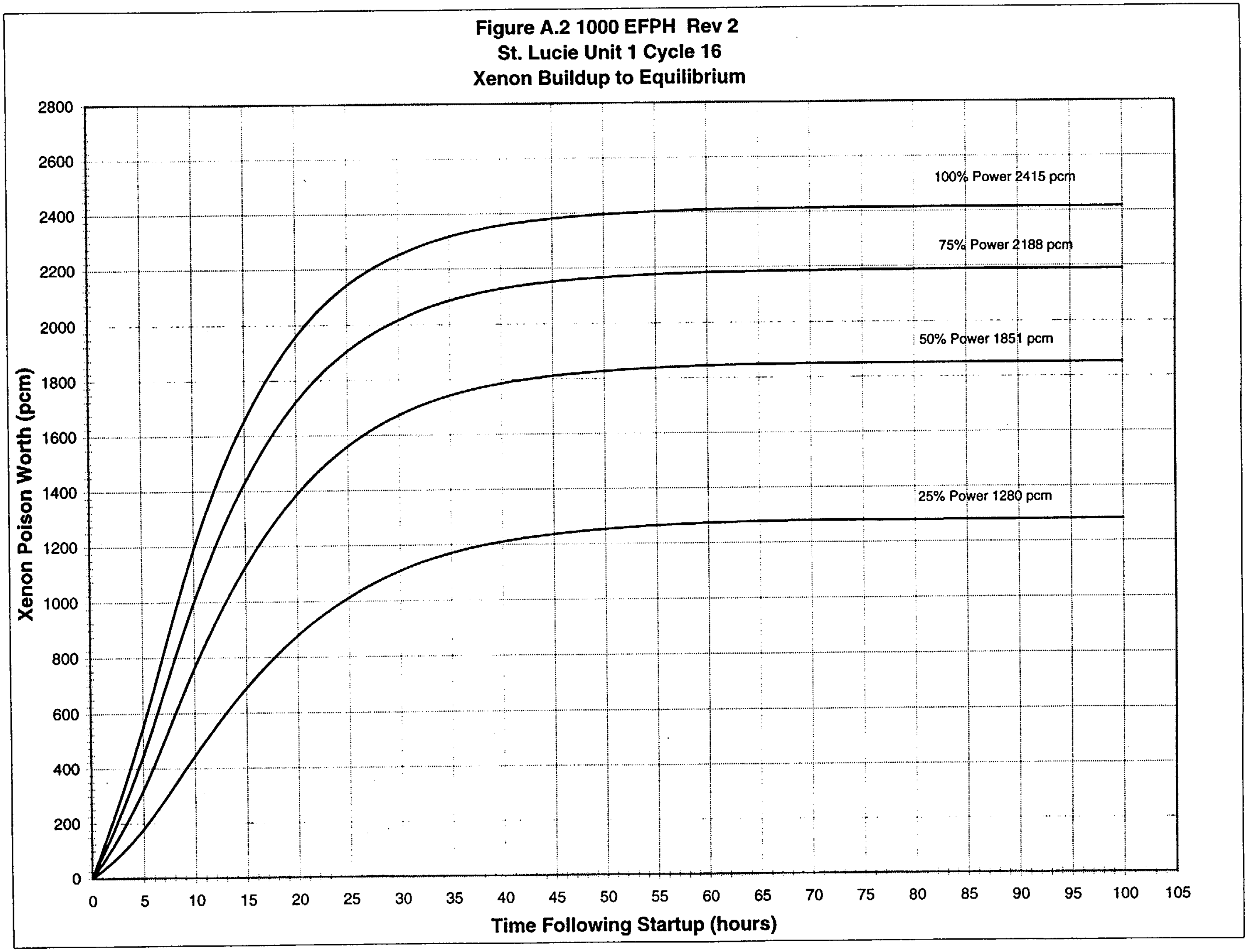

Date Of Update
11 / 24 / 99

References: PSL-1FJF-99-014 Rev. 0 Attach. 1 Page 6
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 13

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Figure A.2

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St. Lucie Unit 1 Cycle 16

Xenon Buildup to Equilibrium (1000 EFPH)

HOURS	100%	75%	50%	25%
0	0	0	0	0
1	99	78	53	28
2	202	160	111	59
3	310	248	174	95
4	425	343	244	134
5	547	445	321	179
6	677	555	406	229
7	810	669	495	282
8	943	783	586	337
9	1071	895	676	392
10	1190	1000	762	446
11	1299	1099	844	499
12	1399	1191	921	549
13	1491	1277	993	598
14	1576	1356	1062	645
15	1654	1430	1126	689
16	1726	1498	1186	731
17	1791	1561	1242	771
18	1852	1619	1293	808
19	1906	1672	1341	843
20	1956	1721	1386	877
21	2002	1765	1427	908
22	2042	1805	1464	937
23	2079	1842	1499	964
24	2112	1875	1531	990
25	2142	1905	1560	1013
26	2169	1932	1587	1035
27	2193	1957	1611	1056
28	2214	1979	1633	1075
29	2234	1999	1654	1092

References: PSL-1FJF-99-114 Rev. 0 Attach. 1 Page 7
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 14

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Figure A.2

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St. Lucie Unit 1 Cycle 16

Xenon Buildup to Equilibrium (1000 EFPH)

HOURS	100%	75%	50%	25%
30	2251	2017	1672	1108
31	2267	2034	1689	1123
32	2281	2049	1704	1136
33	2295	2062	1718	1149
34	2306	2075	1731	1160
35	2317	2086	1742	1170
36	2327	2096	1753	1180
37	2336	2105	1762	1188
38	2344	2113	1770	1196
39	2351	2120	1778	1203
40	2357	2127	1785	1210
41	2363	2133	1791	1216
42	2368	2138	1797	1222
43	2373	2143	1802	1227
44	2377	2148	1807	1232
45	2381	2152	1811	1236
46	2384	2155	1815	1240
47	2387	2158	1818	1244
48	2390	2161	1822	1247
49	2393	2164	1824	1250
50	2395	2166	1827	1253
51	2397	2168	1829	1256
52	2399	2170	1832	1258
53	2401	2172	1834	1261
54	2402	2174	1836	1263
55	2404	2175	1837	1265
56	2405	2176	1839	1267
57	2406	2178	1840	1268
58	2407	2179	1842	1270
59	2408	2180	1843	1271

References: PSL-1FJF-99-114 Rev. 0 Attach. 1 Page 8
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 15

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Figure A.2

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St. Lucie Unit 1 Cycle 16

Xenon Buildup to Equilibrium (1000 EFPH)

HOURS	100%	75%	50%	25%
60	2409	2180	1844	1273
61	2410	2181	1845	1274
62	2410	2182	1846	1275
63	2411	2182	1846	1276
64	2411	2183	1847	1276
65	2412	2183	1847	1277
66	2412	2184	1848	1278
67	2412	2184	1848	1278
68	2413	2184	1849	1278
69	2413	2185	1849	1279
70	2413	2185	1849	1279
71	2413	2185	1849	1279
72	2413	2185	1849	1279
73	2413	2186	1849	1279
74	2413	2186	1850	1279
75	2414	2186	1850	1279
76	2414	2186	1850	1279
77	2414	2187	1850	1279
78	2414	2187	1850	1279
79	2414	2187	1850	1279
80	2414	2187	1850	1279
81	2414	2187	1850	1279
82	2414	2187	1850	1279
83	2414	2187	1850	1279
84	2414	2188	1850	1279
85	2415	2188	1851	1279
86	2415	2188	1851	1280
87	2415	2188	1851	1280
88	2415	2188	1851	1280
89	2415	2188	1851	1280

References: PSL-1FJF-99-114 Rev. 0 Attach. 1 Page 9
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 16

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Figure A.2

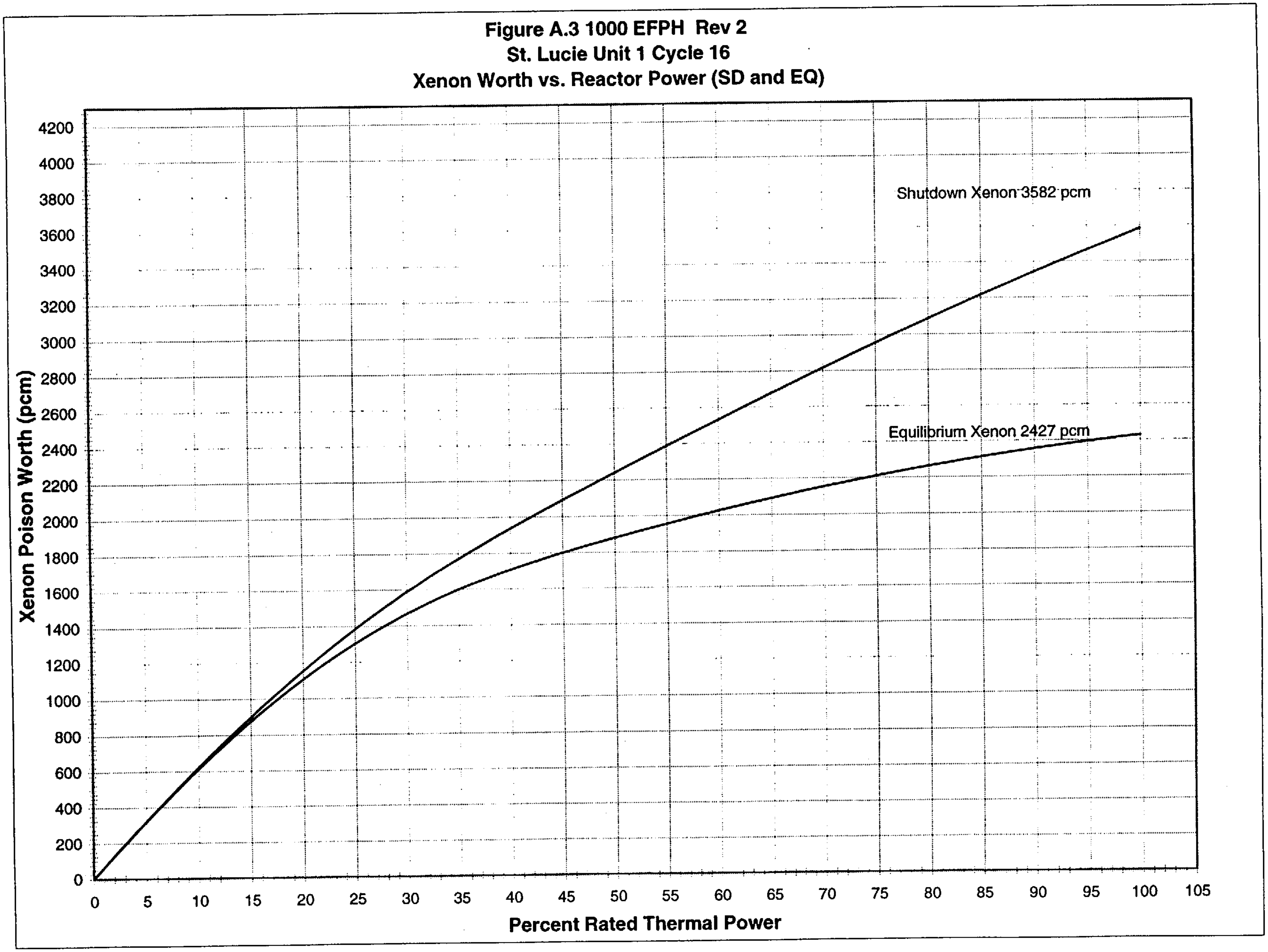
St. Lucie Unit 1 Cycle 16

Xenon Buildup to Equilibrium (1000 EFPH)

HOURS	100%	75%	50%	25%
90	2415	2188	1851	1280
91	2415	2188	1851	1280
92	2415	2188	1851	1280
93	2415	2188	1851	1280
94	2415	2188	1851	1280
95	2415	2188	1851	1280
96	2415	2188	1851	1280
97	2415	2188	1851	1280
98	2415	2188	1851	1280
99	2415	2188	1851	1280
100	2415	2188	1851	1280

Date Of Update
11 / 24 / 99

References: PSL-1FJF-99-114 Rev. 0 Attach. 1 Page 10
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 17



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Date Of Update
11/24/99

References: PSL-1FJF-99-114 Rev. 0 Attach. 2 Page 6
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 53

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Figure A.3

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St. Lucie Unit 1 Cycle 16

Xenon Worth vs. Reactor Power (Shutdown and Equilibrium) 1000 EFPH

RX Power	S/D Xe	Equil Xe
0	0	0
1	66	66
2	130	131
3	194	195
4	258	258
5	320	320
6	382	381
7	443	441
8	503	500
9	562	557
10	621	613
11	678	668
12	735	722
13	790	775
14	845	826
15	899	876
16	952	925
17	1004	972
18	1055	1019
19	1105	1063
20	1154	1107
21	1202	1149
22	1249	1190
23	1295	1229
24	1340	1267
25	1384	1304
26	1427	1339
27	1469	1373
28	1509	1405
29	1549	1436

Continued on Next Page

References: PSL-1FJF-99-114 Rev. 0 Attach. 2 Page 7
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 54

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Figure A.3

Rev. 2

St. Lucie Unit 1 Cycle 16

Xenon Worth vs. Reactor Power (Shutdown and Equilibrium) **1000 EFPH**

RX Power	S/D Xe	Equil Xe
30	1588	1466
31	1626	1495
32	1663	1522
33	1699	1549
34	1735	1574
35	1770	1599
36	1804	1622
37	1838	1645
38	1871	1667
39	1904	1687
40	1936	1708
41	1967	1727
42	1999	1746
43	2029	1764
44	2060	1782
45	2090	1799
46	2120	1816
47	2150	1833
48	2180	1849
49	2209	1864
50	2239	1880
51	2268	1895
52	2298	1911
53	2327	1926
54	2357	1940
55	2386	1955
56	2415	1969
57	2445	1984
58	2474	1998
59	2503	2012

Continued on Next Page

References: PSL-1FJF-99-114 Rev. 0 Attach. 2 Page 8
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 55

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Figure A.3

St. Lucie Unit 1 Cycle 16

Xenon Worth vs. Reactor Power (Shutdown and Equilibrium) 1000 EFPH

RX Power	S/D Xe	Equil Xe
60	2532	2025
61	2561	2039
62	2590	2052
63	2618	2065
64	2647	2078
65	2676	2091
66	2704	2104
67	2732	2116
68	2761	2128
69	2789	2140
70	2817	2152
71	2844	2164
72	2872	2175
73	2900	2187
74	2927	2198
75	2954	2209
76	2981	2220
77	3008	2230
78	3034	2241
79	3061	2251
80	3087	2261
81	3113	2271
82	3139	2281
83	3165	2291
84	3191	2300
85	3216	2309
86	3242	2319
87	3267	2327
88	3292	2336
89	3317	2345

Continued on Next Page

References: PSL-1FJF-99-114 Rev. 0 Attach. 2 Page 9
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 56

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Figure A.3

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St. Lucie Unit 1 Cycle 16

Xenon Worth vs. Reactor Power (Shutdown and Equilibrium) 1000 EFPH

RX Power	S/D Xe	Equil Xe
90	3342	2353
91	3366	2361
92	3391	2369
93	3415	2377
94	3439	2385
95	3464	2392
96	3487	2400
97	3511	2407
98	3535	2414
99	3559	2420
100	3582	2427

Date Of Update 11/24/99

References: PSL-1FJF-99-114 Rev. 0 Attach. 2 Page 10
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 57

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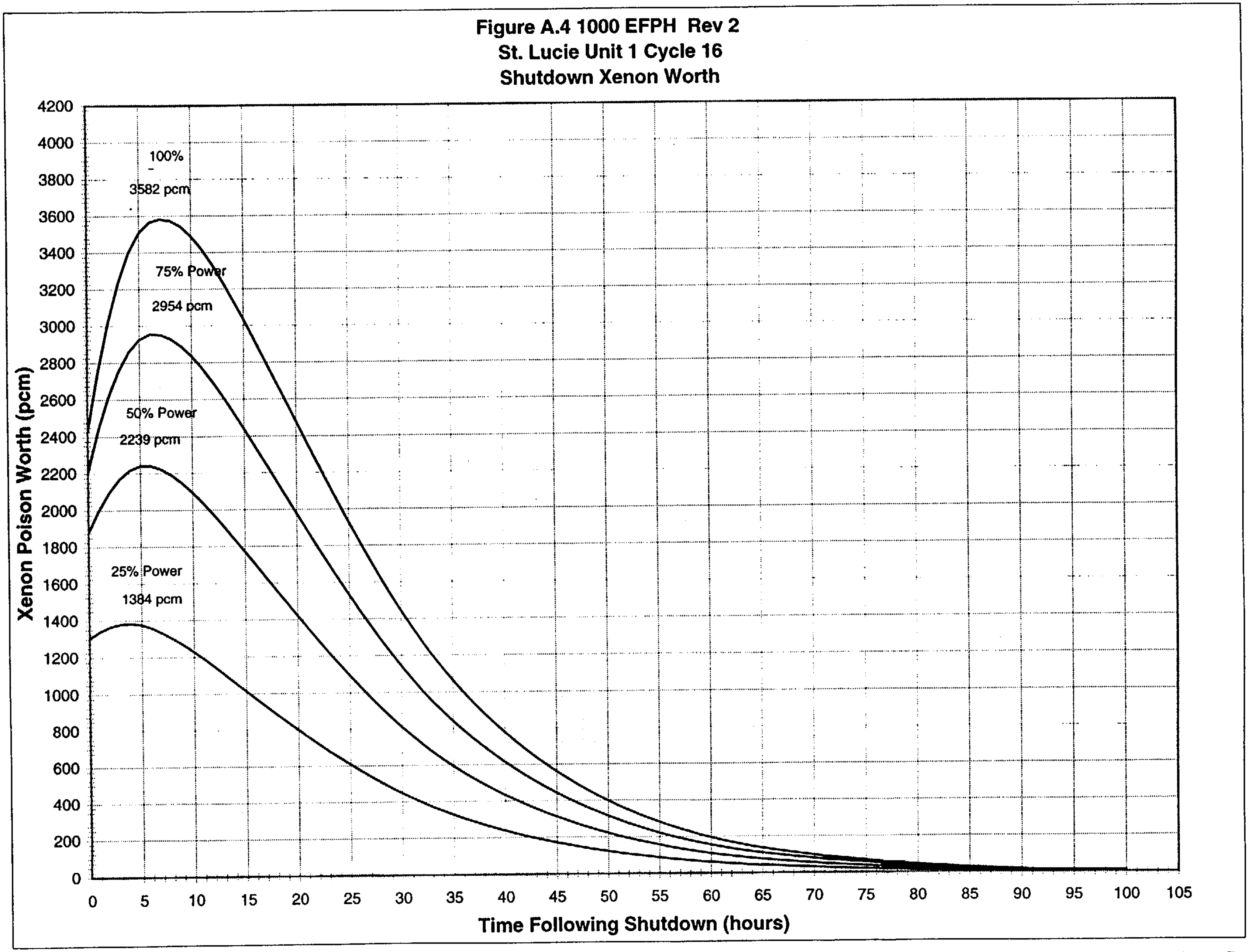

References: PSL-1FJF-99-114 Rev. 0 Attach. 3 Page 6
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 93

Date Of Update
11 / 24 / 99

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Figure A.4

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St. Lucie Unit 1 Cycle 16

Xenon Worth Following Shutdown (1000 EFPH)

	Power			
HOURS S/D	100%	75%	50%	25%
0	2427	2209	1880	1304
1	2746	2428	1999	1340
2	3015	2609	2094	1365
3	3232	2754	2167	1380
4	3397	2860	2215	1384
5	3507	2926	2239	1376
6	3565	2954	2239	1357
7	3582	2952	2220	1331
8	3572	2929	2188	1300
9	3540	2889	2145	1266
10	3488	2835	2095	1228
11	3419	2771	2038	1188
12	3336	2696	1976	1146
13	3242	2615	1910	1102
14	3141	2528	1841	1058
15	3034	2438	1771	1013
16	2925	2347	1701	969
17	2814	2255	1630	925
18	2703	2162	1560	882
19	2590	2070	1490	840
20	2478	1977	1421	799
21	2366	1885	1353	759
22	2254	1795	1286	719
23	2144	1705	1220	681
24	2035	1617	1156	644
25	1929	1531	1093	608
26	1825	1447	1032	573
27	1724	1366	973	539
28	1626	1288	917	507
29	1532	1213	862	477

References: PSL-1FJF-99-114 Rev. 0 Attach. 3 Page 7
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 94

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Figure A.4

Rev. 2 Page 2 of 4

St. Lucie Unit 1 Cycle 16

Xenon Worth Following Shutdown (1000 EFPH)

	Power			
HOURS S/D	100%	75%	50%	25%
30	1443	1142	811	448
31	1358	1075	762	421
32	1278	1011	717	395
33	1203	951	673	371
34	1131	894	633	348
35	1064	841	594	327
36	1000	790	558	306
37	940	743	524	287
38	883	698	492	270
39	829	655	462	253
40	778	615	433	237
41	730	577	406	222
42	684	541	380	208
43	641	506	356	195
44	600	474	333	182
45	561	443	312	171
46	525	415	292	160
47	490	387	273	149
48	458	362	255	140
49	428	338	238	131
50	399	315	222	122
51	372	294	207	114
52	347	274	193	106
53	323	255	180	99
54	301	237	167	92
55	280	221	156	86
56	260	206	145	80
57	242	192	135	75
58	225	178	125	70
59	209	166	117	65

References: PSL-1FJF-99-114 Rev. 0 Attach. 3 Page 8
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 95

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Figure A.4

Rev. 2 Page 3 of 4

St. Lucie Unit 1 Cycle 16

Xenon Worth Following Shutdown (1000 EFPH)

	Power			
HOURS S/D	100%	75%	50%	25%
60	195	155	108	60
61	181	144	101	56
62	169	134	94	52
63	157	125	87	49
64	146	117	81	46
65	136	109	76	43
66	127	102	70	40
67	118	95	66	37
68	110	89	61	34
69	103	83	57	32
70	96	78	53	30
71	89	73	49	28
72	83	68	46	26
73	77	64	43	24
74	72	59	40	22
75	67	55	37	21
76	62	51	34	19
77	57	48	32	18
78	53	44	29	17
79	49	41	27	15
80	45	38	25	14
81	41	35	23	13
82	38	32	21	12
83	34	30	19	11
84	31	27	17	10
85	28	25	16	9
86	25	23	14	8
87	23	21	13	7
88	20	19	12	6
89	18	17	10	6

References: PSL-1FJF-99-114 Rev. 0 Attach. 3 Page 9
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 96

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Figure A.4

Rev. 2 Page 4 of 4

St. Lucie Unit 1 Cycle 16

Xenon Worth Following Shutdown (1000 EFPH)

	Power			
HOURS S/D	100%	75%	50%	25%
90	16	15	9	5
91	14	14	8	5
92	13	13	7	4
93	11	12	7	4
94	10	11	6	3
95	9	10	6	3
96	9	9	5	3
97	8	9	5	3
98	8	9	5	3
99	8	9	5	3
100	8	9	5	3

Date Of Update
11/24/99

References: PSL-1FJF-99-114 Rev. 0 Attach. 3 Page 10
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 97

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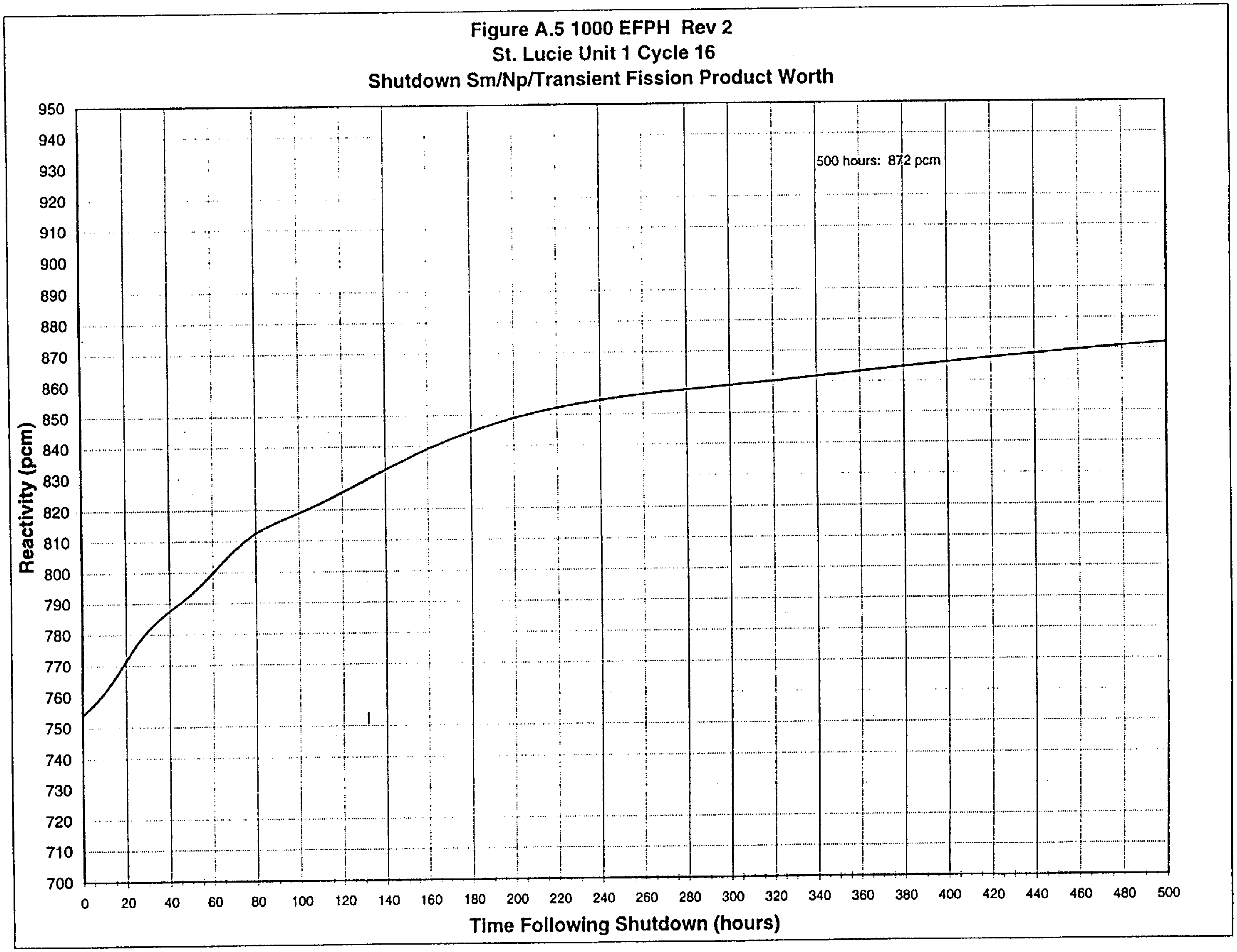


Date Of Update 11/24/99

Reference: Attachment 1
PSL-1FJF-99-137 Rev. 0
Page 10

1

Figure A.5

Rev. 2 Page 1 of 4

St. Lucie Unit 1 Cycle 16

Sm/Np/Transient Fission Product Worth Contribution Following Shutdown (1000 EFPH)

HOURS S/D	WORTH (PCM)
0	754
5	757
10	761
15	766
20	772
25	777
30	781
35	785
40	788
45	790
50	793
55	796
60	800
65	803
70	807
75	810
80	812
85	814
90	816
95	818
100	819
105	820
110	822
115	824
120	825
125	827
130	829
135	831
140	833
145	834

Reference: Attachment 1
PSL-1FJF-99-137 Rev. 0
Page 6

1

Figure A.5

Rev. 2 Page 2 of 4

St. Lucie Unit 1 Cycle 16

Sm/Np/Transient Fission Product Worth Contribution Following Shutdown (1000 EFPH)

HOURS S/D	WORTH (PCM)
150	836
155	838
160	839
165	841
170	842
175	843
180	845
185	846
190	847
195	848
200	849
205	850
210	851
215	852
220	852
225	853
230	854
235	854
240	855
245	855
250	856
255	856
260	856
265	857
270	857
275	857
280	858
285	858
290	858
295	859

Reference: Attachment 1
PSL-1FJF-99-137 Rev. 0
Page 7

1

Figure A.5

Rev. 2 Page 3 of 4

St. Lucie Unit 1 Cycle 16

Sm/Np/Transient Fission Product Worth Contribution Following Shutdown (1000 EFPH)

HOURS S/D	WORTH (PCM)
300	859
305	859
310	860
315	860
320	860
325	861
330	861
335	861
340	862
345	862
350	862
355	863
360	863
365	864
370	864
375	864
380	865
385	865
390	865
395	866
400	866
405	866
410	867
415	867
420	867
425	868
430	868
435	868
440	869
445	869

Reference: Attachment 1
PSL-1FJF-99-137 Rev. 0
Page 8

Figure A.5

Rev. 2 Page 4 of 4

St. Lucie Unit 1 Cycle 16

Sm/Np/Transient Fission Product Worth Contribution Following Shutdown (1000 EFPH)

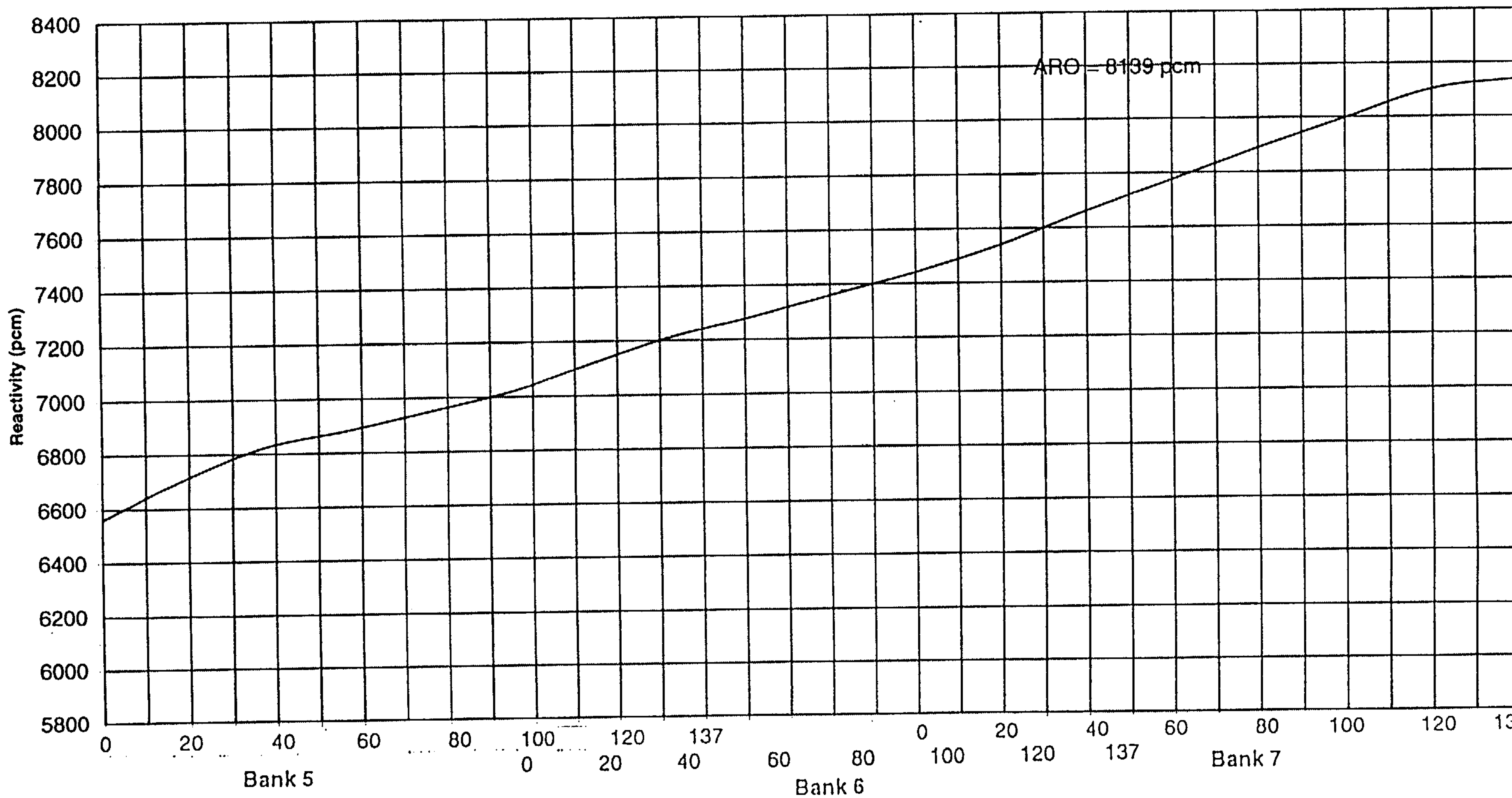
HOURS S/D	WORTH (PCM)
450	869
455	869
460	870
465	870
470	870
475	871
480	871
485	871
490	871
495	872
500	872

Reference: Attachment 1
PSL-1FJF-99-137 Rev. 0
Page 9

Date of Update: 11/24/99

Figure A.6
St. Lucie Unit 1 Cycle 16
HZP Sequential Integral CEA Worth

1000 EFPH, Rev 2



Reference: PSL-1FJF-99-136 Rev 0
Attachment 1 Page 4

PSL-ENG-SEFJ-99-014 Rev. 0
Attachment 1 Page 171

Date of Update: 11/24/99

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Figure A.6
St. Lucie Unit 1 Cycle 16
HZP Sequential Integral CEA Worth
1000 EFPH, Rev. 2, Page 1 of 1

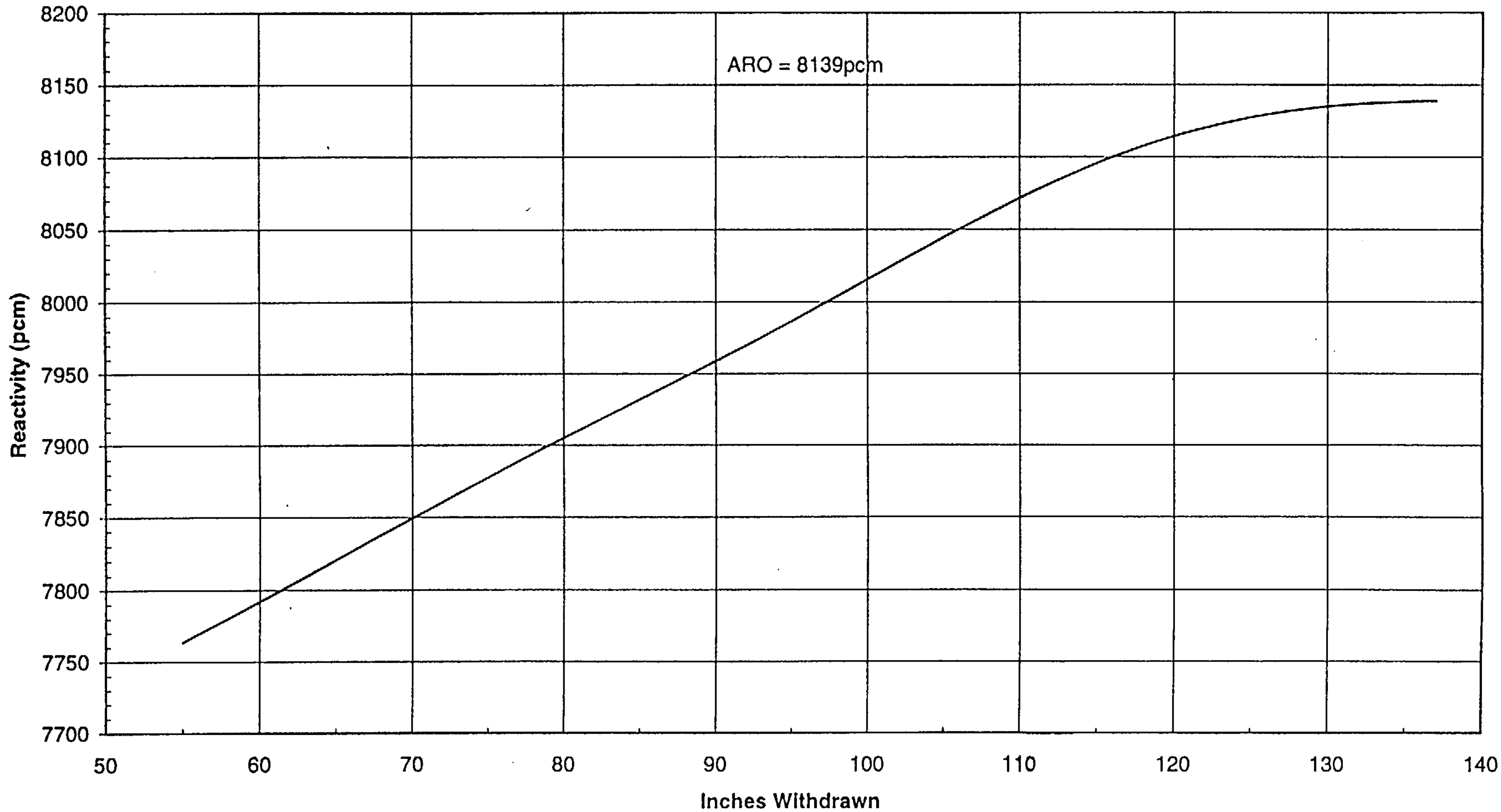
Group	Position (Inches Withdrawn)	Group	Position (Inches Withdrawn)	Integral Worth (pcm)
A	0			0
A	17			231
A	37			1516
A	57			2134
A	77			2446
A	97			2643
A	117			2835
A	137	B	0	2971
		B	17	2986
		B	37	3049
		B	57	3159
		B	77	3268
		B	97	3372
		B	117	3489
1	0	B	137	3557
1	17			3589
1	37			3697
1	57			3840
1	77			3972
1	95	2	0	4077
1	112	2	17	4291
1	132	2	37	4662
1	137	2	57	4933
		2	77	5120
3	0	2	95	5246
3	17	2	112	5392

Group	Position (Inches Withdrawn)	Group	Position (Inches Withdrawn)	Integral Worth (pcm)
3	37	2	132	5542
3	57	2	137	5602
3	77			5670
3	95	4	0	5732
3	112	4	17	5844
3	132	4	37	6055
3	137	4	57	6268
		4	77	6438
5	0	4	95	6560
5	17	4	112	6695
5	37	4	132	6822
5	57	4	137	6884
5	77			6954
5	95	6	0	7019
5	112	6	17	7108
5	132	6	37	7211
5	137	6	57	7284
		6	77	7367
7	0	6	95	7442
7	17	6	112	7540
7	37	6	132	7662
7	57	6	137	7775
7	77			7889
7	97			7998
7	117			8104
7	137			8139

Reference: PSL-1FJF-99-136 Rev. 0
Attachment 1 Page 3

Date of Update: 11/24/99

Figure A.7
St. Lucie Unit 1 Cycle 16
HZP Integral Worth of CEA Lead Group (55 in. to ARO)
1000 EFPH, NoXe, Rev. 2



Reference :PSL-1FJF-99-136 Rev. 0
Attachment 2 Page 6

Date of Update: 11/24/99

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Figure A.7
Page 1 of 2

St. Lucie Unit 1 Cycle 16

HZP Integral Worth of CEA Lead Group (55 in. to ARO)
(1000 EFPH, No Xenon, Rev. 2)

Inches Withdrawn	Reactivity (pcm)
55	7764
56	7769
57	7775
58	7781
59	7786
60	7792
61	7798
62	7804
63	7809
64	7815
65	7821
66	7827
67	7832
68	7838
69	7844
70	7850
71	7855
72	7861
73	7867
74	7872
75	7878
76	7883
77	7889
78	7894
79	7900
80	7905
81	7911
82	7916
83	7922
84	7927
85	7932
86	7938
87	7943
88	7948
89	7954
90	7959
91	7965
92	7970
93	7976
94	7981
95	7987
96	7992
97	7998
98	8004

Reference: PSL-1FJF-99-136 Rev. 0
Attachment 2 Page 4

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Figure A.7
Page 2 of 2

St. Lucie Unit 1 Cycle 16

HZP Integral Worth of CEA Lead Group (55 in. to ARO)
(1000 EFPH, No Xenon, Rev. 2)

Inches Withdrawn	Reactivity (pcm)
99	8010
100	8015
101	8021
102	8027
103	8033
104	8039
105	8044
106	8050
107	8056
108	8061
109	8067
110	8072
111	8077
112	8082
113	8087
114	8091
115	8096
116	8100
117	8104
118	8108
119	8111
120	8115
121	8118
122	8120
123	8123
124	8125
125	8127
126	8129
127	8131
128	8133
129	8134
130	8135
131	8136
132	8137
133	8138
134	8138
135	8139
136	8139
137	8139

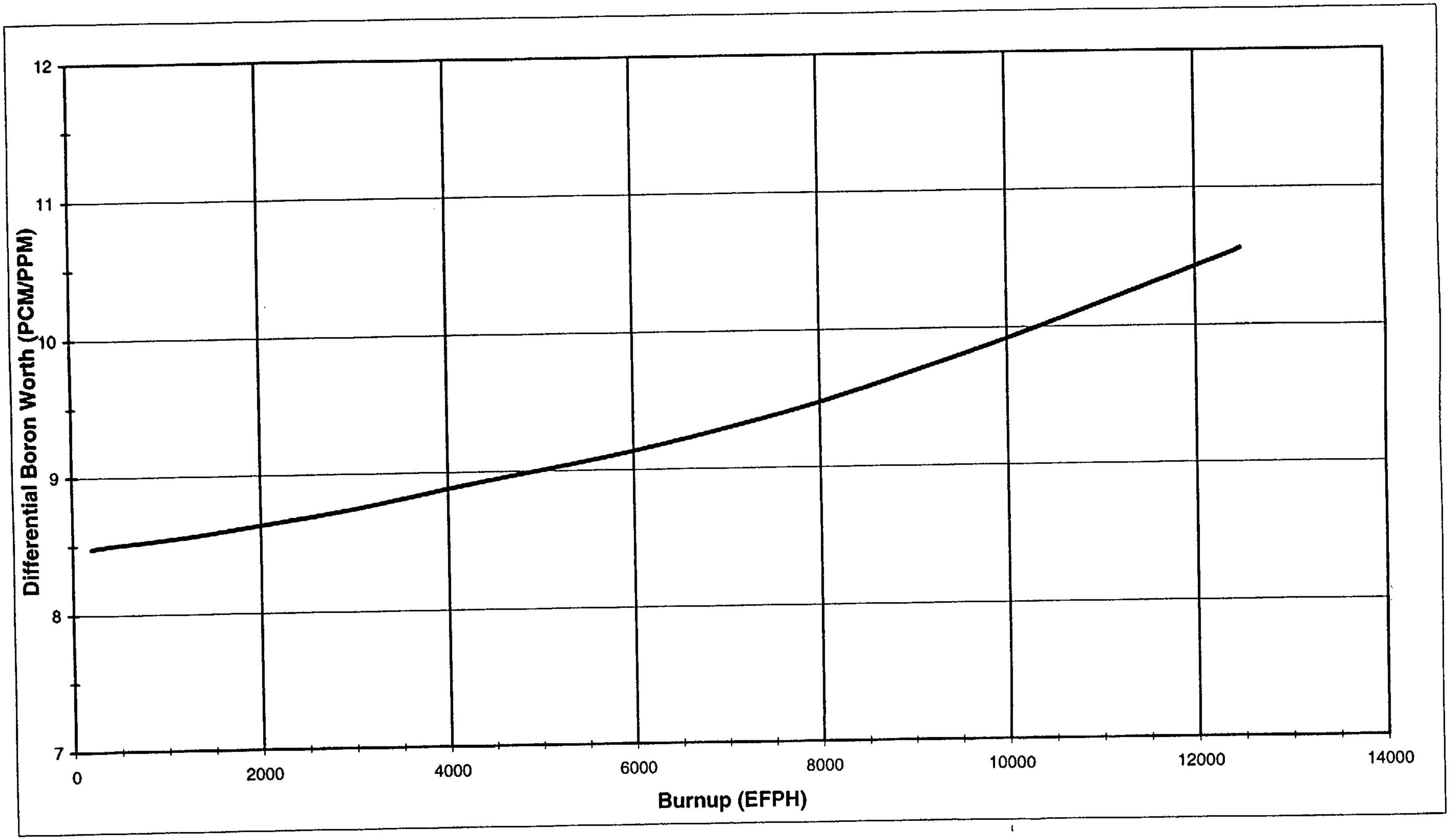
Date of Update: 11/24/99

Reference: PSL-1FJF-99-136 Rev. 0
Attachment 2 Page5

Figure . .3 Rev. 1

St. Lucie Unit 1 Cycle 16

HZP Differential Boron Worth vs Burnup



Date Of Update
10 / 7 / 99

References: PSL-1FJF-99-122 Rev. 0 Attach. 1 Page 7
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 208

Figure A.8 Rev. 1

St. Lucie Unit 1 Cycle 16

HZP Differential Boron Worth vs Burnup

Burnup (EFPH)	Boron Worth (pcm/ppm)
200	8.48
300	8.49
400	8.50
500	8.51
600	8.51
700	8.52
800	8.52
900	8.53
1000	8.54
1100	8.55
1200	8.56
1300	8.56
1400	8.57
1500	8.58
1600	8.59
1700	8.60
1800	8.61
1900	8.62
2000	8.64
2100	8.65
2200	8.66
2300	8.67
2400	8.68
2500	8.69
2600	8.70
2700	8.71
2800	8.72
2900	8.73

References: PSL-1FJF-99-122 Rev. 0 Attach. 1 Page 8
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 209

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St. Lucie Unit 1 Cycle 16

HZP Differential Boron Worth vs Burnup

Burnup (EFPH)	Boron Worth (pcm/ppm)
3000	8.74
3100	8.76
3200	8.77
3300	8.78
3400	8.80
3500	8.81
3600	8.82
3700	8.84
3800	8.85
3900	8.87
4000	8.88
4100	8.89
4200	8.91
4300	8.92
4400	8.93
4500	8.94
4600	8.96
4700	8.97
4800	8.98
4900	8.99
5000	9.01
5100	9.02
5200	9.03
5300	9.04
5400	9.06
5500	9.07
5600	9.08
5700	9.09
5800	9.11
5900	9.12

References: PSL-1FJF-99-122 Rev. 0 Attach. 1 Page 9
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 210

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St. Lucie Unit 1 Cycle 16

HZP Differential Boron Worth vs Burnup

Burnup (EFPH)	Boron Worth (pcm/ppm)
6000	9.14
6100	9.15
6200	9.17
6300	9.18
6400	9.20
6500	9.21
6600	9.23
6700	9.25
6800	9.26
6900	9.28
7000	9.30
7100	9.31
7200	9.33
7300	9.35
7400	9.36
7500	9.38
7600	9.40
7700	9.42
7800	9.44
7900	9.46
8000	9.48
8100	9.49
8200	9.52
8300	9.54
8400	9.56
8500	9.58
8600	9.60
8700	9.62
8800	9.64
8900	9.67

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St. Lucie Unit 1 Cycle 16

HZP Differential Boron Worth vs Burnup

Burnup (EFPH)	Boron Worth (pcm/ppm)
9000	9.69
9100	9.71
9200	9.73
9300	9.76
9400	9.78
9500	9.80
9600	9.82
9700	9.85
9800	9.87
9900	9.89
10000	9.92
10100	9.94
10200	9.97
10300	9.99
10400	10.02
10500	10.04
10600	10.07
10700	10.09
10800	10.12
10900	10.14
11000	10.17
11100	10.19
11200	10.22
11300	10.25
11400	10.27
11500	10.30
11600	10.32
11700	10.35
11800	10.37
11900	10.40

References: PSL-1FJF-99-122 Rev. 0 Attach. 1 Page 11
PSL-ENG-SEFJ-99-014 Rev. 0 Attach. 1 Page 212

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St. Lucie Unit 1 Cycle 16

HZP Differential Boron Worth vs Burnup

Burnup (EFPH)	Boron Worth (pcm/ppm)
12000	10.43
12100	10.45
12200	10.48
12300	10.50
12400	10.53
12480	10.56

1

St. Lucie Unit 1 Cycle 16

Inverse Count Rate Ratio Data Sheet

1000 EFPH , Rev. 2

Date: ___/___/___ Time of Completion: __________ EFPH ___________

Initial Power (%) or Count Rate (CPS):

Count	Count Time (sec)	Channel ____	Channel ____
1	120		
2	120		
3	120		
	Total Counts --->		
	Avg Counts (Total/3)-->		

(Base Counts)

Estimated Critical CEA Position: Group _________ at ________ Inches W/D

Actual Critical CEA Position: Group _________ at ________ Inches W/D

(Filled in at time of use)

SUGGESTED CEA HEIGHT		ACTUAL HEIGHT		% POWER or COUNT RATE		ICRR	
Group	Inches	Group	Inches	CH ____	CH ____	CH ____	CH ____
1	0	1	0	Base Count	Base Count	1.0	1.0
1	92						
2	31						
2	71						
3	40						
4	37						
4	94						
5	102						
6	62						
7	19						
7	60						

COMPLETED BY: _________________________ REVIEWED BY: _________________________

Date of Update: 11/29/99

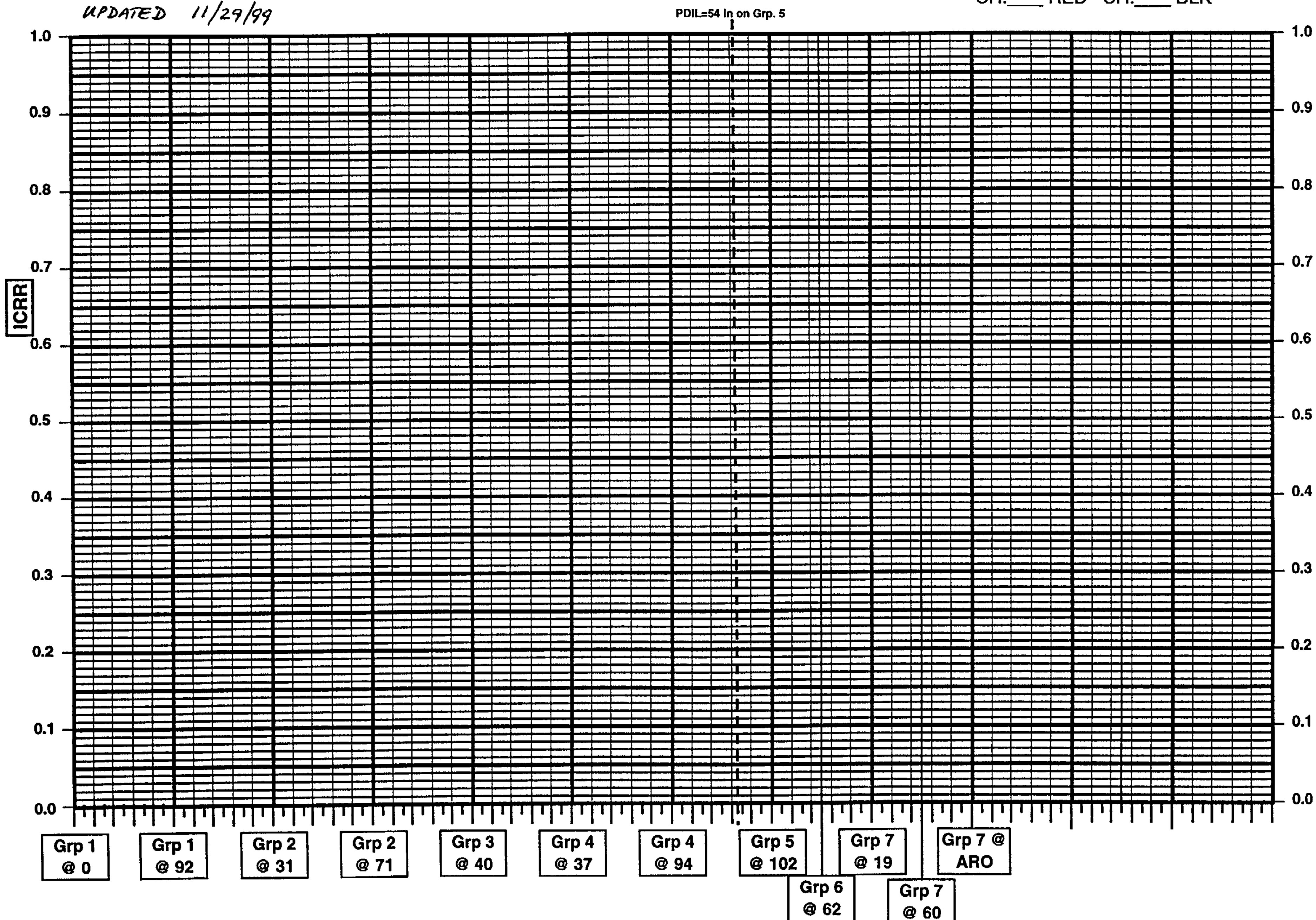
Figure A[illegible]age 2 of 2)
St. Lucie [illegible] 1, Cycle 16
Inverse Count Rate Ratio Plot Sheet

[illegible]up # ________

EFPH: ___________

CH.____ RED CH.____ BLK

UPDATED 11/29/99



Prepared By: ______________________ Date __/__/__ Verified By: ______________________ Date __/__/__

Substitute fig A.9: Unit 1 Cycle 16 specific

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Group	Group Ht.	Group	Group Ht.	Step	Integral Worth.
A	0			0	0
A	17			17	231
A	37			37	1516
A	57			57	2134
A	77			77	2446
A	97			97	2643
A	117			117	2835
A	137	B	0	137	2971
		B	17	154	2986
		B	37	174	3049
		B	57	194	3159
		B	77	214	3268
		B	97	234	3372
		B	117	254	3489
1	0	B	137	274	3557
1	17			291	3589
1	37			311	3697
1	57			331	3840
1	77			351	3972
1	95	2	0	369	4077
1	112	2	17	386	4291
1	132	2	37	406	4662
1	137	2	57	426	4933
		2	77	446	5120
3	0	2	95	464	5246
3	17	2	112	481	5392
3	37	2	132	501	5542
3	57	2	137	506 521	5602
3	77			~~526~~ 541	5670
3	95	4	0	~~544~~ 559	5732
3	112	4	17	~~561~~ 576	5844
3	132	4	37	~~581~~ 596	6055
3	137	4	57	~~601~~ 616	6268

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		4	77	~~621~~	636	6438
5	0	4	95	~~638~~	654	6560
5	17	4	112	~~656~~	671	6695
5	37	4	132	~~676~~	691	6822
5	57	4	137	~~681~~	711	6884
5	77			~~701~~	731	6954
5	95	6	0	~~719~~	749	7019
5	112	6	17	~~736~~	766	7108
5	132	6	37	~~756~~	786	7211
5	137	6	57	~~776~~	806	7284
		6	77	~~796~~	826	7367
7	0	6	95	~~814~~	844	7442
7	17	6	112	~~831~~	861	7540
7	37	6	132	~~851~~	881	7662
7	57	6	137	~~856~~	901	7775
7	77			~~876~~	921	7889
7	97			~~896~~	941	7998
7	117			~~916~~	961	8104
7	137			~~936~~	981	8139

REGION II
ST. LUCIE NUCLEAR PLANT
INITIAL LICENSE EXAMINATION
ADMINISTRATIVE SECTION A1
QUESTIONS

CANDIDATE ______________________________

EXAMINER ______________________________

REGION II
INITIAL LICENSE EXAMINATION
ADMINISTRATIVE SECTION A1
QUESTIONS
ST LUCIE NUCLEAR PLANT

KA Statement: Knowledge of Conduct of Operations Requirements

KA #: K2.1.1 - 3.7 / 3.8

References: ADM-09.07, "Overtime Limitations for Plant Personnel", Operations Policy 403, "Overtime Administration"

Candidate: ______________________________ Time Start __________
Name
Time Finish __________

Performance Rating: **Question 1** Sat _______ Unsat _______
Question 2 Sat _______ Unsat _______

Examiner: ______________________________ **Signature:** ______________________
Name

Comments

Question #1
(Reference allowed)

The following are the schedules for three operators. Determine if overtime guidelines have been exceeded. The Overtime Limit Tracker is not available.

Operator # 1	Operator # 2	Operator # 3
Mon. 0700-1700	Mon. 1500-0300	Mon. 2300-0700
Tues. 0300-1500	Tues. 1200-2300	Tues. OFF
Wed. 0700-2300	Wed. 1500-0500	Wed. OFF
Thurs. 0500-1500	Thurs. 1300-0000	Thurs. 0700-2300
Fri. 0700-1500	Fri. OFF	Fri. 0700-1500
Sat. OFF	Sat. 2300-0900	Sat. 2230-0800
Sun. OFF	Sun. 2300-1200	Sun. 1500-2300

Question #1 Expected Response

Operator #1 - 3 Violations: >16 in a 24 hour period (Wed-Thurs) > 24 hrs in a 48 hr period (Tues-Wed, Wed-Thurs), <8 hrs rest Thursday morning

Operator #2 - 1 violation: > 24 in a 48 hour period (Wed-Fri)

Operator #3 - 1 Violation: < 8 hrs rest on Sat and Sun

GRADING CRITERIA ?

Question #2
(No Reference allowed)

Who is the MINIMUM authority that is required to approve deviation from the plant overtime guidelines?

Question #2 Expected Response

The Site Vice President. (In emergency cases, the Department Head may approve the request provided the Site VP is notified the next day)

Question #1
CANDIDATE COPY

REFERENCE ALLOWED: X ______
YES NO

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF ANSWER)

The following are the schedules for three operators. Determine if overtime guidelines have been exceeded. The Overtime Limit Tracker is not available.

Sun. 0 7

Operator # 1	Operator # 2	Operator # 3
Mon. 0700-1700 10	Mon. 1500-0300	Mon. 2300-0700
Tues. 0300-1500 12	Tues. 1200-2300	Tues. OFF
Wed. 0700-2300 16	Wed. 1500-0500 Th	Wed. OFF
Thurs. 0500-1500 10	Thurs. 1300-0000	Thurs. 0700-2300
Fri. 0700-1500	Fri. OFF	Fri. 0700-1500
Sat. OFF	Sat. 2300-0900	Sat. 2230-0800
Sun. OFF	Sun. 2300-1200	Sun. 1500-2300

Question #2
CANDIDATE COPY

REFERENCE ALLOWED: ______ YES   NO __X__

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF ANSWER)

Who is the MINIMUM authority that is required to approve deviation from the plant overtime guidelines?

OVERTIME ADMINISTRATION

The Operations Department recognizes the need for time off away from work. The routine use of overtime for shift staffing takes away from this necessary rest period. The policy of the Operations Department in support of the Nuclear Division and St. Lucie Plant objectives is to minimize the use of overtime. When the minimum shift crew complement can NOT be maintained, within the guidance of the Filling Shift Vacancies policies, overtime can be utilized. Consult the specific guidance contained in AP 0010119, Overtime Limitations for Plant Personnel, and Nuclear Policy NP-306, Overtime.

1. In order to keep overtime usage to a minimum the following guidelines should be followed:

   A. Overtime will be used to fill shift vacancies only after all other options listed in the Filling of Shift Vacancies policies have been tried first.

   B. Only the Operations Supervisor can authorize overtime to augment shift staffing above the minimum shift crew complement.

   C. Special jobs requiring extra operators should be scheduled in advance to utilize available Relief Shift or Operations Support personnel. The Work Control Center Supervisor should coordinate this with the Operations Administrative Assistant.

2. Under normal conditions employees should work no more than 12 consecutive hours. The following guidelines should be adhered to when meeting overtime needs:

   A. Overtime should be offered for 4 hour periods.

   B. Overtime should be offered to coincide with the 4 hour periods immediately preceding or following an employee's regularly scheduled shift.

   C. Employees shall have a minimum of 8 hours rest time between all periods worked regardless of the duration of the work period.

   D. Overtime on an employee's rest day should NOT exceed 12 consecutive hours, excluding travel time.

OVERTIME ADMINISTRATION
(continued)

* E. All hours worked (excluding travel time) over 12 consecutive hours shall be paid at twice the rate of normal pay (double time).

F. With the exception of rest days, employees should NOT be offered or charged * for any available overtime that does NOT immediately precede or follow their normally scheduled shift.

* Bargaining Unit Employees only.

3. It is each employees responsibility to ensure that they do NOT exceed any overtime limits as a result of working overtime or by shift trade.

   A. Each individual shall fill out the SHIFT TRADE/OVERTIME CHECKLIST for each work period which involves a shift trade or overtime work.

   B. The "Over the Limit Tracker" shall be used and have a copy attached to the SHIFT TRADE/OVERTIME CHECKLIST, unless the computer system is unavailable.

   C. The SHIFT TRADE/OVERTIME CHECKLIST shall be signed and reviewed prior to working the shift trade or overtime hours.

4. The individual offering the overtime hours shall ensure that no overtime limits will be exceeded as a result of those hours being worked.

5. The Operations Supervisor will approve all overtime prior to it being worked to ensure that no overtime limits will be exceeded as a result of those hours being worked. This approval will be based on input from the NPS/ANPS.

Reference: Memorandum of Agreement.
AP 0010119, Overtime Limitations for Plant Personnel.
Nuclear Policy NP-306, Overtime.
St. Lucie Plant Policy PSL-202, Overtime.

Approved: [signature]
Operations Supervisor - St. Lucie Plant

SHIFT TRADE/OVERTIME CHECKLIST

SECTIONS I THRU IV MUST BE COMPLETED
FOR ALL SHIFT TRADES OR OVERTIME WORKED

I. On ____________, ______________________________ was required to work ______________
Date Name Hours worked

____
Reason for Overtime/Shift Trade

II.
1. Enter hours per shift worked and total hours minus shift turnover in column #1 box.
2. Fill out past and future work history in columns 2-7 on both sides of column #1 box.
3. Use this information to complete Section III.
4. Individual working prepares then NPS/ANPS/NWE shall sign Section IV below PRIOR to work beginning.

SAMPLE

MID			8
DAY	8	8	8
PEAK	4		
TOTAL	12	8	16

NOTE: > 24 hrs in 48 = Tech Spec Violation

Date														
Day		7	6	5	4	3	2	1	2	3	4	5	6	7
Hours Per Shift	MID													
	DAY													
	PEAK													
Total Hrs														

III. **AP 0010119 LIMITS**

	YES	NO
A. Greater than 16 consecutive hours?	☐	☐
B. Greater than 16 hours in any 24 hour period?	☐	☐
C. Greater than 24 hours in any 48 hour period?	☐	☐
D. Greater than 72 hours in any 7 day period?	☐	☐

IV.

I have reviewed my past/future work history as stated above. It is correct and will not result in my violating any Tech Spec overtime limits. ______________________ Individual Accepting overtime/shift trade	I have reviewed the past/future work history as stated above and it will not result in violating any Tech Spec overtime limits. ______________________ Reviewed By NPS/ANPS/NWE

FORWARD TO OPERATIONS ADMINISTRATIVE ASSISTANT

SHIFT TRADE/OVERTIME CHECKLIST

SECTIONS I THRU IV MUST BE COMPLETED
FOR ALL SHIFT TRADES OR OVERTIME WORKED

I. On ____________, ________________________ was required to work ____________
Date Name Hours worked

____
Reason for Overtime/Shift Trade

II.
1. Enter hours per shift worked and total hours minus shift turnover in column #1 box.
2. Fill out past and future work history in columns 2-7 on both sides of column #1 box.
3. Use this information to complete Section III.
4. Individual working prepares then NPS/ANPS/NWE shall sign Section IV below PRIOR to work beginning.

SAMPLE

MID			8
DAY	8	8	8
PEAK	4		
TOTAL	12	8	16

NOTE: > 24 hrs in 48 = Tech Spec Violation

Date														
Day		7	6	5	4	3	2	1	2	3	4	5	6	7
Hours	MID	|	|	|	|	|	|	|	|	|	|	|	|	|
Per	DAY	|	|	|	|	|	|	|	|	|	|	|	|	|
Shift	PEAK	|	|	|	|	|	|	|	|	|	|	|	|	|
Total Hrs														

III. **AP 0010119 LIMITS**

	YES	NO
A. Greater than 16 consecutive hours?	☐	☐
B. Greater than 16 hours in any 24 hour period?	☐	☐
C. Greater than 24 hours in any 48 hour period?	☐	☐
D. Greater than 72 hours in any 7 day period?	☐	☐

IV.

I have reviewed my past/future work history as stated above. It is correct and will not result in my violating any Tech Spec overtime limits. ______________________ Individual Accepting overtime/shift trade	I have reviewed the past/future work history as stated above and it will not result in violating any Tech Spec overtime limits. ______________________ Reviewed By NPS/ANPS/NWE

FORWARD TO OPERATIONS ADMINISTRATIVE ASSISTANT

SHIFT TRADE/OVERTIME CHECKLIST

SECTIONS I THRU IV MUST BE COMPLETED
FOR ALL SHIFT TRADES OR OVERTIME WORKED

I. On ____________ (Date), ______________________ (Name) was required to work ____________ (Hours worked)

____
Reason for Overtime/Shift Trade

II.
1. Enter hours per shift worked and total hours minus shift turnover in column #1 box.
2. Fill out past and future work history in columns 2-7 on both sides of column #1 box.
3. Use this information to complete Section III.
4. Individual working prepares then NPS/ANPS/NWE shall sign Section IV below PRIOR to work beginning.

SAMPLE

MID			8
DAY	8	8	8
PEAK	4		
TOTAL	12	8	16

NOTE: > 24 hrs in 48 = Tech Spec Violation

Date														
Day		7	6	5	4	3	2	1	2	3	4	5	6	7
Hours Per Shift	MID	|	|	|	|	|	|	|	|	|	|	|	|	|
	DAY	|	|	|	|	|	|	|	|	|	|	|	|	|
	PEAK	|	|	|	|	|	|	|	|	|	|	|	|	|
Total Hrs														

III. **AP 0010119 LIMITS**

	YES	NO
A. Greater than 16 consecutive hours?	☐	☐
B. Greater than 16 hours in any 24 hour period?	☐	☐
C. Greater than 24 hours in any 48 hour period?	☐	☐
D. Greater than 72 hours in any 7 day period?	☐	☐

IV.

I have reviewed my past/future work history as stated above. It is correct and will not result in my violating any Tech Spec overtime limits. ______________________ Individual Accepting overtime/shift trade	I have reviewed the past/future work history as stated above and it will not result in violating any Tech Spec overtime limits. ______________________ Reviewed By NPS/ANPS/NWE

FORWARD TO OPERATIONS ADMINISTRATIVE ASSISTANT

REGION II
INITIAL LICENSE EXAMINATION
ADMINISTRATIVE
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

VERIFY BAM TANK OPERABILITY

CANDIDATE ______________________________

EXAMINER ______________________________

REGION II
INITIAL LICENSE EXAMINATION
ADMINISTRATIVE
JOB PERFORMANCE MEASURE
ST LUCIE NUCLEAR PLANT

KA Statement: Ability to interpret graphs which contain plant performance data

KA #: K2.1.25 - 2.8 / 3.1

Facility JPM #: New

Task: Using the information provided, verify BAM tank operability

Preferred Evaluation Location:

Simulator ______ Control Room __X__ NTC __X__

Preferred Evaluation Method:

Perform __X__ Simulate _____

References: OP 1-0010125A, Data Sheet 4, "Verification of Boration Flow Paths"

Validation Time __15 minutes__

Candidate: ______________________________ Time Start __________
Name Time Finish __________

Performance Rating: Sat _______ Unsat _______

Examiner: ______________________________ **Signature:** ______________________
Name

Reference Material Needed:

OP 1-0010125A, Data Sheet 4, "Verification of Boration Flow Paths"

Read to Candidate

Directions to candidate for Administrative JPMs:

I will explain the initial conditions and state the task to be performed. You will be allowed the use of any reference needed to complete the task. Ensure you indicate to me when you finish your assigned task by returning the material needed for the task that I provided you.

Initial Conditions: Unit 2 is at 100% power. The following are the current BAM tank parameters:

	Level	Temperature	Boron Concentration
2A BAMT	75%	110°F	5675 ppm
2B BAMT	92%	115°F	4140 ppm

Initiating Cues: The ANPS has directed you to verify BAM tank operability IAW OP 2-0010125A Data Sheet 4

ANSWER KEY

2A BAMT Volume = 7425 gal.

2B BAMT Volume = 9108 gal.

2A BAMT Volume Concentration = 42136875 gal ppm

2B BAMT Volume Concentration = 37707120 gal ppm

Combined Volume = 16533 gal.

Combined Concentration = 4829.37 ppm

Combined Concentration weight % = 2.76

COMBINED BAM TANK VOLUME AND CONCENTRATION MEETS REQUIREMENTS OF FIGURE 3.1-1.

CANDIDATE CUE SHEET

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF TASK)

Initial Conditions: Unit 2 is at 100% power. The following are the current BAM tank parameters:

	Level	Temperature	Boron Concentration
2A BAMT	75%	110°F	5675 ppm
2B BAMT	92%	115°F	4140 ppm

Initiating Cues: The ANPS has directed you to verify BAM tank operability IAW OP 2-0010125A Data Sheet 4

ST. LUCIE UNIT 2
OPERATING PROCEDURE NO. OP-2-0010125A, REVISION 36
SURVEILLANCE DATA SHEETS

DATA SHEET 4
WEEKLY
CVCS BORATION FLOW PATHS AND SOURCES
(Page 3 of 8)

1. (continued) INITIAL

B. (continued)

3. If a Charging Pump from the RWT is used, Then VERIFY the following valves are in the required position:

a.	V2504	RWT to Charging Pumps	Open	_______
b.	V2523	Charging Line	Open	_______

NOTE #
These valves may be in different positions during RCP seal injection, PZR cooldown, when the charging system is shut down and other plant evolutions at the discretion of the NPS/ANPS.

c.	V2598	RCP Seal Injection Charging Line	Open#	_______
d.	V2185	RCP Seal Injection Actuation	Closed#	_______
e.	SE-02-01	Loop 2B1 Charging Isol	Closed#	_______
f.	SE-02-02	Loop 2A2 Charging Isol	Closed#	_______

2. VERIFY the following borated water source parameters:

A. Modes 1, 2, 3 & 4

1. *VERIFY the RWT meets Technical Specification requirements by the following:

a. Level: Channel MA______ft. Channel MC______ft.
Channel MB______ft. Channel MD______ft.

Criteria: Level greater than or equal to 28'5"

b. Boron concentration______ppm

Criteria: Greater than 1720 but less than 2100 PPM

c. Temperature_______°F

Criteria: Greater than 55 but less than 100°F

ST. LUCIE UNIT 2
OPERATING PROCEDURE NO. OP-2-0010125A, REVISION 36
SURVEILLANCE DATA SHEETS

DATA SHEET 4
WEEKLY
CVCS BORATION FLOW PATHS AND SOURCES
(Page 4 of 8)

2. (continued) INITIAL

A. (continued)

2. *2A BAM Tank

Level______% (Figure 3.1-1)

Temperature_______°F (greater than 55°F)

Concentration______PPM (4371 to 6119 ppm)

2A BAM Tank meets requirements of Figure 3.1-1 ______

3. *2B BAM Tank

Level______% (Figure 3.1-1)

Temperature______°F (greater than 55°F)

Concentration______PPM (4371 to 6119 ppm)

2B BAM Tank meets requirements of Figure 3.1-1 ______

4. *Combined BAM Tanks

> NOTE
> If either BAM Tank boron concentration is greater than 6119 PPM, then the combined tank calculation cannot be used for Tech. Spec. compliance.

2A BAM Tank	2B BAM Tank
Level______%	Level______%
Concentration______ppm	Concentration______ppm
Temperature______°F	Temperature______°F

ST. LUCIE UNIT 2
OPERATING PROCEDURE NO. OP-2-0010125A, REVISION 36
SURVEILLANCE DATA SHEETS

DATA SHEET 4
WEEKLY
CVCS BORATION FLOW PATHS AND SOURCES
(Page 5 of 8)

2. (continued) INITIAL

A. (continued)

4. (continued)

Perform the following calculations:

______ X 99 gal./% = ______ gal.
2A Level 2A Volume

______ X 99 gal./% = ______ gal.
2B Level 2B Volume

__________gal. X _________ppm = ______________gal. ppm
2A Volume 2A Conc. 2A Volume Conc.

__________gal. X _________ppm = ______________gal. ppm
2B Volume 2B Conc. 2B Volume Conc.

__________gal. + _________gal. = ________________gal.
2A Volume 2B Volume Combined Volume

(________gal. ppm +________gal. ppm) ÷_______gal. = __________ppm
2A Volume Conc. 2B Volume Conc. Combined Volume Combined Conc.

_____________ppm ÷ 1748.3 ppm/weight % =______________weight %
Combined Conc. Combined Conc.

The combined BAM Tanks volume and concentration meets the requirements of Figure 3.1-1 and both tank temperatures are greater than 55°F. ______

* Satisfactory compliance of either the RWT and the combined BAM Tanks <u>or</u> 2 of the following 3: RWT, 2A or 2B BAM Tank assures compliance to the applicable Technical Specifications.

ST. LUCIE UNIT 2
OPERATING PROCEDURE NO. OP-2-0010125A, REVISION 36
SURVEILLANCE DATA SHEETS

DATA SHEET 4
WEEKLY
CVCS BORATION FLOW PATHS AND SOURCES
(Page 6 of 8)

2. (continued) INITIAL

B. Modes 5 & 6:

1. *RWT

Level: Channel MA_______ft. Channel MC______ft.

Channel MB_______ft. Channel MD______ft.

(level greater than or equal to 8'-7")

Boron Concentration_____________ppm

(greater than or equal to 1720 PPM)

Temperature______°F (greater than 40 but less than 120°F)

RWT meets Tech. Spec. requirements ______

2. *2A Boric Acid Make-Up Tank

Level________% (greater than or equal to 37%)

Concentration______PPM (4371 to 6119 ppm)

Temperature______°F (greater than 55°F)

2A BAM Tank meets Tech. Spec. requirements. ______

ST. LUCIE UNIT 2
OPERATING PROCEDURE NO. OP-2-0010125A, REVISION 36
SURVEILLANCE DATA SHEETS

DATA SHEET 4
WEEKLY
CVCS BORATION FLOW PATHS AND SOURCES
(Page 7 of 8)

2. (continued) INITIAL

B. (continued)

3. *2B Boric Acid Make-Up Tank

Level______% (greater than or equal to 37%)

Concentration_______PPM (4371 to 6119 ppm)

Temperature_______°F (greater than 55°F)

2B BAM Tank meets Tech. Spec. requirements. ______

*Satisfactory compliance with 1 out of 3 of above requirements assures conformance to the applicable Technical Specifications.

Remarks:

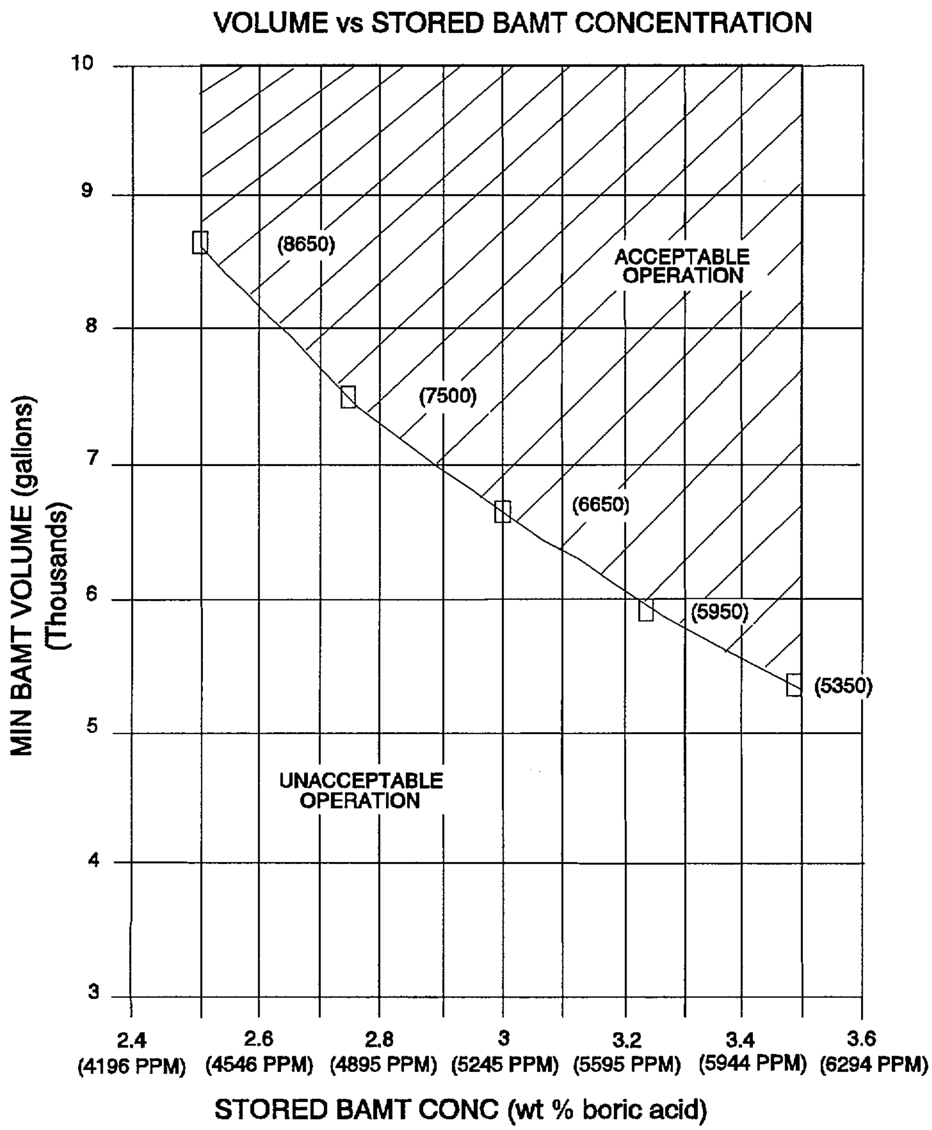
*Satisfactory performance of the above asterisked steps assures conformance with applicable Technical Specification.

____
NPS/ANPS

ST. LUCIE UNIT 2
OPERATING PROCEDURE NO. OP-2-0010125A, REVISION 36
SURVEILLANCE DATA SHEETS

DATA SHEET 4
WEEKLY
CVCS BORATION FLOW PATHS AND SOURCES
(Page 8 of 8)

FIGURE 3.1-1 ST. LUCIE 2 MIN BAMT



(0125A-B.WPG)

REGION II
ST. LUCIE NUCLEAR PLANT
INITIAL LICENSE EXAMINATION
ADMINISTRATIVE SECTION A3
QUESTIONS

CANDIDATE ______________________________

EXAMINER ______________________________

REGION II
INITIAL LICENSE EXAMINATION
ADMINISTRATIVE SECTION A3
QUESTIONS
ST LUCIE NUCLEAR PLANT

KA Statement: Knowledge of 10 CFR 20 and facility radiation control requirements

KA #: K2.3.1 - 2.6 / 3.0

References: HP-02, "FPL Health Physics Manual"

Candidate: ______________________ Time Start ________
Name
Time Finish ________

Performance Rating: **Question 1** Sat ______ Unsat ______
Question 2 Sat ______ Unsat ______

Examiner: ______________________ **Signature:** ______________________
Name

Comments

Question #1

Health Physics has performed a survey of the Unit 2 Charging Pump hallway and rooms.. Using the provided survey map, determine the posting requirements for the hallway and each room.

Question #1 Expected Response

Hallway - Radiation Area, Contaminated Area.

2A Charging Pump Room - Radiation Area, Contaminated Area.

2B Charging Pump Room - High Radiation Area, Hot Spot.

2C Charging Pump Room - Radiation Area.

Question #2

What is the criteria that would require Health Physics to post an area as an "Airborne Radioactivity Area"?

Question #2 Expected Response

25% of the DAC (derived air concentration)

Question #1

CANDIDATE COPY

REFERENCE ALLOWED: ______ (YES) __X__ (NO)

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF ANSWER)

Health Physics has performed a survey of the Unit 2 Charging Pump hallway and rooms.. Using the provided survey map, determine the posting requirements for the hallway and each room.

Question #2

CANDIDATE COPY

REFERENCE ALLOWED: ______ YES   __X__ NO

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF ANSWER)

What is the criteria that would require Health Physics to post an area as an "Airborne Radioactivity Area"?

ST. LUCIE PLANT UNIT NO. 2
HPS-207
CHARGING PUMPS
ELEVATION -0.5 FT.

DATE ____________

TIME ____________

MONITOR ____________

AREA POSTINGS (KEY)

Contaminated Area	(C)	Radiation Area	(R)
High Rad. Area	(H)	RWP for Entry	(E)
Rad. Material Area	(M)	Gate Locked	(L)
Airborne Activity	(A)	No TLD Required	(N)
Exclusion Area	(X)	Hot Particles	(P)

ALL READINGS IN MR/HR UNLESS OTHERWISE NOTED

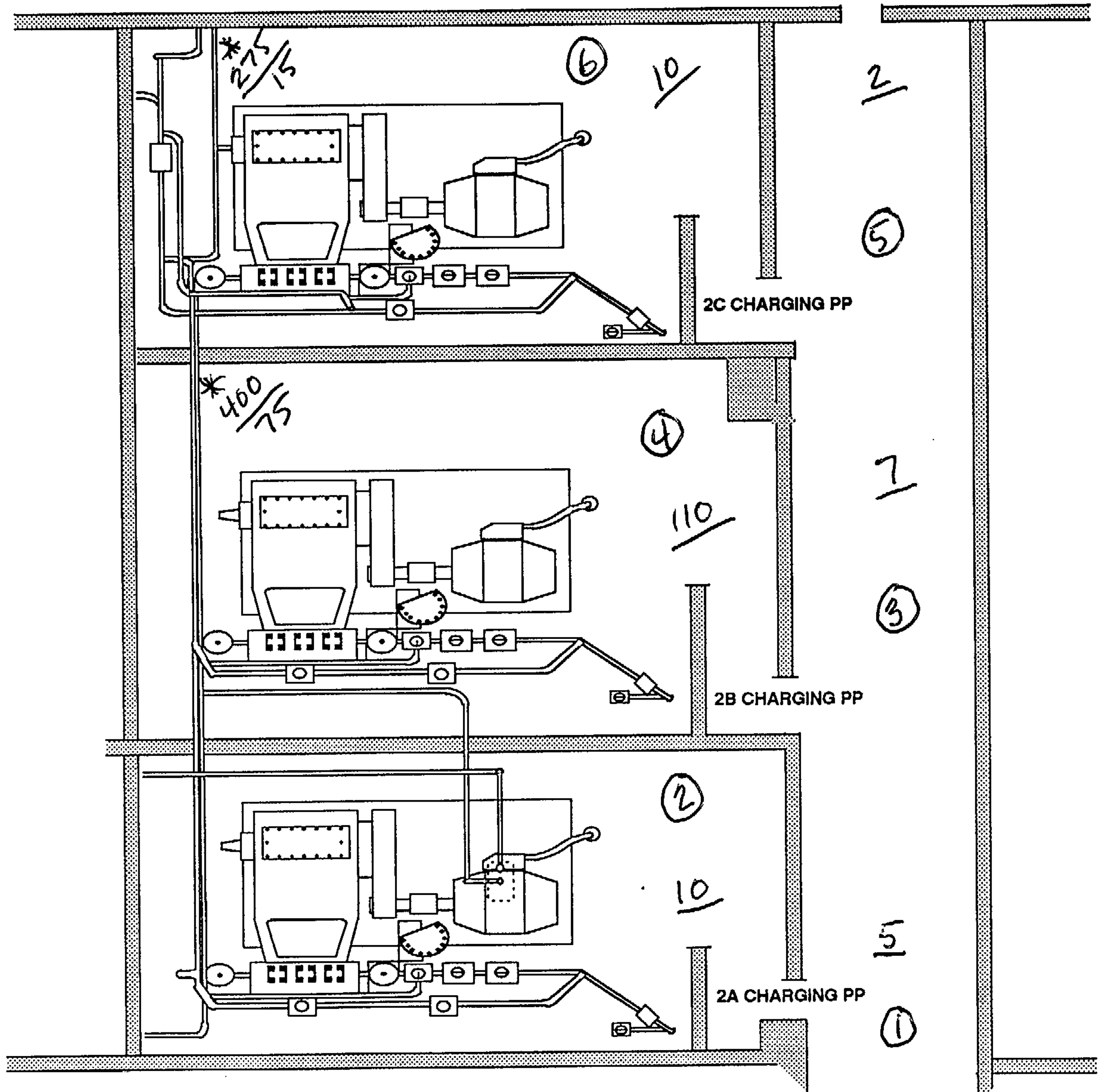
INST.	#	CAL DUE	BKG cpm	MDA dpm

SMEARS (dpm/100cm²)

1	<1K
2	3K
3	<1K
4	<1K
5	2K
6	<1K
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

Remarks ____________

Reviewed ____________



S 2 OPS

DATE ____________ SYS HP

DOCT HPS-207 COMP ____________

DOCN ____________ ITM ____________

e. Periodically in the RCA where the potential for airborne radioactivity exists; and

f. Any time intakes are being estimated to control internal radiation doses.

4.4.4 Radioactive Contamination Surveys

1. The quantity that should be measured is the radioactivity per unit of surface area.

2. Surveys for radioactive contamination should be conducted as follows:

a. Periodically in areas frequently accessed where radioactive materials are handled or stored or where contamination boundaries or postings are located;

b. During initial entry into a known or suspected contaminated area, and periodically thereafter, to determine if conditions have changed;

c. Periodically at control points to contaminated areas, areas used to dress in protective clothing, and step-off pads when in use.

d. During work involving the opening of any radioactive system or the welding, burning, or grinding on equipment containing radioactive materials;

e. After a leak or spill of radioactive materials or any time contamination conditions could change in a work area;

f. Periodically in some areas outside of the RCA (e.g., offices, shops and storage areas);

g. Periodically in areas within the RCA where eating, drinking and smoking are permitted;

h. All materials leaving the RCA.

i. Respiratory protection equipment and protective clothing following cleaning; and

k. For radioactive sources requiring periodic leak testing.

3. The following should be considered when surveying areas or jobs with the potential for contamination from hot particles:

a. Surveys should be performed periodically when no work is being performed.

b. Survey frequency should be based on work in progress, contamination history (including activity content), current survey results and trends, and the dose expended to perform these surveys.

4. Tools and equipment used in contaminated areas should be surveyed prior to removal from the area or should be considered as contaminated and placed in plastic bags and tagged with a radioactive material tag until they can be surveyed and released, or decontaminated.

5. Potentially contaminated materials should be surveyed and properly labeled.

6. Personal articles which are either worn or carried on the body are surveyed by the whole body monitor when the individual performs a whole body frisk. All other items shall be frisked by Health Physics personnel before removing them from the RCA.

a. Individuals who have completed Enhanced Radiation Worker Training may release items that have not been in Contaminated Areas.

7. Waste volumes should be sampled before they are released from the RCA.

8. Materials and equipment brought in by vendors that have previously been in contact with hot particles and have a potential for being contaminated should be surveyed when the containers are opened.

9. Radioactive materials indicating the presence of radioactivity (other than naturally-occurring) should be released only with special permission of the Health Physics Supervisor. A record should be maintained for each item released.

10. Packaging, surveying, labeling and documentation for shipment of radioactive materials should be performed in accordance with applicable procedures. Shipping nuclear fuel is addressed in separate plant procedures.

4.4.5 Posting

> NOTE
> In practice, area posting is based on the measurement of the deep dose equivalent rate and not on the measurement of the deep dose equivalent integrated over one hour as defined in 10CFR20. For example, a radiation area will be posted as such if the deep dose equivalent rate exceeds 5 mrem/hour measured at 30 centimeters (12 inches) from the radiation source. Basing the posting on dose equivalent rate ensures that the dose equivalent limit will not be exceeded.

1. Areas shall be posted as follows:

   a. An area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 5 mrem in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates shall be posted with a conspicuous sign bearing the radiation symbol and the words "**CAUTION, RADIATION AREA**"

   b. An area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving a dose equivalent in excess of 100 mrem in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates shall be posted with a conspicuous sign bearing the radiation symbol and the words "**CAUTION, HIGH RADIATION AREA.**"

   c. An area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving a dose equivalent in excess of 1,000 mrem in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates shall be posted with a conspicuous sign bearing the radiation symbol and the words "**CAUTION, LOCKED HIGH RADIATION AREA.**"

d. An area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving an absorbed dose in excess of 500 rads in 1 hour at 1 meter from the radiation source or from any surface that the radiation penetrates shall be posted with a conspicuous sign bearing the radiation symbol and the words "**GRAVE DANGER, VERY HIGH RADIATION AREA.**"

e. An area, room or enclosure in which the concentration of airborne radioactive materials exist in excess of the DAC's or to such a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6 percent of the ALI or 12 DAC-hours shall be posted with a conspicuous sign bearing the radiation symbol and the words "**CAUTION, AIRBORNE RADIOACTIVITY AREA.**" Compliance with the airborne radioactivity posting requirement will be accomplished by posting the area when the measured airborne radioactivity is greater than 0.25 of the DAC.

f. An area, accessible to individuals, in which contamination levels exist in excess of the surface area contamination guidelines specified in Table 4.2 shall be posted with a conspicuous sign bearing the radiation symbol and the words "**CONTAMINATED AREA.**"

g. An area, accessible to individuals, in which radioactive contamination in the form of hot particles exist shall be posted with a conspicuous sign bearing the radiation symbol and the words "**CONTAMINATED AREA, HOT PARTICLE AREA.**"

h. An area or room in which licensed material is stored in an amount exceeding 10 times the quantity of such material specified in the applicable regulations shall be posted with a conspicuous sign bearing the radiation symbol and the words "**CAUTION, RADIOACTIVE MATERIAL(S).**"

2. In addition to the information specified in section 1 above, warning signs may contain additional information on specific radiological conditions, requirements for entry and other special precautions.

3. Hot spots should be identified on components or piping having contact deep dose equivalent rates greater than 300 mrem / hour and the contact levels are greater than 5 times the deep dose equivalent rate measured at 30 centimeter from the hot spot.

4. Transitory high radiation areas created by moving a large activity source through the RCA need not be posted if continuous Health Physics coverage is provided.

5. Portable equipment, tools or material stored inside the RCA which has contamination in excess of the contamination guidelines specified in Table 4.2 should be identified as radioactive material.

4.5 Radiological Work Practices

4.5.1 Supervision and Monitoring of Radiological Work

1. Radiation workers should be monitored periodically by their supervision and HP personnel to ensure that the workers are following proper radiological work practices at the work site. Improper radiological work practices should be corrected immediately at the work location.

2. Depending on the nature of the job, HP personnel should perform the following functions:

   a. Brief workers on the actual and potential radiological conditions and hazards which may be present during the job.

TABLE 4.2

CONTAMINATION GUIDELNES

QUANTITY	"LOOSE" CONTAMINATION		"FIXED" CONTAMINATION	
	BETA-GAMMA[a] ACTIVIY	ALPHA[b] ACTIVITY	BETA-GAMMA[a] ACTIVITY	ALPHA[b] ACTIVITY
1. Surface Area	1000 dpm/100 cm^2	20 dpm/100 cm^2	N/A	N/A
2. Personnel Contamination (Skin and clothing)	5000 dpm/100 cm^2	300 dpm/100 cm^2	N/A	N/A
3. Material Unconditional Release				
a. Materials, Tools, Equpment and Solid Waste	1000 dpm/100 cm^2 (indirect)	20 dpm/100 cm^2	5000 dpm/100 cm^2 (direct)	100 dpm/100 cm^2
b. Waste Volume(s)[c] (e.g., Liquids)				
4. Protective Clothing	N/A	N/A	5000 cpm/probe area (direct)	N/A
5. Tools and Equipment (For use in RCA)	1000 dpm/100 cm^2	20 dpm/100 cm^2	10 mrem/hr	300 dpm/100 cm^2
6. Respiratory Protective Devices	1000 dpm/100 cm^2	20 dpm/100 cm^2	0.2 mrad/hr	N/A

[a] Contamination guidelines are based on detection levels that can be achieved with present state-of-the-art dectection equipment and methods. If monitoring is performed directly on the item (direct method), the detection level specified is the level that can be detected with manual frisking using a pancake type GM detector. If monitoring is performed using smears followed with counting, the limit is based on the detection level that can be achieved with this counting method.

[b] Monitoring for alpha activity may not be necessary if it can be demonstrated that the beta-gamma activity is limiting using beta-gamma to alpha ratios.

[c] Waste volumes such as oil, dirt and sediment shall contain no detectable activity when counted on a detection system, that meets the sensitivity requirements of the plant's Technical Specifications nad procedures.

REGION II
INITIAL LICENSE EXAMINATION
ADMINISTRATIVE
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

COMPLETE THE STATE OF FLORIDA NOTIFICATION FORM

CANDIDATE ____

EXAMINER ____

REGION II
INITIAL LICENSE EXAMINATION
ADMINISTRATIVE
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

COMPLETE THE STATE OF FLORIDA NOTIFICATION FORM

CANDIDATE ______________________________

EXAMINER ______________________________

REGION II
INITIAL LICENSE EXAMINATION
ADMINISTRATIVE
JOB PERFORMANCE MEASURE
ST LUCIE NUCLEAR PLANT

KA Statement: Knowledge of the Emergency Plan

KA #: K2.4.29 - 2.6 / 4.0

Facility JPM #: New

Task Standard: Complete the State of Florida Notification Form during a Site Area Emergency

Preferred Evaluation Location:

Simulator ______ Control Room __X__ NTC __X__

Preferred Evaluation Method:

Perform __X__ Simulate ____

References: EPIP-02, "Duties and Responsibilities of the Emergency Coordinator", Attachment 2 and Attachment 4, EPIP-01, "Classification of Emergencies"

Validation Time __20 minutes__

Candidate: ______________________________ Time Start ________
Name Time Finish ________

Performance Rating: Sat ______ Unsat ______

Examiner: ______________________ **Signature:** ____________________
Name

Reference Material Needed:

EPIP-02, “Duties and Responsibilities of the Emergency Coordinator”, Attachment 2 and Attachment 4, EPIP-01, “Classification of Emergencies”

Read to Candidate

Directions to candidate for Administrative JPMs:

I will explain the initial conditions and state the task to be performed. You will be allowed the use of any reference needed to complete the task. Ensure you indicate to me when you finish your assigned task by returning the material needed for the task that I provided you.

Initial Conditions: A SGTR (2A)/LOOP has occurred on Unit 2. Chemistry has not yet reported release data. All plant equipment is operable, there are no injuries and a plant cooldown is in progress. The following meteorological conditions exist:

May need some times for events

Wind Speed:	6 mph
Wind direction:	56°
60 meter temp.:	86.3°
10 meter temp.:	87.5°

Initiating Cues: Complete the State of Florida Notification Form for a Site Area Emergency.

ANSWER KEY

This is an ACTUAL EMERGENCY box checked

1A. Time/date: current time

1B Reported by: Candidate/title

1C. Message number: 1

1D. From: Control Room

2. Site: St. Lucie Unit 2

3. Accident Classification: Site Area Emergency

How did we get this

4. Current Emergency Declaration Time: 10 minutes ago, Date: today

5. Incident description: Steam Ge enerator Tube Rupture/Loss of Offsite Power

6. Injuries: None

7. Release Status: C - Release occurring - expected duration: Unknown

8. Need not be filled out at this time.

9. Need not be filled out at this time.

10. Need not be filled out at this time.

11A. Wind direction: 56°, 11B. Sectors affected: KLMN

11C. Wind Speed: 6 MPH, 11D. Stability Class: D

12. Utility Recommended Protective Actions: No Recommendations at this time

13. Has Event been terminated? No

14. Message Received By: State of Florida responder, current time, date.

CANDIDATE CUE SHEET

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A SGTR (2A)/LOOP has occurred on Unit 2. Chemistry has not yet reported release data. All plant equipment is operable, there are no injuries and a plant cooldown is in progress. The following meteorological conditions exist:

Wind Speed:	6 mph
Wind direction:	56°
60 meter temp.:	86.3°
10 meter temp.:	87.5°

INITIATING CUE:

Complete the State of Florida Notification Form.

ATTACHMENT 4

DETERMINATION OF SECTORS AFFECTED AND STABILITY CLASS

(Page 1 of 1)

A. Affected Sectors

1. Using the guide below, determine the Affected Sectors and enter in line 11B of the State Notification form.

> **NOTE**
> If the wind direction is directly on the edge of two sectors (e.g., 11°, 33°, 56°, etc.), an additional sector should be added to the Protective Action Recommendation (PAR). For example, if the wind direction is from 78°, then the affected sectors for the PAR should be L, M, N and P.

Wind From	Affected Sectors	Wind From	Affected Sectors	Wind From	Affected Sectors
348 - 11	HJK	123 - 146	PQR	236 - 258	CDE
11 - 33	JKL	146 - 168	QRA	258 - 281	DEF
33 - 56	KLM	168 - 191	RAB	281 - 303	EFG
56 - 78	LMN	191 - 213	ABC	303 - 326	FGH
78 - 101	MNP	213 - 236	BCD	326 - 348	GHJ
101 - 123	NPQ	there is no	O sector	there is no	I sector

B. Stability Class

1. Enter Delta-T (60 meter minus 10 meter temperatures) _______ deg. F

2. Using Delta-T (ΔT) and the guide below, determine the Stability Class and enter in line 11D of the State Notification form.

ΔT	Stability Class
ΔT less than or equal to -1.7	A
-1.7 less than ΔT less than or equal to -1.5	B
-1.5 less than ΔT less than or equal to -1.4	C
-1.4 less than ΔT less than or equal to -0.5	D
-0.5 less than ΔT less than or equal to +1.4	E
+1.4 less than ΔT less than or equal to +3.6	F
+3.6 less than ΔT	G

END OF ATTACHMENT 4

ATTACHMENT 2
STATE OF FLORIDA NOTIFICATION MESSAGE FORM FOR NUCLEAR POWER PLANTS
(Page 1 of 1)

☐ THIS IS A DRILL ☐ THIS IS AN ACTUAL EMERGENCY

1. A. Time/Date: (Initiated)________ B. Reported by: (Name/Title) ________
   C. Message Number: ________ D. From: ☐ Control Room ☐ TSC ☐ EOF
2. SITE: ☐ ST. LUCIE UNIT 1 ☐ ST. LUCIE UNIT 2
3. ACCIDENT CLASSIFICATION
   ☐ Notification of Unusual Event ☐ Site Area Emergency
   ☐ Alert ☐ General Emergency
4. CURRENT EMERGENCY DECLARATION Time: ________ Date: ___/___/___
5. INCIDENT DESCRIPTION OR UPDATE* ________
6. INJURIES A. ☐ Contaminated ________ B. ☐ Non-contaminated ________
7. RELEASE STATUS:
   A. ☐ No release (Go to Item 11) C. ☐ A Release is occurring--expected duration ________
   B. ☐ Potential (Possible) Release D. ☐ A Release occurred, but stopped--duration ________
8.** RELEASE RATE (calculated as per EPIP-09)
   A. ☐ NOBLE GASES: ________ Curies per second ☐ Measured ☐ Default
   B. ☐ IODINES: ________ Curies per second ☐ Measured ☐ Default
   C. ☐ Release within normal operating limits
9.** TYPE OF RELEASE IS (Blanks are for specific nuclides, if available, i.e, I-131, Cs-137, etc.)
   A. ☐ Radioactive gases ________ C. ☐ Radioactive liquids ________
   B. ☐ Radioactive airborne particulates ________ D. ☐ Other ________
10.** PROJECTED OFFSITE DOSE RATE (calculated as per EPIP-09)

DISTANCE	THYROID DOSE RATE (CDE)	TOTAL DOSE RATE (TEDE)
1 Mile (Site boundary)	________ mrem/hr	________ mrem/hr
2 Miles	________ mrem/hr	________ mrem/hr
5 Miles	________ mrem/hr	________ mrem/hr
10 Miles	________ mrem/hr	________ mrem/hr

11. METEOROLOGICAL DATA (at 10 meters)
   A. Wind direction (from) ____ degrees C. Wind speed ________ mph
   B. Sectors affected ________ (from Attachment 4) D. Stability class ________ (from Attachment 4)
12. UTILITY RECOMMENDED PROTECTIVE ACTIONS (from EPIP-02)
   A. ☐ No recommendations at this time.
   B. ☐ Notify the public to take the following protective actions:

NOTE
If messages refer to 360° radius, use the word ALL under sectors.

MILES	NO ACTION	SHELTER/SECTORS	EVACUATE/SECTORS
0--2			
2--5			
5--10			

13. HAS EVENT BEEN TERMINATED? A. ☐ NO B. ☐ YES Time: ________ Date: ___/___/___
   EC Approval: ________ Time: ________ Date: ___/___/___
14. MESSAGE RECEIVED BY Name: ________ Time: ________ Date: ___/___/___
15. Return to applicable checklist (UE, ALERT, SITE AREA/GENERAL) and start from last completed step.

* If Emergency Class escalation is known to be necessary, Then add, "A new notification form will be transmitted within 15 minutes; go to Line 14."

** This information may not be available on initial notifications.

END OF ATTACHMENT 2

REGION II
INITIAL LICENSE EXAMINATION
ADMINISTRATIVE
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

MAKE PROTECTIVE ACTION RECOMMENDATIONS (SRO)

CANDIDATE ____

EXAMINER ____

REGION II
INITIAL LICENSE EXAMINATION
ADMINISTRATIVE
JOB PERFORMANCE MEASURE
ST LUCIE NUCLEAR PLANT

KA Statement: Knowledge of the Emergency Plan

KA #: K2.4.29 - 2.6 / 4.0

Facility JPM #: New

Task Standard: Make protective action recommendations based on a set of conditions.

Preferred Evaluation Location:

Simulator ______ Control Room __X__ NTC __X__

Preferred Evaluation Method:

Perform __X__ Simulate _____

References: EPIP-02, "Duties and Responsibilities of the Emergency Coordinator", Attachment 4, 5, 6

Validation Time __20 minutes__

Candidate: ______________________________ Time Start __________
Name Time Finish __________

Performance Rating: Sat _______ Unsat _______

Examiner: ______________________ **Signature:** ____________________
Name

Reference Material Needed:

EPIP-02, "Duties and Responsibilities of the Emergency Coordinator", Attachment 4, 5, 6.

Read to Candidate

Directions to candidate for Administrative JPMs:

I will explain the initial conditions and state the task to be performed. You will be allowed the use of any reference needed to complete the task. Ensure you indicate to me when you finish your assigned task by returning the material needed for the task that I provided you.

Initial Conditions: A General Emergency has been declared with the following plant conditions:

A large break LOCA in progress
CET temperature is 600°F
Wind direction is 146 degrees
Wind speed is 15 mph.
Chemistry reports offsite dose calculations as follows:

Distance	TEDE	CDE
1 mile	3500 mrem	13000 mrem
2 miles	1400 mrem	3000 mrem
5 miles	650 mrem	1100 mrem
10 miles	300 mrem	500 mrem

Initiating Cues: Make the appropriate Protective Action Recommendations for this event

Expected Response: 0-2 miles (Evacuate CR), 2-5 miles (Evacuate sectors PQRA and shelter remaining sectors), 5-10 miles (shelter sectors PQRA), 10 miles-TBD (None).

CANDIDATE CUE SHEET

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF TASK)

<u>Initial Conditions:</u> A General Emergency has been declared with the following plant conditions:

A large break LOCA in progress
CET temperature is 600°F
Wind direction is 146 degrees
Wind speed is 15 mph.
Chemistry reports offsite dose calculations as follows:

Distance	TEDE	CDE
1 mile	3500 mrem	13000 mrem
2 miles	1400 mrem	3000 mrem
5 miles	650 mrem	1100 mrem
10 miles	300 mrem	500 mrem

<u>Initiating Cues:</u> Make the appropriate Protective Action Recommendations for this event

ATTACHMENT 4

DETERMINATION OF SECTORS AFFECTED AND STABILITY CLASS

(Page 1 of 1)

A. Affected Sectors

1. Using the guide below, determine the Affected Sectors and enter in line 11B of the State Notification form.

NOTE

If the wind direction is directly on the edge of two sectors (e.g., 11°, 33°, 56°, etc.), an additional sector should be added to the Protective Action Recommendation (PAR). For example, if the wind direction is from 78°, then the affected sectors for the PAR should be L, M, N and P.

Wind From	Affected Sectors	Wind From	Affected Sectors	Wind From	Affected Sectors
348 - 11	HJK	123 - 146	PQR	236 - 258	CDE
11 - 33	JKL	146 - 168	QRA	258 - 281	DEF
33 - 56	KLM	168 - 191	RAB	281 - 303	EFG
56 - 78	LMN	191 - 213	ABC	303 - 326	FGH
78 - 101	MNP	213 - 236	BCD	326 - 348	GHJ
101 - 123	NPQ	there is no	O sector	there is no	I sector

B. Stabililty Class

1. Enter Delta-T (60 meter minus 10 meter temperatures) ________ deg. F

2. Using Delta-T (ΔT) and the guide below, determine the Stability Class and enter in line 11D of the State Notification form.

ΔT	Stability Class
ΔT less than or equal to -1.7	A
-1.7 less than ΔT less than or equal to -1.5	B
-1.5 less than ΔT less than or equal to -1.4	C
-1.4 less than ΔT less than or equal to -0.5	D
-0.5 less than ΔT less than or equal to +1.4	E
+1.4 less than ΔT less than or equal to +3.6	F
+3.6 less than ΔT	G

END OF ATTACHMENT 4

ATTACHMENT 5

DETERMINATION OF PROTECTIVE ACTION RECOMMENDATIONS (PARs)

(Page 1 of 6)

A. Guidelines for Protective Action Recommendation (PARs) to Off-site Authorities

1. FPL is required to provide county and state governmental authorities with recommendations for protective action to be taken by the public during radiological emergencies at the St. Lucie Nuclear Power Plant.

2. The responsible authorities are the State of Florida Division of Emergency Management (DEM) and St. Lucie and Martin County Departments of Public Safety.

3. PARs should be made utilizing all of the available data. This includes plant conditions, off-site dose projections and/or field monitoring data. The more conservative PARs should be made.

4. Due to the large political and legal ramifications of these recommendations and the potential impact on FPL, the following format and content should be used:

   a. If any case where a GENERAL EMERGENCY has been declared, the minimum PAR shall be: Shelter all people within a 2 mile radius and out to 5 miles in the affected sectors. (Affected sectors are the downwind sector plus the two adjacent sectors, three in total.)

   b. If a GENERAL EMERGENCY has been declared due to loss of physical control of the plant to intruders, including the Control Room or any other area(s) vital to the operation of the reactor system (as defined in the Security Plan), the minimum PAR shall be: Evacuate all people within a 2 mile radius from the plant and out to 5 miles in the downwind sectors. Shelter all people in the remaining sectors from 2 to 5 miles and from 5 to 10 miles from the plant.

   c. If the emergency has not been classified as a GENERAL EMERGENCY and the offsite doses are LESS THAN 500 mrem Total Dose (TEDE) and 1000 mrem Thyroid Dose (CDE) at 1 mile over the projected duration of the release, no protective action is recommended. This should be reported to DEM and other outside agencies who inquire as:

ATTACHMENT 5
DETERMINATION OF PROTECTIVE ACTION RECOMMENDATIONS (PARs)
(Page 2 of 6)

A. (continued)

4. (continued)

c. (continued)

Based on our current assessment of all the information now available to us, Florida Power & Light Company recommends that you consider taking the following protective actions (PA) - NONE. This recommendation may change in the future, but we cannot now say when it may change or what it may change to.

B. Determining Protective Action Recommendations (PARs)

> **NOTE**
> If a controlled release is necessary to stabilize plant conditions or an uncontrolled release is anticipated, determine the approximate source term and duration of the release and the projected off-site doses prior to making any PARs.

1. In determining PARs, both plant conditions AND off-site doses must be considered. However, if a release has not occurred, then determine PARs based on plant conditions.

2. PARs Based on Plant Conditions

   a. Refer to Attachment 6, Protective Action Recommendations.

   b. Begin with the General Emergency question and proceed through the flowchart answering the questions at each prompt.

   c. Upon completion of the flowchart, enter the PAR table and determine the PAR for each downwind distance.

   d. Enter PARs into Line 1 of the table in Section C below.

ATTACHMENT 5
DETERMINATION OF PROTECTIVE ACTION RECOMMENDATIONS (PARs)
(Page 3 of 6)

B. (continued)

3. PARs Based on Off-site Dose Projections

NOTE
For purposes of this procedure and when discussing dose calculations, the terms projected and forecasted can be, and are used, interchangeably.

a. Refer to Attachment 6, Protective Action Recommendations.

b. PARs are based on the Thyroid Dose (line 7) and/or the Total Dose (line 18) from the Dose Calculation Worksheet in EPIP-09, Off-Site Dose Calculations. This same information is available, when using the Class A Model dose program, on the 10 Mile Standard Report in the Forecast Mode.

c. For each downwind distance, enter the PAR table at the appropriate dose level and determine the PAR for that distance.

d. Enter PARs into Lines 2a and 2b of the table in Section C below.

ATTACHMENT 5

DETERMINATION OF PROTECTIVE ACTION RECOMMENDATIONS (PARs)

(Page 4 of 6)

B. (continued)

EXAMPLE

A release has occurred at the St. Lucie Plant. The wind direction is from 22 degrees and the projected off-site integrated (2 hr) Thyroid Dose (CDE) is 10,000 mrem at 1 mile, 2000 mrem at 2 miles and less than 1000 mrem at 5 miles. The plant is in a GENERAL EMERGENCY with no actual or projected core damage and no loss of physical control of the plant. The following PAR should be made:

Based on our current assessment of all the information now available to us, Florida Power & Light Company recommends that you consider taking the following protective actions:

i. Evacuate all people between a 0 and 2 mile radius from the plant.
ii. Shelter all people between a 2 and 5 mile radius from the plant who are in sectors J, K and L.
iii. No protective action is recommended between a 5 and 10 mile radius from the plant.

This recommendation may change in the future, but we cannot now say when it may change or what it may change to.

¶12 4. PARs Based on Field Monitoring Data

a. Refer to Attachment 6, Protective Action Recommendations.

b. PARs are based on Thyroid Dose Rate and/or the Total Dose Rate measured in the field. Field monitoring dose rates need to be multiplied times the expected duration of the release (default value is 2 hours) in order to determine projected doses.

1. Thyroid Dose (CDE) = Field measured thyroid dose rate x expected duration of release.

2. Total Dose Rate (TEDE) = Field measured Deep Dose Equivalent (DDE) + (0.04 x Thyroid Dose (CDE)).

/R4

ATTACHMENT 5

DETERMINATION OF PROTECTIVE ACTION RECOMMENDATIONS (PARs)

(Page 5 of 6)

B. (continued)

4. (continued)

c. Field monitoring results from near site sample locations need to be adjusted/extrapolated to the 1 mile distance. Sample results between 1 to 2 miles need to be adjusted/extrapolated to the 2 mile distance and results between 2 to 5 miles adjusted/extrapolated to the 5 mile distance.

d. For each downwind distance, enter the PAR table at the appropriate dose level and determine the PAR for that distance.

CAUTION

Do NOT mix doses based on dose calculations with doses based on field measurements when determining PARs.

5. When available, both plume calculations and off-site monitoring results should be evaluated when making PARs. If significant discrepancies exist between field monitoring results and plume dispersion calculations, Then an evaluation of the discrepancy should be made, and the appropriate value should be selected in the determination of PARs.

6. PARs have been developed based on guidance in NUREG/BR-0150, Vol. 1 and EPA 400-R-92-001.

/R4

ATTACHMENT 5

DETERMINATION OF PROTECTIVE ACTION RECOMMENDATIONS (PARs)

(Page 6 of 6)

C. Protective Action Recommendations (PARs)

> **NOTE**
>
> Actual PARs shall be the most conservative PARs based on plant conditions or off-site doses.

1. Complete the table below:

   Step 1. Determine PARs based on Attachment 6, Protective Action Recommendations, and enter into line 1.

   Step 2. Determine PARs based on Attachment 6, Protective Action Recommendations, and enter into lines 2a and 2b.

Protective Action Recommendations		Distance From Plant/Recommendation		
		0 - 2 Mile	2 - 5 Mile	5 - 10 Mile
Line 1.	Plant Conditions			
Line 2a.	Total Dose (TEDE)			
Line 2b.	Thyroid Dose (CDE)			

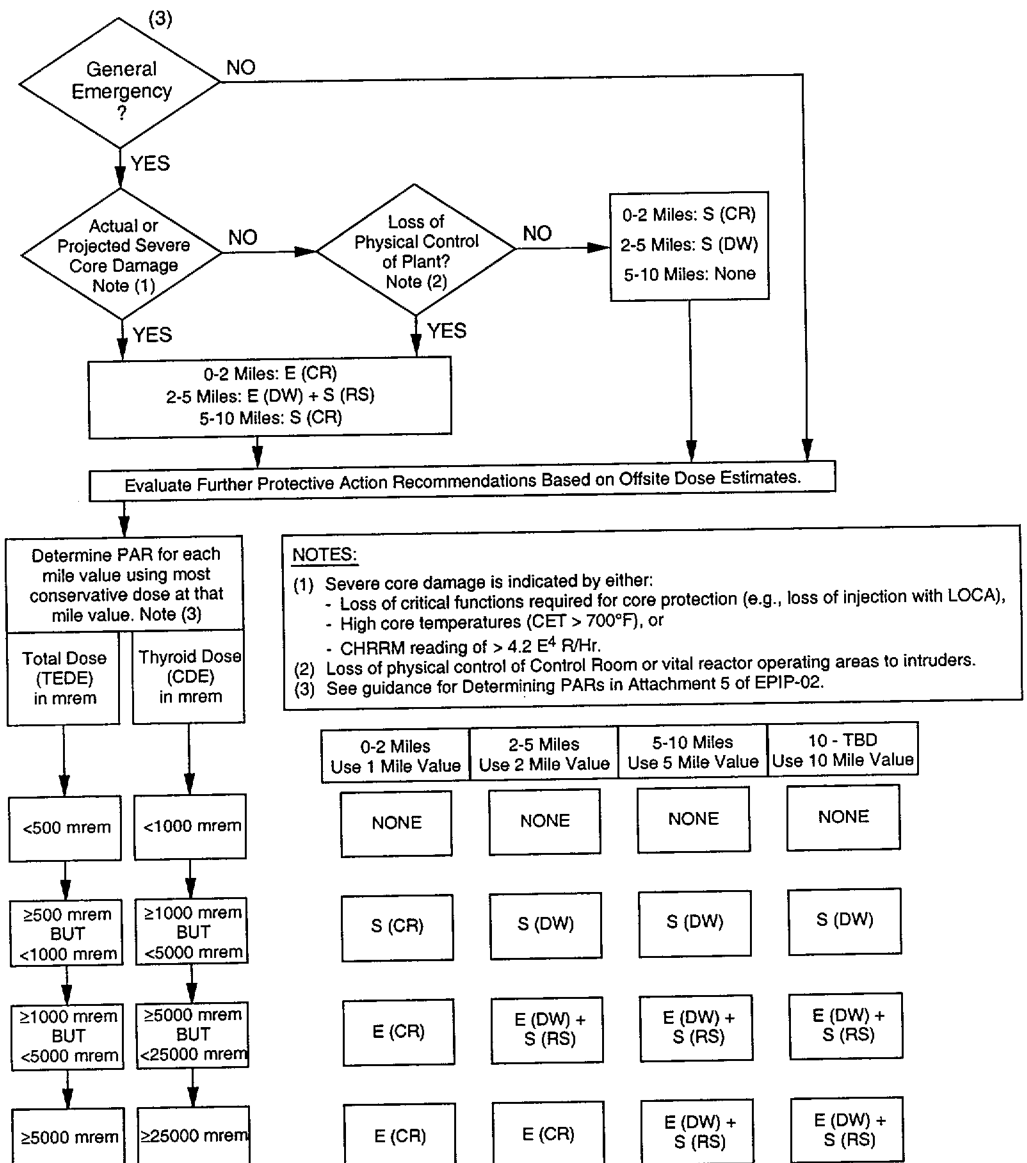
2. Choose the most conservative PARs and record in Section 12 of the State of Florida Notification Message Form.

END OF ATTACHMENT 5

ATTACHMENT 6

PROTECTIVE ACTION RECOMMENDATIONS

(Page 1 of 1)



LEGEND OF SYMBOLS & ABBREVIATIONS:

< = Less Than; ≥ = Greater Than or Equal To

None - No Protective Action Recommended

S - Sheltering Recommended

E - Evacuation Recommended

DW - Downwind + 2 Adjoining Sectors

RS - Remaining Sectors

CR - Complete Circle Around Plant at Specified Distance

(P/EP/EPIP-02-Fig1-R0)

END OF ATTACHMENT 6

Table of Contents

PREPARATION:

Ahead of time, prepare a full RPS Logic Matrix Procedure with sections 7.1 thru 7.4 all signed off. Ensure copy of Appendix A is included and have extra copies of section 7.5 AB matrix ready for replacement maintenance of the book.

1. **INSTALL IC-1 (100% Power, MOL Steady State)**
2. **Turn ON RPS Testing Power Supply**
3. **ENSURE all RPS Test switches are in the OFF position**
4. **EXECUTE JPM SCENARIO**
5. **TRIGGER JPM-012 Lesson Step**
6. **VERIFY TCB-01 breaker is red box failed as is.**

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

PERFORM RPS LOGIC MATRIX TEST UNIT 2

CANDIDATE ______________________________________

EXAMINER ______________________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST LUCIE NUCLEAR PLANT

Task: Monitor the RPS

Alternate Path: Yes X **No** ____

Facility JPM #: 0821103 / modified

Task Standard: Perform an RPS Logic Matrix test Unit 2

Preferred Evaluation Location:

Simulator X Control Room ______ In-Plant ______

Preferred Evaluation Method:

Perform X Simulate _____

References: 2-OSP-62.02 RPS LOGIC MATRIX TEST, Revision 1

Validation Time 15 minutes **Time Critical** No

Candidate: ______________________________ Time Start ________
Name Time Finish ________

Performance Rating: Sat ______ Unsat ____________

Examiner: ________________________ **Signature:** ____________________

Tools/Equipment/ Procedures Needed:
2-OSP-62.02 RPS LOGIC MATRIX TEST

Read to Candidate

Directions to candidate for In-Plant or Control Room JPMs:

I will explain the initial conditions and state the task to be performed. All in-plant or control room JPM steps, including any communications, shall be simulated for this JPM. Under no circumstances, unless directed by the examiner, are you to operate any plant equipment. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Directions to candidate for Simulator JPMs:

I will explain the initial conditions and state the task to be performed. All simulator JPM steps, including any communications, shall be performed for this JPM. You are you to operate any plant equipment that is necessary for the completion of this JPM. The simulator will provide the cues as you perform this JPM. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Initial Conditions: The Unit is operating at full power and the periodic surveillance of the RPS is being performed.

- Sections 7.1, 7.2 , 7.3 and 7. 4 of the test have been already been satisfactorily completed.
- Limits and Precautions section has been reviewed and all requirements for the test have been set ready. Shift Briefing Appendix A is available for review if desired.
- System Alignment for Testing (7.1) has been completed and the RPS Test Power Supply is energized.

Initiating Cues: The ANPS has directed you to complete the Two-Out-Of-Four Logic Matrix Tests IAW 2-OSP-62.02 RPS LOGIC MATRIX TEST. For the purpose of this JPM, the 'Two Man Rule' will **NOT** be performed during this evolution.

Start Time ________

Step 1: Review Limits and Precautions, Check System Alignment for Testing. Standard: Operator may wish to review the Limits-Precautions and Test Alignment and Shift Breifing Appendix-A prior to beginning the test. (This is an acceptable candidate option) Cue: (RPS panel A) **Section 4.0 Precautions/Limits and Section 7.1 System Alignment for Testing of the RPS test procedure are complete.** Comments:	Sat ____ Unsat ____
Step 2: Depress and hold the AB Matrix Relay Hold pushbutton and verify that the four Hold lights are lit. (step 7.4.3A) Standard: Operator depresses and holds the Matrix Relay Hold pushbutton, observes the four hold lights to be illuminated Cue: (RPS panel A) **Matrix Relay Hold pushbutton depressed and held, four hold lights illuminated*** Comments: * If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly.	**Critical Step** Sat ____ Unsat ____
Step 3: Place the AB Channel Trip Select switch in position 1 and verify ALL four white AB Matrix Relay lights are NOT LIT (step 7.4.3C) Standard: Operator places the Channel Trip select switch to position 1, verifies the four AB Matrix Relay lights are OFF Cue: (RPS panel A) **Channel Trip select switch to position 1, all four white AB Matrix Relay lights not illuminated*** Comments:	**Critical Step** Sat ____ Unsat __

Step 4: Place the AB Matrix Relay Trip Select switch to position 1 and verify the following lights change status: (step 7.4.3D) **AB1**: Hold, NOT LIT Drop out, LIT, **RPS TRIP STATUS PANEL**:K1 Relay NOT LIT, TCB-1 & TCB-5 Position, OPEN, Left Side Phase Current: LIT Standard: Operator places the AB Matrix Relay Trip select switch to position 1 and observes the following: **AB1**: Hold, NOT LIT Drop out, LIT **RPS TRIP STATUS PANEL**: K1 Relay, NOT LIT TCB-1, **CLOSED** TCB-5, OPEN Left Side Phase Current: LIT Cue: (RPS panel A) **AB1**: Hold, NOT LIT Drop out, LIT **RPS TRIP STATUS PANEL**: K1 Relay, NOT LIT TCB-1, **CLOSED** TCB-5, OPEN Left Side Phase Current: LIT Comments: * If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly.	Sat ____ Unsat ____
Step 5: *Back out of the RPS logic Matrix test by performing the following:* Rotate the channel trip select switch to the OFF position (Appendix-A, Shift Brief; Step 1.E.2.a Safe Condition 3-steps.) Standard: Operator rotates the channel trip select switch to the OFF position Cue: (RPS panel A) **Channel trip select switch in OFF*** Comments:	**Critical Step** Sat ____ Unsat ____

Step 6: Slowly release the Matrix Hold pushbutton (Appendix-A, Shift Brief; Step 1.E.2.a Safe Condition 3-steps.) Standard: Operator releases the Matrix Hold pushbutton Cue: (RPS panel A) **Matrix Hold pushbutton released*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 7: Rotate the Matrix Relay Trip select switch to the OFF position (Appendix-A, Shift Brief; Step 1.E.2.a Safe Condition 3-steps.) Standard: Operator rotates the Matrix Relay Trip select switch to the OFF position Cue: (RPS panel A) **Matrix Relay Trip select switch in OFF*** Comments: * If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly.	**Critical Step** Sat ____ Unsat ____

Stop Time ________

CANDIDATE CUE SHEET

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF TASK)

Initial Conditions: The Unit is operating at full power and the periodic surveillance of the RPS is being performed.

- Sections 7.1, 7.2 , 7.3 and 7. 4 of the test have been already been satisfactorily completed.
- Limits and Precautions section has been reviewed and all requirements for the test have been set ready. Shift Briefing Appendix A is available for review if desired.
- System Alignment for Testing (7.1) has been completed and the RPS Test Power Supply is energized.

Initiating Cues: The ANPS has directed you to complete the Two-Out-Of-Four Logic Matrix Tests IAW 2-OSP-62.02 RPS LOGIC MATRIX TEST. For the purpose of this JPM, the 'Two Man Rule' will **NOT** be performed during this evolution.

FPL	**ST. LUCIE UNIT 2** **OPERATIONS SURVEILLANCE PROCEDURE** SAFETY RELATED	Procedure No. **2-OSP-62.02** Current Revision No. **1** Effective Date **11/05/99**

Title:

RPS LOGIC MATRIX TEST

Responsible Department: **OPERATIONS**

REVISION SUMMARY:

REVISION 1 – THIS PROCEUDRE HAS BEEN COMPLETELY REWRITTEN. Modified and incorporated TC #99-141 and first time use comments for improvement, checked the TCB armature in the UP position during two out of four logic matrix tests while the Matrix relay trip select switch is in a numbered position, added steps to RTGB Manual Trip Pushbutton Operability Test, and added light color to tables for the HOLD and DROP OUT lights. Also added color to the Trip Unit lights for human factors. (Bill Scott, 10/28/99)

REVISION 0 – *Previously issued as OP 2-1400059.* This procedure provides instructions for the periodic checks of the Reactor Protection System (RPS) circuitry to satisfy Technical Specification Surveillance Requirements 4.3.1.1.1, Table 4.3-1 items 1, 11 and 12. (Bill Scott, 10/05/99)

APPLICABLE PAGES only

(105 pps)

Revision	FRG Review Date	Approved By	Approval Date
0	10/05/99	R.G. West Plant General Manager	10/05/99
1	10/28/99	R. G. West Plant General Manager N/A Designated Approver	10/28/99

S_2_OPS	
DATE	
DOCT	PROCEDURE
DOCN	2-OSP-62.02
SYS	
COM	COMPLETED
ITM	1

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3.0 PREREQUISITES INITIAL

3.1 The Steam Generator levels shall be greater than the Low RPS S/G Level trip set point.

_______ ANPS

3.2 If performing Trip Relay contact testing, Then I&C Maintenance is available with test equipment for performing K-Relay testing.

_______ ANPS

3.3 If applicable, System Load Dispatcher has been notified.

_______ ANPS

4.0 PRECAUTIONS / LIMITATIONS

4.1 When TCBs are opened, the breaker armature shall be verified in the closed air gap (down) position prior to reclosing the TCBs. These may be manually assisted if necessary.

4.2 TCB-9 shall be closed before beginning this test to ensure synchronizing capabilities exist.

4.3 Failure to allow at least a five-second-time delay between opening and closing TCBs may result in breaker damage. This time delay allows the breaker to attain equilibrium conditions prior to operating in the opposite direction and reduces heating effects on the breaker internals.

4.4 During low mode operation (Modes 3, 4 and 5), this surveillance is a prerequisite for other testing procedures. Due to low RCS pressure and flow, TCBs will NOT close unless the following keylock bypass switches are bypassed:

- Zero Power Mode.
- Low SG Pressure.

4.5 Trip Relay contact testing is only required to be performed on one logic matrix on an 18 month frequency or for PMT on trip relay replacement.

4.6 It is the expectation of St. Lucie Plant Management that the Control Room staff will utilize the Two-Man rule while performing the testing sections of this procedure. In this process, one licensed operator reads the procedural step and a second licensed operator performs the action. The reader then verifies the correct performance and signs for the step.

5.0 RECORDS REQUIRED

5.1 RCO Chronological Log entries.

5.2 Completed sections of this procedure shall be processed as QA records in accordance with QI-17-PSL-1, Quality Assurance Records.

5.3 Completed appendices of this procedure shall be processed as QA records in accordance with QI-17-PSL-1, Quality Assurance Records.

6.0 ACCEPTANCE CRITERIA

6.1 Verification Of Matrix Relay Hold Coils is satisfactory if for each Matrix Relay Trip Select switch position, all Matrix Relay Hold lights responded as indicated.

6.2 Verification Of Bistable Trip Unit Test Coils is satisfactory if for each Channel Trip Select switch position, all Trip Unit lights responded as indicated.

6.3 The Two-Out-Of-Four Logic Matrix Test is satisfactory all actions responded as indicated.

6.4 The Trip Matrix Fuse Test is satisfactory if all actions responded as indicated for each RPS Trip Matrix.

6.5 The RTGB Manual Trip Pushbutton Operability Test is satisfactory if all actions responded as indicated for each Reactor Trip Channel TCB pushbutton.

7.0 INSTRUCTIONS

INITIAL

7.1 System Alignment For Testing

NOTE
This section does NOT require the two-man rule.

1. ENSURE a shift briefing has been conducted in accordance with Appendix A, Shift Briefing For RPS Logic Matrix Test. ______

2. If TCBs are NOT CLOSED, Then ENSURE that **ALL** applicable sections of OP 2-1210051, Wide Range Nuclear Instrumentation Channels Functional Test, have been completed within the last seven days.

   Date last performed: ____/____/____ ______

3. If TCBs are required to be closed and **EITHER** of the following conditions exist:

   - RCS pressure is less than the RPS TMLP trip setpoint,
   - Less than four RCPs are running,

   Then PLACE **ALL** of the following Zero Power Mode Trip Bypass key-switches to the BYPASS position:

SWITCH POSITION	RPS PANELS				INITIAL
	MA	MB	MC	MD	
	Key 115	Key 116	Key 117	Key 118	
BYPASS (✔)					______

4. If TCBs are required to be closed and Steam Generator pressure is less than 600 psia, Then PLACE **ALL** of the following Low SG Pressure Trip Bypass key-switches to the BYPASS position:

SWITCH POSITION	RPS PANELS				INITIAL
	MA	MB	MC	MD	
	Key 119	Key 120	Key 121	Key 122	
BYPASS (✔)					______

7.1 System Alignment For Testing (continued) INITIAL

5. VERIFY **ALL** TCBs (TCB-1 through TCB-9) are CLOSED. _______

- If **ALL** TCBs are NOT CLOSED, Then REFER TO 2-NOP-66.01, CEDM MG Set Operation. _______

6. ENSURE **ALL** of the following **Matrix** Relay Trip Select switches are in the OFF position:

SWITCH POSITION	MATRIX RELAY TRIP SELECT SWITCHES						INITIAL
	AB	BC	BD	AC	CD	AD	
OFF (✔)							_______

7. ENSURE **ALL** of the following **Channel** Trip Select switches are in the OFF position:

SWITCH POSITION	CHANNEL TRIP SELECT SWITCHES						INITIAL
	AB	BC	BD	AC	CD	AD	
OFF (✔)							_______

8. ENSURE **ALL** 12 DC Power Supply red lights (three lights each) are LIT on the following panels:

LIGHTS PS-1, PS-2, PS-3	RPS PANELS				INITIAL
	MA	MB	MC	MD	
LIT (✔)					_______

9. ENSURE **ALL** 11 Trip Units red lights (three lights each) are NOT LIT on the following panels:

TRIP LIGHTS	RPS PANELS				INITIAL
	MA	MB	MC	MD	
NOT LIT (✔)					_______

7.1 System Alignment For Testing (continued) INITIAL

10. VERIFY **ALL** four white Matrix Relay Lights for each RPS Matrix are LIT:

MATRIX LIGHT	RPS MATRIX RELAY LIGHTS						INITIAL
	AB	BC	BD	AC	CD	AD	
LIT (✔)							_______

- If **ANY** of the white Matrix Relay Lights are NOT LIT and the bulbs have been checked, Then NOTIFY ICM. _______

11. ENERGIZE the Test Power Supply, as follows:

A. DEPRESS the Test Power pushbutton. _______

B. VERIFY the following light INDICATION:

TEST POWER SUPPLY LIGHTS	CONDITION	INITIAL
TEST POWER	LIT	_______
Left GND DET	LIT	_______
Right GND DET	LIT	_______

END OF SECTION 7.1

7.5 Two-Out-Of-Four Logic AB Matrix Test (continued) INITIAL

3. (continued)

D. PLACE the AB **Matrix** Relay Trip Select switch to Position 1 and VERIFY the following lights change status:

LIGHTS	AB MATRIX LIGHTS				INITIAL
	AB1	AB2	AB3	AB4	
HOLD (red)	**NOT LIT**	--	--	--	______
DROP OUT (green)	**LIT**	--	--	--	______

LIGHTS	RPS TRIP STATUS PANEL	INITIAL
K-1 RELAY	**NOT LIT**	______
TCB-1 & TCB-5 POSITION	**OPEN**	______
LEFT SIDE PHASE CURRENT	**LIT**	______

CONDITION	LOCAL AT TCBs	INITIAL
TCB-1	OPEN & Armature in UP position	______
TCB-5	OPEN & Armature in UP position	______

E. If Trip Path Relay K-1 contacts testing is to be conducted by ICM, Then PERFORM Appendix B, K-Relay Trip Path Test. ______

F. PLACE the AB **Matrix** Relay Trip Select switch to the MID-Position Between Position 1 and Position 2 and VERIFY the following:

LIGHTS	AB MATRIX LIGHTS				INITIAL
	AB1	AB2	AB3	AB4	
HOLD (red)	LIT	LIT	LIT	LIT	______
DROP OUT (green)	NOT LIT	NOT LIT	NOT LIT	NOT LIT	______

LIGHTS	RPS TRIP STATUS PANEL	INITIAL
K-1 RELAY	LIT	______
TCB-9 POSITION	CLOSED	______

CONDITION	LOCAL AT TCBs	INITIAL
TCB-1	Armature in DOWN position	______
TCB-5	Armature in DOWN position	______

7.5 Two-Out-Of-Four Logic AB Matrix Test (continued) INITIAL

3. (continued)

G. CLOSE **BOTH** TCB-1 and TCB-5 by turning the Trip Circuit Breaker Reset switch to RESET and VERIFY the following:

LIGHTS	RPS TRIP STATUS PANEL	INITIAL
TCB-1 POSITION	CLOSED	____
TCB-5 POSITION	CLOSED	____
LEFT SIDE PHASE CURRENT	NOT LIT	____

CONDITION	LOCAL AT TCBs	INITIAL
TCB-1 POSITION	CLOSED	____
TCB-5 POSITION	CLOSED	____

H. PLACE the AB **Matrix** Relay Trip Select switch to Position 2 and VERIFY the following lights change status:

LIGHTS	AB MATRIX LIGHTS				INITIAL
	AB1	AB2	AB3	AB4	
HOLD (red)	--	**NOT LIT**	--	--	____
DROP OUT (green)	--	**LIT**	--	--	____

LIGHTS	RPS TRIP STATUS PANEL	INITIAL
K-2 RELAY	**NOT LIT**	____
TCB-2 & TCB-6 POSITION	**OPEN**	____
LEFT SIDE PHASE CURRENT	**LIT**	____

CONDITION	LOCAL AT TCBs	INITIAL
TCB-2	OPEN & Armature in the UP position	____
TCB-6	OPEN & Armature in the UP position	____

I. If Trip Path Relay K-2 contacts testing is to be conducted by ICM, Then PERFORM Appendix B, K-Relay Trip Path Test. ____

7.5 Two-Out-Of-Four Logic AB Matrix Test (continued) INITIAL

3. (continued)

J. PLACE the AB **Matrix** Relay Trip Select switch to the MID-Position Between Position 2 and Position 3 and VERIFY the following:

LIGHTS	AB MATRIX LIGHTS				INITIAL
	AB1	AB2	AB3	AB4	
HOLD (red)	LIT	LIT	LIT	LIT	______
DROP OUT (green)	NOT LIT	NOT LIT	NOT LIT	NOT LIT	______

LIGHTS	RPS TRIP STATUS PANEL	INITIAL
K-2 RELAY	LIT	______
TCB-9 POSITION	CLOSED	______

CONDITION	LOCAL AT TCBs	INITIAL
TCB-2	Armature in the DOWN position	______
TCB-6	Armature in the DOWN position	______

K. CLOSE **BOTH** TCB-2 and TCB-6 by turning the Trip Circuit Breaker Reset switch to RESET and VERIFY the following:

LIGHTS	RPS TRIP STATUS PANEL	INITIAL
TCB-2 POSITION	CLOSED	______
TCB-6 POSITION	CLOSED	______
LEFT SIDE PHASE CURRENT	NOT LIT	______

CONDITION	LOCAL AT TCBs	INITIAL
TCB-2 POSITION	CLOSED	______
TCB-6 POSITION	CLOSED	______

7.5 Two-Out-Of-Four Logic AB Matrix Test (continued) INITIAL

3. (continued)

L. PLACE the AB **Matrix** Relay Trip Select switch to Position 3 and VERIFY the following lights change status:

LIGHTS	AB MATRIX LIGHTS				INITIAL
	AB1	AB2	AB3	AB4	
HOLD (red)	--	--	**NOT LIT**	--	______
DROP OUT (green)	--	--	**LIT**	--	______

LIGHTS	RPS TRIP STATUS PANEL	INITIAL
K-3 RELAY	**NOT LIT**	______
TCB-3 & TCB-7 POSITION	**OPEN**	______
RIGHT SIDE PHASE CURRENT	**LIT**	______

CONDITION	LOCAL AT TCBs	INITIAL
TCB-3 POSITION	OPEN & Armature in the UP position	______
TCB-7 POSITION	OPEN & Armature in the UP position	______

M. If Trip Path Relay K-3 contacts testing is to be conducted by ICM, Then PERFORM Appendix B, K-Relay Trip Path Test. ______

N. PLACE the AB **Matrix** Relay Trip Select switch to the MID-Position Between Position 3 and Position 4 and VERIFY the following:

LIGHTS	AB MATRIX LIGHTS				INITIAL
	AB1	AB2	AB3	AB4	
HOLD (red)	LIT	LIT	LIT	LIT	______
DROP OUT (green)	NOT LIT	NOT LIT	NOT LIT	NOT LIT	______

LIGHTS	RPS TRIP STATUS PANEL	INITIAL
K-3 RELAY	LIT	______
TCB-9 POSITION	CLOSED	______

CONDITION	LOCAL AT TCBs	INITIAL
TCB-3 POSITION	Armature in the DOWN position	______
TCB-7 POSITION	Armature in the DOWN position	______

7.5 Two-Out-Of-Four Logic AB Matrix Test (continued) INITIAL

3. (continued)

O. CLOSE **BOTH** TCB-3 and TCB-7 by turning the Trip Circuit Breaker Reset switch to RESET and VERIFY the following:

LIGHTS	RPS TRIP STATUS PANEL	INITIAL
TCB-3 POSITION	CLOSED	______
TCB-7 POSITION	CLOSED	______
RIGHT SIDE PHASE CURRENT	NOT LIT	______

CONDITION	LOCAL AT TCBs	INITIAL
TCB-3 POSITION	CLOSED	______
TCB-7 POSITION	CLOSED	______

P. PLACE the AB **Matrix** Relay Trip Select switch to Position 4 and VERIFY the following lights change status:

LIGHTS	AB MATRIX LIGHTS				INITIAL
	AB1	AB2	AB3	AB4	
HOLD (red)	--	--	--	**NOT LIT**	______
DROP OUT (green)	--	--	--	**LIT**	______

LIGHTS	RPS TRIP STATUS PANEL	INITIAL
K-4 RELAY	**NOT LIT**	______
TCB-4 & TCB-8 POSITION	**OPEN**	______
RIGHT SIDE PHASE CURRENT	**LIT**	______

CONDITION	LOCAL AT TCBs	INITIAL
TCB-4 POSITION	OPEN & Armature in the UP position	______
TCB-8 POSITION	OPEN & Armature in the UP position	______

Q. If Trip Path Relay K-4 contacts testing is to be conducted by ICM, Then PERFORM Appendix B, K-Relay Trip Path Test. ______

7.5 Two-Out-Of-Four Logic AB Matrix Test (continued) INITIAL

3. (continued)

R. PLACE the AB **Matrix** Relay Trip Select switch to the OFF Position and VERIFY the following:

LIGHTS	AB MATRIX LIGHTS				INITIAL
	AB1	AB2	AB3	AB4	
HOLD (red)	LIT	LIT	LIT	LIT	______
DROP OUT (green)	NOT LIT	NOT LIT	NOT LIT	NOT LIT	______

LIGHTS	RPS TRIP STATUS PANEL	INITIAL
K-4 RELAY	LIT	______
TCB-9 POSITION	CLOSED	______

CONDITION	LOCAL AT TCBs	INITIAL
TCB-4 POSITION	Armature in the DOWN position	______
TCB-8 POSITION	Armature in the DOWN position	______

S. CLOSE **BOTH** TCB-4 and TCB-8 by turning the Trip Circuit Breaker Reset switch to RESET and VERIFY the following:

LIGHTS	RPS TRIP STATUS PANEL	INITIAL
TCB-4 POSITION	CLOSED	______
TCB-8 POSITION	CLOSED	______
RIGHT SIDE PHASE CURRENT	NOT LIT	______

CONDITION	LOCAL AT TCBs	INITIAL
TCB-4 POSITION	CLOSED	______
TCB-8 POSITION	CLOSED	______

T. PLACE the AB **Channel** Trip Select switch to the OFF Position and VERIFY **ALL** four white AB Matrix Relay lights are LIT. ______

U. SLOWLY RELEASE the AB Matrix Relay HOLD pushbutton. ______

7.5 Two-Out-Of-Four Logic AB Matrix Test (continued)

4. VERIFY the following acceptance criteria:

- This surveillance is satisfactory **ALL** actions responded as indicated.
- If **ANY** action did NOT respond as indicated in Mode 1 or 2, Then REFER TO Tech Spec Table 3.3-1 and PERFORM required action within 1 hour.
- If **ANY** action did NOT respond as indicated in Mode 3, 4 or 5, Then REFER TO Tech Spec Table 3.3-1 and PERFORM required action.

Results of this surveillance have been reviewed and compared to the Acceptance Criteria. Based on this review, the surveillance is ❒ SAT ❒ UNSAT .

Reviewed By: ______________________________ Date: ___/___/___
NPS/ANPS

Remarks:____
____
____
____
____
____
____
____
____
____
____
____

END OF SECTION 7.5

7.5 Two-Out-Of-Four Logic AB Matrix Test — INITIAL

CAUTION

If testing must be terminated for any reason, the following steps should be taken in order to avoid a trip condition:

1. Rotate the Channel Trip Select switch to the OFF position.
2. SLOWLY release the Matrix Relay Hold pushbutton.
3. Rotate the Matrix Relay Trip Select switch to the OFF position.
4. Re-enter at the beginning of this section when testing is to resume.

NOTE

Documentation is required at the end of this section when any or all of this section is completed.

1. ENSURE Section 4.0, Precautions / Limitations, has been reviewed. ______

2. ENSURE Section 7.1, System Alignment For Testing, is complete. ______

3. PERFORM the AB Matrix test on RPS Panel MA, as follows:

A. DEPRESS and HOLD the AB Matrix Relay HOLD pushbutton. ______

B. VERIFY **ALL** four red AB Matrix Relay HOLD lights are LIT. ______

- If **ANY** of the Matrix Relay HOLD lights are NOT LIT and the bulbs have been checked, Then NOTIFY ICM. ______

C. PLACE the AB **Channel** Trip Select switch to Position 1 and VERIFY **ALL** four white AB Matrix Relay lights are NOT LIT. ______

APPENDIX A
SHIFT BRIEFING FOR RPS LOGIC MATRIX TEST
(Page 1 of 4)

INITIAL

1. REVIEW the following items that are applicable to the current plant conditions:

A. Communications:

1. It is the expectation of St. Lucie Plant Management that the Control Room staff will utilize the Two-Man rule while performing the testing sections of this procedure. _______

- In this process, one licensed operator reads the procedural step and a second licensed operator performs the action. _______

- The reader then verifies the correct performance and signs for the step. _______

2. Communication shall be established with an operator at the TCBs when local verification of TCB trip position is required. _______

3. This is a load threatening surveillance procedure. The local operator at the TCBs should NOT try to follow along with the procedure in hand. The operator performs the checks communicated from the Control Room. This method of performance allows the local operator to perform the required check without slowing down the performance of the procedure. _______

4. If performing Trip Relay contact testing, Then the following shall be set up in advance:

- I&C Maintenance shall be available with test equipment for performing K-Relay testing. _______

- Covers for measuring voltages for K-Relay testing should be removed at the beginning of the test. _______

APPENDIX A
SHIFT BRIEFING FOR RPS LOGIC MATRIX TEST
(Page 2 of 4)

INITIAL

1. (continued)

B. Plant Conditions:

1. If in Modes 1 or 2, failure of the test results in a one-hour action statement per Tech Spec 3.3.1 Table 3.3-1 Action 2. _______

2. If applicable, System Load Dispatcher is to be notified. _______

3. The Steam Generator levels shall be greater than the Low RPS S/G Level trip set point. _______

4. TCB-9 shall be closed before beginning this test to ensure synchronizing capabilities exist. _______

5. During low mode operation (Modes 3, 4 and 5), this surveillance is a prerequisite for other testing procedures. Due to low RCS pressure and flow, TCBs will NOT close unless the following keylock bypass switches are bypassed:

   - Zero Power Mode. _______
   - Low SG Pressure. _______

C. Trip Relay contact testing is only required to be performed on one logic matrix on an 18 month frequency or for PMT on trip relay replacement. _______

D. Equipment Special requirements:

1. When TCBs are opened, the breaker armature shall be verified in the closed air gap (down) position prior to reclosing the TCBs. These may be manually assisted if necessary. _______

APPENDIX A
SHIFT BRIEFING FOR RPS LOGIC MATRIX TEST
(Page 3 of 4)

INITIAL

1. (continued)

E. Matrix Relay Hold pushbutton:

1. This pushbutton becomes difficult to maintain in a depressed condition for prolonged periods. ______

2. How do we place the system in a safe condition in the event that the operator needs to release the pushbutton?

a. PERFORM the following three steps:

1. Rotate the Channel Trip Select switch to the OFF position. ______

2. SLOWLY release the Matrix Relay Hold pushbutton. ______

3. Rotate the Matrix Relay Trip Select switch to the OFF position. ______

3. If TCBs are tripped in the procedure and after performing the three steps to place the system in a safe condition, is it permissible to reset the TCBs?

YES. After a careful evaluation of operability, the RPS Panel has been returned to the original status and plant conditions permit, then RESET the TCBs.

APPENDIX A
SHIFT BRIEFING FOR RPS LOGIC MATRIX TEST
(Page 4 of 4)

INITIAL

1. (continued)

F. Acceptance Criteria:

1. What is the Acceptance Criteria for the sections of the procedure to be performed?

- Discuss the requirements of Section 6.0, Acceptance Criteria, for the sections to be performed. ______

2. What are the actions to be performed in the event of unsatisfactory results?

- Discuss Tech Spec action requirements for unsatisfactory results. ______

END OF APPENDIX A

ECCS JPM-006 SET-UP INSTRUCTIONS

PREPARATION:

Ahead of time, prepare a full Safety Injection Tank Fill Procedure 2-0410021. Ensure sections 5.1 thru 5.4 are already signed off.

EXECUTE JPM:

1. INSTALL IC-1 (100% Power, MOL Steady State)
2. EXECUTE JPM SCENARIO
3. TRIGGER JPM-006 Lesson Step
4. RUN Simulator for two minutes
5. VERIFY Annunciators R-1, R-21, and R-31 are in.

IMPORTANT NOTE:

There is a simulator DR open in the response of the Header Isolation valve. The pressure throttling response of the valve is currently UnSat and will need to be resolved prior to administration of this JPM.

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

FILL A SAFETY INJECTION TANK UNIT 2

CANDIDATE ____

EXAMINER ____

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST LUCIE NUCLEAR PLANT

Task: Fill a Safety Injection Tank

Alternate Path: Yes _____ **No** __X__

Facility JPM #: New

Task Standard: Successfully fill 2A1 Safety Injection Tank

Preferred Evaluation Location:

Simulator __X__ Control Room ______ In-Plant _____

Preferred Evaluation Method:

Perform __X__ Simulate _____

References: OP 2-0410021, "Safety Injection Tank Normal Operation"

Validation Time __15 minutes__ **Time Critical** __No__

Candidate: ______________________________ Time Start __________
Name Time Finish __________

Performance Rating: Sat ______ Unsat ______ Question Grade _______

Examiner: ______________________ **Signature:** ________________
Name

Tools/Equipment/ Procedures Needed:
OP 2-0410021, "Safety Injection Tank Normal Operation"

Read to Candidate

Directions to candidate for In-Plant or Control Room JPMs:

I will explain the initial conditions and state the task to be performed. All in-plant or control room JPM steps, including any communications, shall be simulated for this JPM. Under no circumstances, unless directed by the examiner, are you to operate any plant equipment. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Directions to candidate for Simulator JPMs:

I will explain the initial conditions and state the task to be performed. All simulator JPM steps, including any communications, shall be performed for this JPM. You are you to operate any plant equipment that is necessary for the completion of this JPM. The simulator will provide the cues as you perform this JPM. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Initial Conditions: Unit 2 is at 100% power. Annunciator R-1, R-21 and R-31are in alarm. The 2A1 Safety Injection Tank level has decreased below normal operating band.

Initiating Cues: The ANPS has directed you to fill the 2A1 SIT to normal operating level IAW OP 2-0410021 using the 2A HPSI pump.

Start Time ________

Step 1: Prior to filling SITs, ensure makeup water is between 1720 and 2100 ppm boron (step 8.3.1) Standard: Operator verifies RWT boron concentration between 1720 and 2100 ppm by contacting Chemistry or looking at Chemistry report Cue: **Chemistry reports RWT boron at 1900 ppm*** Comments:	Sat ____ Unsat ____
Step 2: Ensure the loop SI headers are less than 1100 psig by verifying the absence of SI header high pressure annunciators (step 8.3.2) Standard: Operator observes absence of SI header high pressure annunciators Cue: (RTGB 206) **No SI header high pressure annunciators present*** Comments:	Sat ____ Unsat ____
Step 3: If dilution of the SI header is indicated, then recirc the header per section 8.6.2 (step 8.3.3) Standard: Operator observes no backleakage from RCS loop check valve indicated Cue: (RTGB 206) **No loop check valve leakage indicated*** Comments:	Sat ____ Unsat ____
Step 4: Start the 2A HPSI pump (step 8.3.4) Standard: Operator announces and starts the 2A HPSI pump by placing the control switch to START Cue: (RTGB 206) **2A HPSI indicates red light illuminated, amps stable*** Comments:	**Critical Step** Sat ____ Unsat ____

* If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly.

Step 5: Open V3621 (SIT fill and drain valve) (step 8.3.5) Standard: Operator places the control switch for V3621 to the OPEN position Cue: (RTGB 206) **V3621 indicates red light illuminated*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 6: Open HCV-3628 (SI loop check valve leakage valve) (step 8.3.6) Standard: Operator rotates controller knob to obtain full output on controller and observes red light indication Cue: (RTGB 206) **HCV-3628 indicates red light illuminated*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 7: CAUTION: Do not exceed 700 psig on SIT loop pressure indiction Throttle open HCV-3627 (HPSI header isolation valve) (step 8.3.7) Standard: Operator throttles open HCV-3627 while observing 2A1 SIT header loop pressure and ensures not to exceed 700 psig Cue: (RTGB 206) **HCV-3627 indicates dual indication, 2A1 SIT loop header pressure <700 psig*** Comments:	**Critical Step** Sat ____ Unsat ____

* If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly.

Step 8: Monitor and maintain SIT pressure ≤ 565 psig (step 8.3.8) Standard: Operator monitors SIT pressure ≤ 565 psig. When (if) pressure exceeds 545 psig, he crossties the nitrogen fill lines between SITs to reduce pressure by opening V3622, V3612, V3632 and V3642 Cue: (RTGB 206) **Pressure < 545 psig, (V3622, V3612, V3632 and V3642 indicate red lights Illuminated, green lights illuminated after pressure decreases < 545 psig)*** Comments: (Candidate may elect to cross-tie SIT vents to equalize pressure during fill)	**Critical Step (if valves are manipulated)** Sat ____ Unsat ____
Step 9: When SIT is filled to desired level, then close HCV-3627 (step 8.3.9) Standard: Operator takes control switch for HCV-3627 to close, observes green light indication Cue: (RTGB 206) **HCV-3627 indicates green light illuminated*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 10: Close V3621 (SIT fill and drain valve) (step 8.3.10) Standard: Operator places control switch for V3621 to CLOSED Cue: (RTGB 206) **V3621 indicates green light illuminated*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 11: Close HCV-3628 (SI loop check valve leakage valve) (step 8.3.11) Standard: Operator rotates controller knob to obtain zero output on controller, and observes green light indicated on HCV-3628 Cue: (RTGB 206) **HCV-3628 indicates green light illuminated*** Comments:	**Critical Step** Sat ____ Unsat ____

* If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly.

Step 12: Stop 2A HPSI pump and return the control switch to AUTO (step 8.3.12) Standard: Operator places the control switch for the 2A HPSI pump to OFF and then to the AUTO position Cue: (RTGB 206) **2A HPSI pump indicates green light illuminated, switch in mid-position*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 13: Record SIT post fill data on Data Sheet 1 (step 8.3.13) Standard: Operator records post fill data on Data Sheet 1 Cue: **Data Sheet 1 completed** Comments:	Sat ____ Unsat ____
Step 14: Notify Tech Staff to perform Data Sheet 25* Standard: Operator contacts Tech Staff to perform Data Sheet 25 Cue: **Tech Staff acknowledges*** Comments: **End of Task**	Sat ____ Unsat ____

* If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly.

Stop Time ________

CANDIDATE CUE SHEET

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF TASK)

Initial Conditions: Unit 2 is at 100% power. Annunciator R-1, R-21 and R-31are in alarm. The 2A1 Safety Injection Tank level has decreased below normal operating band.

Initiating Cues: The ANPS has directed you to fill the 2A1 SIT to normal operating level IAW OP 2-0410021 using the 2A HPSI pump.

REVISION: 0	PROCEDURE TITLE: ANNUNCIATOR RESPONSE PROCEDURE	PANEL: R
PROCEDURE NO: 2-ARP-01-R1	ST. LUCIE UNIT 2	WINDOW: 1

ANNUNCIATOR PANEL R

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60

2A1 SIT
PRESS
HIGH/LOW

R-1

DEVICE:
PIA-3321

LOCATION:
RTGB 206

SETPOINT:
High 570 psig rising
Low 540 psig dropping

ALARM CONFIRMATION:
1. PIA-3321, SI Tank 2A1 Pressure

OPERATOR ACTIONS:
1. If SIT level is outside normal operating bands or is unexpectedly changing, Then REFER TO R-31, 2A1 SIT LEVEL HIGH/LOW.
2. ENSURE SIT nitrogen supply valves and vent valves are aligned in accordance with OP 2-0410021, Safety Injection Tank Normal Operation.
3. ESTABLISH proper SIT pressure in accordance with OP 2-0410021, Safety Injection Tank Normal Operation.

CAUSES: System leak, valve misalignment or temperature change.

REFERENCES:
1. CWD 2998-B-327 sheet 281
2. P&ID 2998-G-078 sheet 132
3. TEDB

REVISION: 0	PROCEDURE TITLE: ANNUNCIATOR RESPONSE PROCEDURE	PANEL: R
PROCEDURE NO: 2-ARP-01-R21	ST. LUCIE UNIT 2	WINDOW: 21

ANNUNCIATOR PANEL R

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60

2A1 SIT PRESS LOW-LOW

R-21

DEVICE:
PIS-3322

LOCATION:
RCB/49/N-50/W-10

SETPOINT:
515 psig dropping

ALARM CONFIRMATION:
1. PIA-3321, SI Tank 2A1 Pressure
2. R-1, 2A1 SIT PRESS HIGH/LOW in alarm

OPERATOR ACTIONS:
1. If SIT level is low or is dropping unexpectedly, Then REFER TO R-31, 2A1 SIT LEVEL HIGH/LOW.
2. ENSURE V3735 and V3736, SIT 2A1 Vent, are LOCKED CLOSED.
3. ENSURE SIT valves are aligned in accordance with OP 2-0410021, Safety Injection Tank Normal Operation.
4. ESTABLISH proper SIT pressure in accordance with OP 2-0410021, Safety Injection Tank Normal Operation.
5. If SIT pressure CAN NOT be maintained, Then ATTEMPT to identify leaks by visual inspection.

CAUSES: Decreasing SIT Level. SIT valve misalignment or system leak.

REFERENCES:
1. CWD 2998-B-327 sheet 1522
2. P&ID 2998-G-078 sheet 132
3. TEDB

REVISION:	PROCEDURE TITLE:	PANEL:
0	ANNUNCIATOR RESPONSE PROCEDURE	R
PROCEDURE NO:		WINDOW:
2-ARP-01-R31	ST. LUCIE UNIT 2	31

ANNUNCIATOR PANEL R

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60

2A1 SIT
LEVEL
HIGH/LOW

R-31

DEVICE:
LIA-3321

LOCATION:
RTGB-206

SETPOINT:
High 87% rising
Low 82.5% dropping

ALARM CONFIRMATION:
1. LIA-3321, SI Tank 2A1 Level

OPERATOR ACTIONS:
1. ENSURE SIT valves are aligned in accordance with OP 2-0410021, Safety Injection Tank Normal Operation.
2. If SIT Level is high or rising, Then PERFORM a primary leak rate in accordance with OP 2-0010125A, Data Sheet 1, Reactor Coolant System Water Inventory Balance.
   A. **If primary leak rate indicates the SIT level increase is from RCS, Then GO TO ONOP 2-0120031, Excessive Reactor Coolant System Leakage.**
3. If SIT Level is low or dropping, Then PERFORM the following:
   A. If V3624, SIT 2A1 Isolation, is OPEN, Then ENSURE RCS Pressure is greater than SIT pressure.
   B. DISPATCH an Operator to check for external system leaks.
   C. MONITOR LIS-07-6, Reactor Cavity Sump Level, for a higher rate of change.
   D. MONITOR LR-07-2D and LIS-07-02A thru D, Refueling Water Tank Level, for unexpected level rise.
   E. MONITOR other SIT levels for unexpected rise.
4. ESTABLISH proper SIT level in accordance with OP 2-0410021, Safety Injection Tank Normal Operation.
5. If an inadvertent SIT discharge to the RCS occurred, Then DETERMINE required reportability in accordance with AP 0010721, NRC Required Non-Routine Notifications and Reports.

CAUSES: High level could result from valve misalignment or valve leakage. Low level could result from valve misalignment or valve leakage, system leakage, or discharge into the RCS.

REFERENCES:
1. CWD 2998-B-327 sheet 281
2. P&ID 2998-G-078 sheet 132
3. TEDB

FPL	ST. LUCIE UNIT 2 OPERATING PROCEDURE SAFETY RELATED	Procedure No. **2-0410021** Current Rev. No. **36A** Effective Date: **12/02/99**

Title:

SAFETY INJECTION TANK NORMAL OPERATION

Responsible Department: **OPERATIONS**

Revision Summary

Revision 36A - Corrected note box in Data Sheet 1. (Bob Czachor, 11/10/99)

Revision 36 - Deleted Mode 4 requirement for SIT operability. (Gene Boyd, 05/04/99)

Revision 35 - Added a note to the front of each section requiring cross tying of the Nitrogen supply headers between SITs as required by PM 99-03-344.
(Gene Boyd, 04/21/99)

AND

This revision changes a procedure number from OP 2-0250020 to 2-NOP-02.24.
(Charlie Simpkins, 02/18/99)

AND

Minor correction to Step 8.3.14 to correct reference to Section 8.3. (J. S. Napier, 03/10/99)

(APPLICABLE PAGES INCLUDED)

Revision	FRG Review Date	Approved By	Approval Date
0	05/21/82	C. M. Wethy Plant General Manager	05/22/82
Revision	**FRG Review Date**	**Approved By**	**Approval Date**
36A	05/04/99	R. G. West Plant General Manager	05/04/99
		W. G. Guldemond Designated Approver	11/10/99

S_2_OPS
DATE
DOCT PROCEDURE
DOCN 2-0410021
SYS
COMP COMPLETED
ITM 36A

1.0 TITLE:

SAFETY INJECTION TANK NORMAL OPERATION

2.0 REVIEW AND APPROVAL:

See cover page.

3.0 PURPOSE:

This procedure provides instructions for normal valve alignment, initial filling and nitrogen or borated water makeup to the Safety Injection Tanks (SIT).

4.0 PRECAUTIONS AND LIMITS:

4.1 During plant cooldown, RCS pressure must be maintained greater than SIT pressure at all times to prevent SIT discharge to the RCS.

4.2 Notify personnel in the containment prior to venting a SIT, due to the loud noise emitted.

¶2 4.3 All SITs shall be operable in modes 1, 2 and 3 (with pressurizer press. greater than or equal to 1750 psia), operability includes: isolation valve open and power removed, level 81% - 88.5% on narrow range level instruments, boron concentration 1720 - 2100 ppm and N_2 pressure 500-650 psig. /R36

¶2 4.4 When in Mode 3 with pressurizer pressure less than 1750 psia, either of the following shall be operable: /R36

1. Three SITs operable, with isolation valves open and power removed, level 75-88.5%, boron concentration 1720-2100 ppm and N_2 pressure 235-650 psig.

2. All four SITs operable, with isolation valves open and power removed, level 49-88.5% boron concentration 1720-2100 ppm and N_2 pressure 235-650 psig.

¶2 4.5 The SIT isolation valves must be open in Modes 1-3. /R36

4.6 SITs shall NOT be filled when the RCS is on solid pressure control.

4.0 PRECAUTIONS AND LIMITS: (continued)

§1 4.7 V3551 and V3523, 2B HPSI Hot Leg Injection Header Isolations, are affected by V3523 inoperability. PSL-ENG-SEMS-98-119, Rev. 1, has V3551 deenergized in Locked Closed position and V3523 in Open, with breaker cubicle Thermal Overload Heaters removed.

5.0 RELATED SYSTEM STATUS:	INITIAL
5.1 The SITs shall be aligned in accordance with 2-NOP-03.31, Safety Injection Tanks Initial Alignment.	______
5.2 The Nitrogen System is aligned for normal operation.	______
5.3 The HPSI and LPSI Systems are aligned for operation according to plant conditions.	______
5.4 Instrument Air System is available to the air operated valves.	______

8.0 INSTRUCTIONS: (continued) INITIAL

8.3 Filling of SITs with RCS Pressure greater than 1500 psig.

¶1

> NOTE
> The practice of cross tying SIT Nitrogen Supply Lines has been evaluated by Engineering and concluded that this practice is within the bounds of analyzed conditions.

1. Prior to filling SITs, ensure SIT makeup water is between 1720 and 2100 ppm boron. ______
2. Ensure loop SI headers are less than 1100 psig by verifying the absence of SI header high pressure annunciators. If the 2B2 SI Hdr pressure indicator (PIA-3349) is in alarm, Then Fill the 2B2 SIT per step 8.4.15. ______
3. If dilution of the SI header is indicated (i.e., RCS loop check valve backleakage or maintenance on the header), Then recirc the header per section 8.6.2. ______
4. START 2A or 2B HPSI Pump. ______
5. OPEN V3621, V3611, V3631 or V3641 (SIT Fill and Drain Valve) for the SIT to be filled. ______
6. OPEN HCV-3618, HCV-3628, HCV-3638 or HCV-3648 (SI Loop Check Valve leakage valve) for appropriate SIT. ______

> CAUTION
> Do not exceed 700 psig on SIT loop pressure indication to prevent lifting relief valve on RWT return line.

7. If the 2A HPSI Pump is to be used, Then THROTTLE OPEN HCV-3617, HCV-3627, HCV-3637 or HCV-3647 (HPSI Header Isol) to appropriate SI header. If the 2B HPSI Pump is to be used, Then THROTTLE OPEN HCV-3616, HCV-3626, HCV-3636, HCV-3646 (B HPSI Header Isol) to appropriate SI header. ______

8.0 INSTRUCTIONS: (continued)

8.3 (continued) INITIAL

CAUTION
Notify personnel in containment prior to venting a SIT due to the loud noise emitted.

8. Monitor and maintain SIT pressure less than or equal to 565 psig utilizing the following methods. _______

   A. The primary method of SIT pressure control to conserve N_2 during fill operations is to crosstie the nitrogen fills between the selected SITs.

      2A1 SIT: V3622
      2A2 SIT: V3612
      2B1 SIT: V3632
      2B2 SIT: V3642

   B. The alternate method of SIT pressure control is to operate the SIT vent to containment. _______

      2A1 SIT: V3735 or V3736
      2A2 SIT: V3733 or V3734
      2B1 SIT: V3737 or V3738
      2B2 SIT: V3739 or V3740

NOTE
Safety Injection Tank level should be filled to greater than 84% as required by OP-2-0010125A, Data Sheet 25.

9. When the SIT is filled to the desired level, Then CLOSE the HPSI header isolation valve opened in Step 7. _______

10. CLOSE the SI fill and drain valve opened in Step 5. _______

11. CLOSE the SI loop check valve leakage valve opened in Step 6. _______

12. STOP the running HPSI pump and return the control switch to AUTO. _______

13. Record SIT post fill data per Data Sheet 1. _______

8.0 INSTRUCTIONS: (continued)

8.3 (continued) INITIAL

14. Notify Technical Staff to Perform Verification of ECCS Check Valve Integrity per OP 2-0010125A, Data Sheet 25, on those applicable header check valves used during the performance of Section 8.3. ______

15. Filling of 2B2 SIT with leakage on V3247 (PIA-3349 in alarm is annunciated by R57)

CAUTION
During the implementation of step 8.4.15 the following precautions shall be used: 1. Conduct a tailboard meeting prior to the evolution emphasizing the use of correct RTGB indications. 2. The NPS/ANPS or NWE shall monitor the evolution.

A. START the 2B HPSI Pump. ______

B. OPEN V3641, 2B2 Fill/Drain. ______

C. OPEN HCV-3638, SI Loop 2B1 Check Valve Leakage. ______

CAUTION
Do not exceed 700 psig on 2B1 loop pressure indication (PIA-3339) to prevent lifting relief valve on RWT return line.

D. THROTTLE OPEN HCV-3636, Header B to Loop 2B1 Valve, DO NOT exceed 700 psig as indicated on PI-3339, SI Loop 2B1 pressure. ______

CAUTION
Notify personnel in containment prior to venting a SIT due to the loud noise emitted.

E. Monitor and maintain 2B2 SIT pressure (PIA-3341) less than or equal to 565 psig utilizing the following methods.

8.0 INSTRUCTIONS: (continued)

8.3 (continued) INITIAL

15. (continued)

E. (continued)

1. The primary method of SIT pressure control to conserve Nitrogen during fill operations is to crosstie the nitrogen fills between selected SITs. ______

   2A1 SIT: V3622
   2A2 SIT: V3612
   2B1 SIT: V3632
   2B2 SIT: V3642

2. The alternate method of SIT pressure control is to operate the SIT vent to containment. ______

   2B2 SIT: V3739 or V3740

F. When the desired level in the 2B2 SIT is reached, CLOSE HCV-3636, HPSI Hdr Isolation. ______

G. CLOSE V3641, 2B2 SIT fill and drain. ______

H. CLOSE HCV-3638, 2B1 loop check valve leakage valve. ______

I. STOP the 2B HPSI Pump and return the control switch to AUTO. ______

J. Record 2B2 SIT post fill data per Data Sheet 1. ______

K. Notify Tech Staff to perform Verification of ECCS Check Valve Integrity per OP 2-0010125A, Data Sheet 25, for the 2B1 SI Hdr valve (V3260). ______

ST. LUCIE UNIT 2
OPERATING PROCEDURE NO. 2-0410021, REVISION 36A
SAFETY INJECTION TANK NORMAL OPERATION

DATA SHEET 1
SAFETY INJECTION TANK POST FILL DATA SHEET
(Page 1 of 2)

INITIAL

Record the following:

1. Safety Injection Tank filled. ________

2. The date/time the SIT was filled. ________/________

3. The date/time the SIT was last sampled for boron concentration prior to this fill. ________/________

4. If the makeup water source was the RWT, Then determine the following:

   A. The date/time of the last RWT boron concentration sample. ________/________

   B. Boron concentration result of last RWT sample. ________

   C. Review the RCO chronological log for any RWT fill evolutions since the last RWT boron sample. ________ RCO

> NOTE
>
> If in Modes 1, 2, 3 or 4, Then the SIT boron concentration shall be verified to be between 1720 and 2100 ppm as follows:
>
> 1) If the SIT makeup water source was the RWT and the RWT has been verified to be between 1720 and 2100 ppm by sample analysis since the last filling evolution of the RWT, Then the boron concentration in the SIT shall be verified by sample analysis within 31 days (with a maximum allowable extension not to exceed 25% of the surveillance interval) of the last boron sample of the SIT.
> 2) If the makeup water source was the RWT and RWT boron concentration has NOT been verified to be between 1720 and 2100 ppm by sample analysis since the last filling evolution of the RWT, Then the boron concentration of the SIT shall be verified by sample analysis within 6 hours of filling the SIT.
> 3) If the makeup water source was NOT the RWT, Then the boron concentration of the SIT shall be verified by sample analysis within 6 hours of filling the SIT.
>
> If in Modes 5 or 6, Then the SIT boron concentration shall be verified to be between 1720 and 2100 ppm prior to entering Mode 4.

/R36A

ST. LUCIE UNIT 2
OPERATING PROCEDURE NO. 2-0410021, REVISION 36A
SAFETY INJECTION TANK NORMAL OPERATION

DATA SHEET 1
SAFETY INJECTION TANK POST FILL DATA SHEET
(Page 2 of 2)

INITIAL

*5. The date/time or mode the SIT is required to be sampled for boron concentration. ________/______

*6. If the SIT is required to be sampled within 6 hours of filling, Then record the following:

A. The time the Chemistry Technician was notified to sample. ______

B. The date/time the SIT was sampled. ________/______

C. Boron concentration in ppm determined by sample analysis. ______

D. Post fill results satisfy conditions and requirements of Technical Specifications 3.5.1 and 4.5.1. ______ RCO

7. If the SIT is required to be sampled prior to exceeding 275 psia in Mode 4, Then ensure the sample requirement is recorded on Data Sheet 30, Unscheduled Surveillance Tracking, of OP 2-0010125A, "Surveillance Data Sheets." ______ RCO

8. If the SIT is required to be sampled within 31 days of its last sample, Then no further action is required per this Data Sheet.

Reviewed by ____________________________
NPS/ANPS/NWE

* Satisfactory performance of the above asterisked steps assures conformance with applicable Technical Specifications.

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

RESPOND TO AN "A" SHUTDOWN COOLING LOOP SUCTION VALVE CLOSURE (V3480) WHILE ON SDC

CANDIDATE ______________________________

EXAMINER ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST LUCIE NUCLEAR PLANT

Task: Perform lineups on the RHRS

Alternate Path: **Yes** ____ **No** __X__

Facility JPM #: 0821086

Task Standard: Reestablish Shutdown Cooling

Preferred Evaluation Location:

Simulator __X____ Control Room ______ In-Plant ______

Preferred Evaluation Method:

Perform ___X___ Simulate _____

References: ONOP 2-0440030, "Shutdown Cooling Off-Normal," Rev 35

Validation Time ___20 minutes___ **Time Critical** ___No___

Candidate: ________________________________ Time Start __________
Name Time Finish __________

Performance Rating: Sat ______ Unsat ______ Question Grade ______

Examiner: ________________________ **Signature:** ____________________
Name

Tools/Equipment/ Procedures Needed:
ONOP 2-0440030, "Shutdown Cooling Off-Normal", Appendix E

Read to Candidate

Directions to candidate for In-Plant or Control Room JPMs:

I will explain the initial conditions and state the task to be performed. All in-plant or control room JPM steps, including any communications, shall be simulated for this JPM. Under no circumstances, unless directed by the examiner, are you to operate any plant equipment. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Directions to candidate for Simulator JPMs:

I will explain the initial conditions and state the task to be performed. All simulator JPM steps, including any communications, shall be performed for this JPM. You are you to operate any plant equipment that is necessary for the completion of this JPM. The simulator will provide the cues as you perform this JPM. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Initial Conditions: The 2A Shutdown Cooling System was in service when V-3480, the 2A loop suction isolation closed due to a spurious signal. The 2A LPSI pump has been stopped and the problem has been corrected. The B train SDC System is out of service, the RCS hot legs are full and RCS level and temperature are unchanged. RCS level is 33 feet, RCS temperature is 121 degrees and stable.

Initiating Cues: The ANPS has directed that 2A Shutdown Cooling flow be restored IAW ONOP 2-0440030, Appendix E

Start Time ________

Step 1: Ensure V3480, V3481 and V3664 hot leg suction valves are open (step 2A2) Standard: Operator verifies V3480, V3481 and V3664 hot leg suction valves are open Cue: (RTGB 206) **V3481 and V3664 indicate red lights illuminated, V3480 indicates green light illuminated*** Comments:	Sat ____ Unsat ____
Step 2: Open V3480 (step 2A2, indicates ensure) Standard: Operator places the keyswitch for V3480 to the Open position Cue: (RTGB 206) **V3480 indicates red light illuminated*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 3: Ensure open HCV-14-3A (step 2A3) Standard: Operator verifies HCV-14-3A open Cue: (RTGB 206) **HCV-14-3A indicates red light illuminated*** Comments:	Sat ____ Unsat ____
Step 4: Open HCV-3615 and HCV-3625 (step 2A4) Standard: Operator takes control switches for HCV-3615 and HCV-3625 to Open position Cue: **HCV-3615 and HCV-3625 indicate red lights illuminated*** Comments:	**Critical Step** Sat ____ Unsat ____

* If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly.

Step 5: Close HCV-3657 (step 2A5) Standard: Operator places HCV-3657 control switch to Closed Cue: (RTGB 206) **HCV-3657 indicates green light illuminated*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 6: Ensure closed V3444 (step 2A6) Standard: Operator checks closed V3444 Cue: (RTGB 206) **V3444 indicates green light illuminated*** Comments:	Sat ____ Unsat ____
Step 7: Ensure closed V3536 (step 2A7) Standard: Operator checks closed V3536 Cue: (RTGB 206) **V3536 green light illuminated*** Comments:	Sat ____ Unsat ____
Step 8: Place FCV-3306 keyswitch in the Modulate position (step 2A8) Standard: Operator places FCV-3306 keyswitch in the Modulate position or verifies switch in Modulate if already performed Cue: (RTGB 206) **FCV-3306 keyswitch in the Modulate position*** Comments:	**Critical Step** Sat ____ Unsat ____

* If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly.

Step 9: Close FCV-3306 (step 2A9) Standard: Operator places FCV-3306 control switch to Closed position Cue: (RTGB 206) **FCV-3306 indicates green light illuminated*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 10: Ensure RCS pressure < 275 psia (step 2A10) Standard: Operator observes indications to ensure RCS pressure < 275 psia Cue: (RTGB 206) **RCS pressure indicates 270 psia*** Comments:	Sat ____ Unsat ____
Step 11: Start the 2A LPSI pump (step 2A12) Standard: Operator places the control switch for 2A LPSI pump to Start Cue: (RTGB 206) **2A LPSI pump indicates red light illuminated, stable amps after starting surge*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 12: Adjust FCV-3306 to obtain 100 to 200 gpm as indicated on FI-3322 and FI-3312 (step 2A13) Standard: Operator positions FCV-3306 to obtain 100 to 200 gpm as indicated on FI-3322 and FI-3312 **(indications must be multiplied by X10)** Cue: (RTGB 206) **FCV-3306 positioned, flow 150 gpm*** Comments:	**Critical Step** Sat ____ Unsat ____

* If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly.

Step 13: When temperature stabilizes, increase flow until desired flowrate is obtained as indicated on FR-3306 (step 2A14) Standard: Operator positions control switch for FCV-3306 to open until flowrate on FR-3306 is 3000 gpm Cue: (RTGB 206) **FCV-3306 has dual indication, 3000 gpm indicated on FR-3306*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 14: Ensure open V3517, SDC HX to 2A HX valve (step 2A15) Standard: Operator observes V3517 to be in the open position Cue: (RTGB 206) **V3517 indicates red light illuminated*** Comments:	Sat ____ Unsat ____
Step 15: Throttle open HCV-3657, HCV-3615 and HCV-3625 to establish the following: FCV-3306 full closed, 2A SDC loop flow ≥ 1000 gpm, FI-3322 and FI-3312 are within 300 gom of each other (Steps 2A16 a, b and c) Standard: operator throttles open HCV-3657, HCV-3615 and HCV-3625 and verifies FCV 3306 is closed, 2A SDC loop flow ≥ 1000 gpm and loop 2A1 and 2A2 flow indications are within 300 gpm of each other Cue: (RTGB 206) **HCV-3657, HCV-3615 and HCV-3625 indicate red and green lights illuminated, flow is > 1000 gpm and loop flows agree within 300 gpm*** Comments:	**Critical Step** Sat ____ Unsat ____

* If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly.

Step 16: Establish the desired cooldown rate and ensure 2A SDC inlet and outlet warmup rates are <20°F/minute (steps 2A16 d and e) Standard: Operator observes cooldown is established and ensures 2A SDC inlet and outlet warmup rates are <20°F/minute on TR-3351 and TR-3303W Cue: (RTGB 206) **Cooldown rate established, 2A SDC inlet and outlet heatup rates <20°F/minute*** Comments:	Sat ____ Unsat ____
Step 17: Operate the SDC system in the TOTAL flow range of 3000 to 7000 gpm and NOT to exceed 3500 gpm per train Standard: Operator observes flow rate is between 3000 and 3500 gpm Cue: (RTGB 206) **Flow rate is 3300 GPM*** Comments: **END OF TASK**	**Critical Step** Sat ____ Unsat ____

Stop Time ________

* If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly.

CANDIDATE CUE SHEET

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

Unit 2 A train Shutdown Cooling System was in service when V-3480, the A loop suction isolation closed due to a spurious signal. The 2A LPSI pump has been stopped and the problem has been corrected. The B train SDC System is out of service, the RCS hot legs are full and RCS level and temperature are unchanged. RCS level is 33 feet, RCS temperature is 121 degrees and stable.

INITIATING CUE:

The ANPS has directed that A train Shutdown Cooling flow be restored IAW ONOP 2-0440030, Appendix E

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
6. If a single train of SDC is still in operation and capable of removing the current decay heat load, Then:	6. Continue efforts to restore at least one train of SDC to service:
A. Adjust the operating SDC Loop flowrate per 2-NOP-03.05, Shutdown Cooling.	A. Refer to Appendix E, Restoration of SDC. 1. Step 1 for restoration of a SDC Train when RCS level has dropped below the hot leg centerline or heated up excessively. 2. Step 2 for restoration of a SDC Train when RCS level has NOT dropped below the hot leg centerline or heated up excessively.
B. Refer to EXIT Conditions.	B. Continue with Step 7.2.7.
§2 7. Establish containment integrity as follows:	
A. Evacuate unnecessary personnel from containment.	

APPENDIX E
RESTORATION OF SDC
(Page 8 of 14)

1. (continued)

   B. (continued)

      13. (continued)

         f. (continued)

            6. (continued)

               If **ALL** the following RCS conditions exist; and if desired:

               - The Reactor has been subcritical for greater than or equal to 125 hours,
               - The highest RCS temperature is less than or equal to 117°F,
               - CCW Inlet temperature to the SDC Heat Exchangers is less than or equal to 87°F.

               Then OPERATE the SDC System in the TOTAL flow range of 2000 to 2500 gpm, and NOT to exceed a max. flow of 2200 gpm per train.

      14. If both trains are to be placed in operation, Then ensure Locked Open V3545, Hot Leg Suction Crosstie.

2. If RCS:

   - Level has NOT dropped below the hot leg centerline (29' 6") with the desired SDC Train in operation.

   AND

   - Has NOT heated up excessively (to greater than 200 degrees) since the desired SDC Train has been in operation.

APPENDIX E
RESTORATION OF SDC
(Page 9 of 14)

2. (continued)

Then restore the desired SDC Train to service as follows:

A. To restore the 2A SDC Train:

1. If the 2A LPSI pump has NOT been secured, Then secure the 2A LPSI pump to preclude damage to the pump.
2. Ensure V3480, V3481 and V3664, 2A Hot Leg Suction Valves, are OPEN.
3. Ensure OPEN HCV-14-3A, CCW to the 2A SDC HX.
4. OPEN HCV-3615 and HCV-3625, 2A LPSI Header Isolation Valves.
5. CLOSE HCV-3657, 2A SDC HX Flow Control Valve.
6. Ensure CLOSED V3444, 2A LPSI Suction Valve.
7. Ensure CLOSED V3536, 2A SDC Warmup Valve.
8. Place FCV-3306, Bypass Keyswitch, in the MODULATE position.
9. CLOSE FCV-3306, 2A Shutdown Cooling Bypass Valve.
10. Ensure that RCS pressure is less than 275 psia.
11. If cavitation was observed prior to securing the 2A LPSI pump, Then locally vent the 2A LPSI pump.
12. Start the 2A LPSI pump.
13. Immediately after starting the 2A LPSI pump, ADJUST the position of FCV-3306, 2A Shutdown Cooling Bypass Valve, to obtain between 100 and 200 gpm TOTAL flow as indicated on the following:

    FI-3322, LPSI Loop 2A1 Flow

    FI-3312, LPSI Loop 2A2 Flow

APPENDIX E
RESTORATION OF SDC
(Page 10 of 14)

2. (continued)

A. (continued)

14. When temperature stabilizes, increase flow slowly until desired flow is obtained as indicated on FR-3306.

15. Ensure OPEN V3517, SDC to 2A HX Valve.

16. Throttle OPEN HCV-3657, HCV-3615 and HCV-3625 to establish the following:

a. FCV-3306, SDC Loop 2A Bypass, is FULL CLOSED.

b. 2A SDC Loop flow is greater than or equal to 1000 gpm.

c. FI-3322, LPSI Loop 2A1 Flow, and FI-3312, LPSI Loop 2A2 Flow, are within 300 gpm of each other.

d. **ONE** of the following:

The desired cooldown rate.

OR

The desired RCS temperature.

NOTE

- 2A SDC Heat Exchanger INLET temperature is indicated by the red pen on TR-3351.
- 2A SDC Heat Exchanger OUTLET is indicated on TR-3303W.

e. 2A SDC Heat Exchanger inlet and outlet warm up rate less than 20 degrees/minute.

APPENDIX E

RESTORATION OF SDC

(Page 11 of 14)

2. (continued)

A. (continued)

16. (continued)

f. **ONE** of the following:

If the RCS level is greater than 30 feet, Then OPERATE the SDC System in the TOTAL flow range of 3000 to 7000 gpm, and NOT to exceed a max. flow of 3500 gpm per train.

OR

If the RCS level is between 29 feet 8 inches and 30 feet, Then OPERATE the SDC System in the TOTAL flow range of 3000 to 4400 gpm, and NOT to exceed a max. flow of 2200 gpm per train.

OR

If **ALL** the following RCS conditions exist; and if desired:

- The Reactor has been subcritical for greater than or equal to 125 hours,
- The highest RCS temperature is less than or equal to 117°F,
- CCW Inlet temperature to the SDC Heat Exchangers is less than or equal to 87°F.

Then OPERATE the SDC System in the TOTAL flow range of 2000 to 2500 gpm, and NOT to exceed a max. flow of 2200 gpm per train.

17. If both Trains are to be placed in operation, ensure Locked Open V3545, Hot Leg Suction Crosstie.

EXECUTE JPM:

1. **INSTALL IC-54 (Special JPM Set Up IC Set, Standard Facility Set-Up)**
2. **EXECUTE FACILITY 077A JPM SCENARIO**
3. **START SCENARIO 077A**
4. **RUN Simulator for one minute**
5. **FREEZE Simulator**
6. **UNFREEZE Simulator when candidate is ready to start JPM**

IMPORTANT NOTE:

No procedure for this JPM

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

MANUALLY ACTUATE AFAS - UNIT 2

CANDIDATE ____

EXAMINER ____

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST LUCIE NUCLEAR PLANT

Task: Feed Steam Generators with the AFW System

Alternate Path: Yes __X__ **No** ____

Facility JPM #: 0821077A

Task Standard: Manually actuate AFAS and feed the 2A steam generator

Preferred Evaluation Location:

Simulator __X__ Control Room ______ In-Plant _____

Preferred Evaluation Method:

Perform __X__ Simulate _____

References: None

Validation Time __10 minutes__ **Time Critical** __No__

Candidate: ______________________________ Time Start __________
Name Time Finish __________

Performance Rating: Sat ______ Unsat ______ Question Grade ______

Examiner: ______________________________ **Signature:** ____________________
Name

Tools/Equipment/ Procedures Needed:
None

Read to Candidate

Directions to candidate for In-Plant or Control Room JPMs:

I will explain the initial conditions and state the task to be performed. All in-plant or control room JPM steps, including any communications, shall be simulated for this JPM. Under no circumstances, unless directed by the examiner, are you to operate any plant equipment. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Directions to candidate for Simulator JPMs:

I will explain the initial conditions and state the task to be performed. All simulator JPM steps, including any communications, shall be performed for this JPM. You are you to operate any plant equipment that is necessary for the completion of this JPM. The simulator will provide the cues as you perform this JPM. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Initial Conditions: A Steam Generator Tube Rupture occurred in S/G 2B. The 2B S/G has been isolated and the RCS is being cooled down and depressurized. AFW to S/G 2A has just secured automatically due to a differential pressure lock-out.

Initiating Cues: The ANPS has directed you to manually initiate AFAS-1 and restore S/G 2A Level to the normal range (60-70% NR).

Start Time ________

Step 1: Manually initiate AFAS-1 Standard: Operator places all four AFAS initiation switches to the MANUAL position Cue: (RTGB 203) **All four AFAS initiation switches to MANUAL*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 2: Observe valves MV-09-9, 1-SE-09-2, MV-09-11 & 1-SE-09-4 stroke to full open Standard: Operator observes MV-09-9, 1-SE-09-2, MV-09-11 & 1-SE-09-4 stroke to full open and flow indicated on FI-09-2A and FI-09-2C Cue: (RTGB 203) **MV-09-9 indicates red light illuminated, SE-09-4 indicates red light illuminated, MV-09-11 indicates green light illuminated, SE-09-2 indicates green light illuminated, no flow indicated on FI-09-2A and FI-09-2C*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 3: Manually initiate flow to S/G 2A from the 2A OR 2C AFW Pump Standard: Operator obtains key and opens SE-09-2 to establish flowpath from 2A AFW to 2A SG OR manually opens MV-09-11 from RTGB to establish flowpath from 2C AFW to 2A SG Cue: (RTGB 203) **MV-09-11 indicates red light illuminated OR SE-09-2 indicates red light illuminated*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 4: Restore S/G 2A Level to 60-70% NR using 2A OR 2C AFW Pump. Standard: Operator throttles AFW flow and observes level increase in the 2A steam generator Cue: (RTGB 203) **2A steam generator level increasing*** Comments:	**Critical Step** Sat ____ Unsat ____

* If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly.

Step 5: Notify ANPS that 2A steam generator level is 60%-70% Narrow Range indication Standard: Operator notifies ANPS that 2A steam generator level is 60%-70% Narrow Range indication Cue: **ANPS acknowledges (In the interest of time, this JPM can be terminated at any time after flow is established)*** Comments: **END OF TASK**	Sat ____ Unsat ____

* If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly.

Stop Time ________

CANDIDATE CUE SHEET

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A Steam Generator Tube Rupture occurred in S/G 2B. The 2B S/G has been isolated and the RCS is being cooled down and depressurized. AFW to S/G 2A has just secured automatically due to a differential pressure lock-out.

INITIATING CUE:

The ANPS has directed you to manually initiate AFAS-1 and restore S/G 2A Level to the normal range (60-70% NR).

(NO PROCEDURE REF)

CRDS JPM-001 SET-UP INSTRUCTIONS

PREPARATION:

Ahead of time, prepare a full CEA OFF-NORMAL Procedure 2-0410021.

EXECUTE JPM:

1. INSTALL IC-1 (100% Power, MOL Steady State)
2. RUN Simulator
3. EXECUTE JPM SCENARIO
4. TRIGGER JPM-001 Lesson Step
5. Program DEH to 805 MW at 5 MW/Min
6. Reset (4) RPS Hi-Rate Trip Units
7. Freeze Simulator When DEH GO light is Extinguished

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

RECOVER A SLIPPED CEA UNIT 2

CANDIDATE ______________________________

EXAMINER ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST LUCIE NUCLEAR PLANT

Task: Operate the control rods manually while the reactor is at power

Alternate Path: **Yes** __X__ **No** ____

Facility JPM #: New

Task Standard: Recover a slipped CEA IAW OP 2-0110030, Appendix A, trip the reactor and turbine.

Preferred Evaluation Location:

Simulator __X__ Control Room _____ In-Plant _____

Preferred Evaluation Method:

Perform __X__ Simulate _____

References: ONOP 2-0110030, "CEA Off-Normal and Realignment

Validation Time __15 minutes__ **Time Critical** __No__

Candidate: ______________________________ Time Start _________
Name Time Finish _________

Performance Rating: Sat ______ Unsat ______ Question Grade _______

Examiner: ________________________ **Signature:** __________________
Name

Tools/Equipment/ Procedures Needed:
ONOP 2-0110030, "CEA Off-Normal and Realignment, Appendix A,

Read to Candidate

Directions to candidate for In-Plant or Control Room JPMs:

I will explain the initial conditions and state the task to be performed. All in-plant or control room JPM steps, including any communications, shall be simulated for this JPM. Under no circumstances, unless directed by the examiner, are you to operate any plant equipment. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Directions to candidate for Simulator JPMs:

I will explain the initial conditions and state the task to be performed. All simulator JPM steps, including any communications, shall be performed for this JPM. You are you to operate any plant equipment that is necessary for the completion of this JPM. The simulator will provide the cues as you perform this JPM. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Initial Conditions: Unit 2 is at 98% power, 5000 EFPH. The CEA periodic was in progress when CEA #57 slipped to 18" below the rest of group 5. All IOAs have been performed and Reactor Engineering and Plant Management has been notified.

Initiating Cues: The ANPS has directed you to investigate CEA # 57 for operability per Appendix A of ONOP 2-0110030, "CEA Off-Normal and Realignment.

Start Time ________

Step 1: CAUTION: Reactor power shall NOT be increased above the stable power level established following CEA misalignment (caution step, Appendix A) Standard: Operator remains cognizant of power level at all times Cue: **Power level constant*** Comments:	Sat ____ Unsat ____
Step 2: Place the mode select switch in Manual Individual mode (step 1A) Standard: Operator places mode select switch in Manual Individual Cue: (RTGB 204) **Mode select switch in Manual Individual*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 3: Select the affected CEA on the individual CEA selection switches (step 1B) Standard: Operator selects CEA 57 on the individual CEA selection switches Cue: (RTGB 204) **CEA 57 selected*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 4: Select the group of the affected CEA on the group select switch (step 1C) Standard: Operator selects group 5 on the group select switch Cue: (RTGB 204) **Group 5 selected*** Comments:	**Critical Step** Sat ____ Unsat ____

* If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly

Step 5: Depress and hold the CEA motion inhibit bypass pushbutton (step 1D1) Standard: Operator depresses and holds the CEA motion inhibit bypass pushbutton Cue: (RTGB 204) **Motion inhibit bypass pushbutton depressed*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 6: Depress and release the bypass enable pushbutton (step 1D2) Standard: Operator depresses and released the bypass enable pushbutton Cue: (RTGB 204) **CMI bypass enabled*** Comments:	**Critical Step** Sat ____ Unsat ____
Step 7: Insert and withdraw the affected CEA and check for smooth operation and normal indications (step 1F) Standard: Operator inserts and withdraws CEA 57 and observes smooth operation and normal indications Cue: (RTGB 204) **CEAs #9 and #10 drop to the bottom of the core*** Comments:	**Critical Step** Sat ____ Unsat ____

* If JPM is performed on the simulator, cues will not be verbalized by the examiner, but will be used to verify the JPM is being performed correctly

Step	Critical Step
Step 8: Trip the reactor and turbine Standard: Operator, upon indications of 2 additional dropped CEAs, depresses the Reactor trip pushbuttons on RTGB 204 Cue: (RTGB 204) **All rods inserted*** Comments: **END OF TASK**	Sat ____ Unsat ____

Stop Time ________

CANDIDATE CUE SHEET

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

Unit 2 is at 98% power, 5000 EFPH. The CEA periodic was in progress when CEA #57 slipped to 18" below the rest of group 5. All IOAs have been performed and Reactor Engineering and Plant Management has been notified.

INITIATING CUE:

The ANPS has directed you to investigate CEA # 57 for operability per Appendix A of ONOP 2-0110030, "CEA Off-Normal and Realignment.

7.0 OPERATOR ACTIONS:

7.1 Immediate Operator Actions:

INSTRUCTIONS	CONTINGENCY ACTIONS
1. Place CEDMCS panel in OFF.	
2. If continuous CEA withdrawal is indicated, while CEDMCS panel is OFF, Then trip the reactor and turbine and carry out 2-EOP-01, "Standard Post Trip Actions."	
3. If a mismatch between reactor power and turbine power (T-avg and T-ref) exists, Then adjust turbine power to equal reactor power.	
4. If 3 or more CEAs are misaligned from any other CEA in their group by greater than 15 inches and/or dropped, Then manually trip the reactor and turbine and carry out 2-EOP-01, "Standard Post Trip Actions."	

APPENDIX A
CEA INVESTIGATION FOR OPERABILITY
(Page 1 of 3)

> **CAUTION**
> - Reactor Power shall NOT be increased above the stable power level established following the CEA(s) misalignment.
> - Criticality shall be anticipated any time CEAs are being withdrawn.

1. For the affected CEA(s), perform the following to determine operability:

   A. Place the mode select switch in the manual individual mode.

   B. Select the affected CEA on the individual CEA selection switches.

   C. Select the group of the affected CEA on the group select switch.

   D. If CEA motion inhibit is present, Then:

      1. Depress and hold the CEA motion inhibit bypass pushbutton.

      2. Depress then release the bypass enable pushbutton.

   E. If the CEA was dropped, Then first withdraw the affected CEA until core mimic CEA bottom light and lower electrical limit lights both deenergize.

> **CAUTION**
> Do NOT exceed ± 10 inches of the original position without permission from the ANPS.

   F. Insert and withdraw the affected CEA and check for smooth operation and normal indications.

   G. If CEA is determined to be operable proceed to the applicable appendix for CEA realignment.

APPENDIX A
CEA INVESTIGATION FOR OPERABILITY
(Page 2 of 3)

> **NOTE**
> Tripped CEA disconnect and/or loss of CEA subgroup logic function will cause dropped CEAs.

2. If the CEA(s) does NOT operate (move), Then check the status of the CEDM coil power supply panels in the cable spreading room:

   A. Symptoms:

      1. CEA disconnect in OFF; red light off, green light on.

      2. CEA disable lights are red for the affected CEA.

      3. Timer failure lights are red for the affected CEA.

   B. Trouble Shooting:

      1. If CEA disconnect is off, Then:

         a. Turn ON disconnect switch.

         b. Reset ACTM card toggle switch. (located inside cabinet, top switch, UG ENGD light should remain on).

      2. If CEA disconnect is not off, Then:

         a. Reset ACTM card toggle switch.

   C. Check the air conditioning system for proper operation.

   D. Check the cooling fans for proper operation.

   E. Contact the I&C Dept. for assistance and notify them of the problem and any abnormalities found.

      1. Check the CEDMCS and CEA drive system for alarms that might indicate the CEA problem.

APPENDIX A

CEA INVESTIGATION FOR OPERABILITY

(Page 3 of 3)

2. (continued)

E. (continued)

> CAUTION
>
> Do NOT exceed ± 10 inches of original position without permission from the ANPS.

2. Withdraw and insert the CEA(s) in manual individual or manual group at the direction of I&C to support troubleshooting.

F. Have I & C perform the following as necessary.

1. Check associated power supplies and fuses.

2. Obtain coil current traces and voltage measurements to determine the location of trouble.

> NOTE
>
> Two or more CEAs simultaneously transferring to the lower gripper could indicate CEDMCS noise caused by system grounds. /R45

3. If two or more CEAs simultaneously transfer to the lower gripper, Then perform the following: /R45

   a. Direct I&C to troubleshoot for possible system grounds. /R45

   b. Minimize movement of CEAs. /R45

G. Proceed to the applicable Appendix for CEA realignment or to Appendix B if CEA is determined to be inoperable.

END OF APPENDIX A

Lesson File:	/cae/if/ifdata/lesson/nrc2/xl04.xld
Lesson Description:	Y2000 NRC OPERATING TEST, JPM SET-UP FILE
Lesson IC used:	
Created on:	11/28/99 12:22:50

Step #: 1
Step Description : JPM 012 -- Set Up for Logic Matrix JPM
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFL2CBA - L2_2_93301 TCB1 - FAIL AS IS	MALF	TRUE		

Step #: 2
Step Description : JPM 006 -- 2A1 SIT Fill JPM Set-Up
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION		TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TAMFMA1 - MF_TANKA1 MASS	LB	REM	81500.000	0:00:20	

Step #:	3
Step Description :	JPM 001 -- Set-Up Step for SLIPPED CEA JPM
Delay Time :	0:00:00
Mode :	Regular
InitialState :	Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TVLIR01D - LI_CEAF DROPPED CEA HEIGHT	MALF	118.000		
2	TFLIR57D - LI_CEA57 DROP CEA #57 TO SELECTE	MALF	TRUE		
3	TFLIR57D - LI_CEA57 DROP CEA #57 TO SELECTE	MALF	FALSE		0:00:04

Step #: 4
Step Description : JPM 001 (1) -- DROPS TWO MORE CEAs (manual Trigger)
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TVLIR01D - LI_CEAF DROPPED CEA HEIGHT	MALF	0.0		
2	TFLIR09D - LI_CEA9 DROP CEA #9 TO SELECTED	MALF	TRUE		
3	TFLIR10D - LI_CEA10 DROP CEA #10 TO SELECTE	MALF	TRUE		

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

OPERATE THE HYDROGEN RECOMBINER UNIT 1

CANDIDATE ______________________________________

EXAMINER ______________________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST LUCIE NUCLEAR PLANT

Task: Start up the Hydrogen Recombiners

Alternate Path: Yes _____ **No** __X__

Facility JPM #: Not in bank, Unit 2 used previously for 1997NRC exam

Task Standard: Place the 1A Hydrogen Recombiner in service

Preferred Evaluation Location:

Simulator __X__ Control Room ______ In-Plant ______

Preferred Evaluation Method:

Perform __X__ Simulate _____

References: 1-EOP-99, Appendix M

Validation Time __10 minutes__ **Time Critical** __No__

Candidate: ______________________________ Time Start __________
Name Time Finish __________

Performance Rating: Sat _______ Unsat _______

Examiner: ______________________________ **Signature:** ______________________
Name

Tools/Equipment/ Procedures Needed:
1-EOP-99, Appendix M

Read to Candidate

Directions to candidate for In-Plant or Control Room JPMs:

I will explain the initial conditions and state the task to be performed. All in-plant or control room JPM steps, including any communications, shall be simulated for this JPM. Under no circumstances, unless directed by the examiner, are you to operate any plant equipment. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Directions to candidate for Simulator JPMs:

I will explain the initial conditions and state the task to be performed. All simulator JPM steps, including any communications, shall be performed for this JPM. You are you to operate any plant equipment that is necessary for the completion of this JPM. The simulator will provide the cues as you perform this JPM. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Initial Conditions: A large break LOCA has occurred inside Unit 1 containment building. Chemistry has reported that hydrogen concentration is 1.2%.

Initiating Cues: The ANPS has directed you to place 1A Hydrogen Recombiner in service IAW 1-EOP-99, Appendix M. The SNPO has reported that breakers 1-41251 and 1-42103 are closed.

Start Time ________

Step 1: Verify the power available white light on the H2 recombiner control panel is illuminated (step 2) Standard: Operator observes the power available white light is illuminated Cue: (1A H2 recombiner panel behind RTGB 103) **White light illuminated.** Comments:	Sat _____ Unsat _____
Step 2: Place the power adjust potentiometer at 000 (step 3) Standard: Operator simulates rotating the power adjust potentiometer until the value is 000. Cue: (1A H2 recombiner panel behind RTGB 103) **Power adjust potentiometer rotated.** Comments:	**Critical Step** Sat _____ Unsat _____
Step 3: Place the power out switch on the control panel to the ON position, The red light on the switch will illuminate (step 4) Standard: Operator simulates placing the power on switch to the ON position and observes the red light on the switch illuminates. Cue: (1A H2 recombiner panel behind RTGB 103) **Red light illuminated.** Comments:	**Critical Step** Sat _____ Unsat _____
Step 4: Gradually turn the power adjust potentiometer to 70 KW as indicated on the power out wattmeter (step 5) Standard: Operator simulates SLOWLY turning the power adjust potentiometer to 70 KW, ensuring not to exceed 75 KW. Cue: (1A H2 recombiner panel behind RTGB 103) **Power adjust potentiometer at 70 KW.** Comments:	**Critical Step** Sat _____ Unsat _____

Step 5: Periodically check the temperature of the three thermocouples using the temperature channel selector switch. When temperature reaches 1250°F, then adjust the power adjust potentiometer to maintain temperature between 1250°F and 1400°F Standard: Operator simulates selecting each temperature control channel by placing the selector switch in each position and observes temperature indication. Cue: (1A H2 recombiner panel behind RTGB 103) **Temperatures indicate 1270°F on all three channels.** (Note: this JPM can be terminated after candidate has checked temperature indication) Comments: **END OF TASK**	**Critical Step** Sat _____ Unsat _____

Stop Time _________

CANDIDATE CUE SHEET

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A large break LOCA has occurred inside Unit 1 containment building. Chemistry has reported that hydrogen concentration is 1.2%.

INITIATING CUE:

The ANPS has directed you to place 1A Hydrogen Recombiner in service IAW 1-EOP-99, Appendix M. The SNPO has reported that breakers 1-41251 and 1-42103 are closed.

APPENDIX M

OPERATION OF HYDROGEN RECOMBINERS

(Page 1 of 2)

CRITERIA FOR OPERATION

1. If containment hydrogen concentration is greater than or equal to 0.5%, Then place the hydrogen recombiners in service per page 2 of this appendix.

2. Operation of the hydrogen recombiners may be terminated when containment hydrogen concentration is less than 0.5%.

3. If the containment hydrogen concentration is greater than 3.5%, Then consult with the TSC in considering the use of the Hydrogen Purge System to reduce the concentration. Factors to consider include the following:

   A. Containment atmosphere radiation level.

   B. Containment hydrogen concentration.

   C. Rate of increase in containment hydrogen concentration.

4. If it is decided to operate the Hydrogen Purge System, Then place it in service per Appendix N, "Hydrogen Purge System Operation."

5. Operation of the Hydrogen Purge System may be terminated if:

   A. Containment hydrogen concentration is less than 0.5%.

   OR

   B. Containment hydrogen concentration is less than 3.5% and hydrogen recombiners are operating.

(Continued on Next Page)

APPENDIX M
OPERATION OF HYDROGEN RECOMBINERS
(Page 2 of 2)

PLACING HYDROGEN RECOMBINERS IN SERVICE

1. Ensure the following breakers are CLOSED:

   Breaker 1-41251 "Hydrogen Recombiner 1A"
   Breaker 1-42103 "Hydrogen Recombiner 1B"

2. Verify power available white light on H_2 Recombiner Control Panel is illuminated.

3. Place the power adjust potentiometer at zero (000).

4. Place the power out switch on the control panel to the ON position. The red light on the switch will illuminate.

> CAUTION
> There is a lag in the power out wattmeter reading, so the potentiometer knob must be rotated slowly. Do NOT exceed 75 KW.

5. Gradually turn the power adjust potentiometer to 70 KW as indicated on the power out wattmeter.

> CAUTION
> Do NOT exceed recombiner temperature of 1400°F.

6. Periodically check the temperature of the three thermocouples using the temperature channel selector switch. When the temperature reaches 1250°F, Then adjust the power adjust potentiometer to maintain temperature between 1250°F and 1400°F.

END OF APPENDIX M

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

INITIATE HOT AND COLD LEG INJECTION UNIT 1

CANDIDATE ______________________________

EXAMINER ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST LUCIE NUCLEAR PLANT

Task: Adjust HPSI flow

Alternate Path: Yes _____ No __X__

Facility JPM #: New

Task Standard: Initiate hot and cold leg injection using the secondary alternate method

Preferred Evaluation Location:

Simulator ______ Control Room __X__ In-Plant ______

Preferred Evaluation Method:

Perform ______ Simulate __X__

References: 1-EOP-99, Appendix O

Validation Time ____20 minutes____ **Time Critical** __No__

Candidate: ______________________________ Time Start __________
Name Time Finish __________

Performance Rating: Sat ______ Unsat ______

Examiner: ______________________ **Signature:** ____________________
Name

Tools/Equipment/ Procedures Needed:

Read to Candidate

Directions to candidate for In-Plant or Control Room JPMs:

I will explain the initial conditions and state the task to be performed. All in-plant or control room JPM steps, including any communications, shall be simulated for this JPM. Under no circumstances, unless directed by the examiner, are you to operate any plant equipment. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Directions to candidate for Simulator JPMs:

I will explain the initial conditions and state the task to be performed. All simulator JPM steps, including any communications, shall be performed for this JPM. You are you to operate any plant equipment that is necessary for the completion of this JPM. The simulator will provide the cues as you perform this JPM. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Initial Conditions: A large break LOCA/LOOP occurred on Unit 1 approximately eight hours ago. The 1B Emergency Diesel Generator tripped on overspeed and cannot be restarted.

Initiating Cues: The ANPS has directed you to align hot and cold leg injection using the 1A Containment Spray Pump through the 1A LPSI injection flow path IAW 1-EOP-99, Appendix O.

Start Time ________

Step 1: Ensure all of the following: 1A Containment Spray pump is running, RCS pressure is < 250 psia, RCS to containment differential pressure is less than 150 psid, and all available HPSI pumps running and all associated header valves open. (step 4A) Standard: Operator observes 1.) 1A Containment Spray pump is running 2.)RCS pressure indications and verifies pressure < 250 psia, 3.) containment pressure and calculates containment to RCS differential and 4.) all available HPSI pumps running and all associated header valves open. Cue: (RTGB 106) **1.) Red light on, green light off for 1A CS pump.** **2.) RCS pressure 160 psia.** **3.) Containment Pressure 5 psig.** **4.) Red light on green light off for 1A HPSI pump, normal flow indicated.** Comments:	Sat _____ Unsat _____
Step 2: Ensure V3456 1A SDC HX outlet open (step 4B1) Standard: Operator observes V3456 and verifies open indication. Cue: (CRAC Panel) **Red light on, green light off for V3456.** Comments:	Sat _____ Unsat _____
Step 3: Ensure both LPSI pumps are stopped (step 4B2) Standard: Operator observes 1A and 1B LPSI pumps light indication to verify both are stopped Cue: (RTGB 106) **Green lights on, red lights off for 1A and 1B LPSI pumps.** Comments:	Sat _____ Unsat _____

Step 4: Place FCV-3306 keyswitch in the AUTO position (step 4B3) Standard: Operator simulates placing the keyswitch for FCV-3306 in the AUTO position. Cue: (RTGB 106) **FCV-3306 in AUTO.** Comments:	**Critical Step** Sat _____ Unsat _____
Step 5: With keyswitch in AUTO, take manual control of FIC-3306 and close FCV-3306 (step 4B4) Standard: Operator simulates reducing the output of FIC-3306 to 0%. Cue: (RTGB 106) **Green light on, red light off for FCV-3306.** Comments:	**Critical Step** Sat _____ Unsat _____
Step 6: Close V3206, 1A LPSI discharge isolation (step 4C) Standard: Operator simulates placing keyswitch for V3206 to the CLOSED position. Cue: (CRAC panel) **Green light on, red light off for V3206.** Comments:	**Critical Step** Sat _____ Unsat _____
Step 7: Close V3444, 1A LPSI pump suction isolation (step 4C) Standard: Operator simulates placing the keyswitch for V3444 to the CLOSED position. Cue: (CRAC panel) **Green light on, red light off for V3444.** Comments:	**Critical Step** Sat _____ Unsat _____

Step 8: Open MV-03-1A, Shutdown Cooling warmup valve. (step 4C) Standard: Operator simulates placing the keyswitch for MV-03-1A to the OPEN position. Cue: (CRAC panel) **Red light on, green light off for MV-03-1A.** Comments:	**Critical Step** Sat ____ Unsat ____
Step 9: Open HCV-3480, SDC loop 1A suction valve (step 4C) Standard: Operator simulates placing the keyswitch for HCV-3680 in the OPEN position. Cue: (RTGB 106) **Red light on, green light off for HCV-3480.** Comments:	**Critical Step** Sat ____ Unsat ____
Step 10: Open HCV-3481, SDC loop 1A suction valve (step 4C) Standard: Operator simulates placing the keyswitch for HCV-3681 in the OPEN position. Cue: (RTGB 106) **Red light on, green light off for HCV-3481.** Comments:	**Critical Step** Sat ____ Unsat ____
Step 11: Close ALL LPSI header isolation valves (HCV-3615, HCV-3625, HCV-3635, HCV-3645) (step 4E) Standard: Operator simulates placing the control switches for HCV-3615, HCV-3625, HCV-3635, HCV-3645 in the CLOSED position. Cue: (RTGB 106) **Green lights on, red lights off for all LPSI header isolation valves.** Comments:	**Critical Step** Sat ____ Unsat ____

Step 12: Place HCV-3657, SDC Temp Control, keyswitch to manual (step 4F) Standard: Operator simulates placing the keyswitch for HCV-3657 to the MANUAL position. Cue: (RTGB 106) **HCV-3657 in manual.** Comments:	**Critical Step** Sat _____ Unsat _____
Step 13: Slowly open HCV-3657 using HIC-3657, SDC Temp Control, to maintain a minimum of 250 GPM on FIC-3306 (step 4G) Standard: Operator simulates adjusting HIC-3657 to obtain >250 GPM as indicated on FIC-3306. Cue: (RTGB 106) **Green and red lights on for HCV-3657, 300 GPM indicated on FIC-3306.** Comments:	**Critical Step** Sat _____ Unsat _____
Step 14: Adust the A train HPSI header valves to maintain a total hot and cold leg injection of 250 to 1500 gpm (step 4H) Standard: Operator simulates opening HCV-3617, HCV-3627, HCV-3637 and HCV-3647 and adjusting each valve until flow is balanced between 250 and 1500 gpm Cue: (RTGB 106) **Cold leg injection flow is 300 gpm.** Comments: **End of Task**	**Critical Step** Sat _____ Unsat _____

Stop Time __________

CANDIDATE CUE SHEET

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A large break LOCA/LOOP occurred on Unit 1 approximately eight hours ago. The 1B Emergency Diesel Generator tripped on overspeed and cannot be restarted..

INITIATING CUE:

The ANPS has directed you to align hot and cold leg injection using the 1A Containment Spray Pump through the 1A LPSI injection flow path IAW 1-EOP-99, Appendix O.

APPENDIX O
HOT AND COLD LEG INJECTION
(Page 1 of 16)

INITIAL

NOTE

This appendix contains 5 sections:

- Section 1: Aligning 1A LPSI Pump for Hot Leg Injection
- Section 2: Aligning 1B LPSI Pump for Hot Leg Injection
- Section 3: Aligning HPSI Pump for Hot/Cold Leg Injection
- Section 4: Aligning 1A CS Pump for Hot/Cold Leg Injection
- Section 5: Aligning 1B CS Pump for Hot/Cold Leg Injection

Select the method to be used by RCS conditions present and equipment availability. The sections are listed in design preferred order, from the "primary Method", using LPSI, to the "First Alternate" method (HPSI) and "Second Alternate" method (CS).

1. Aligning 1A LPSI Pump for Hot Leg Injection

CAUTION

Radiological conditions in the RAB could be significantly higher than normal dose rates during LOCA conditions, depending on the extent of fuel damage.

A. VERIFY ALL the following conditions exist:

- RCS Pressure is less than 250 psia ______
- RCS Pressure: Containment Pressure differential is less than 150 psid ______
- BOTH LPSI Pumps are OFF. ______
- ALL available HPSI Pumps are RUNNING and ALL associated HPSI Header Injection valves are fully OPEN unless this configuration conflicts with HPSI run-out considerations (640 gpm maximum per pump). ______

/R28

(Continued On Next Page)

APPENDIX O

HOT AND COLD LEG INJECTION

(Page 2 of 16)

INITIAL

1. (continued)

B. ALIGN the LPSI System by performing the following **in order:**

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
1B LPSI Pump RTGB Hand Switch	LPSI Pump 1B	STOP	
V3207	LPSI Pump Disch Isol Va (CRAC)	CLOSE	
V3432	LPSI Pump Suct Isol Va (CRAC)	CLOSE	
MV-03-1B	B SDC Warm-up Va (CRAC)	OPEN	
HCV-3625	LPSI Header to Loop 1A1 Valve	CLOSED	
HCV-3615	LPSI Header to Loop 1A2 Valve	CLOSED	
HCV-3635	LPSI Header to Loop 1B1 Valve	CLOSED	
HCV-3645	LPSI Header to Loop 1B2 Valve	CLOSED	
V3651	SDC Loop 1B	OPEN	
V3652	SDC Loop 1B	OPEN	

C. CLOSE MV-03-2, FCV-3306 Bypass Va (CRAC) ______

D. PLACE FCV-3306, SDC Return Flow, keyswitch in AUTO. ______

E. PLACE FIC-3306, SDC Return Flow, in MAN and SET to 5% OPEN output. ______

/R28

(Continued on Next Page)

APPENDIX O

HOT AND COLD LEG INJECTION

(Page 3 of 16)

INITIAL

1. (continued)

> CAUTION
>
> Limit LPSI Pump operation in simultaneous Hot and Cold Leg Injection alignment to 3500 gpm.

F. START LPSI Pump 1A. ______

G. ADJUST FIC-3306 to control LPSI flow between 250 to 3500 gpm. ______

/R28

(Continued on Next Page)

APPENDIX O
HOT AND COLD LEG INJECTION
(Page 4 of 16)

INITIAL

2. Aligning 1B LPSI Pump for Hot Leg Injection

> CAUTION
> Radiological conditions in the RAB could be significantly higher than normal dose rates during LOCA conditions, depending on the extent of fuel damage.

A. VERIFY ALL the following conditions exist:

- RCS Pressure is less than 250 psia ______
- RCS Pressure: Containment Pressure differential is less than 150 psid ______
- BOTH LPSI Pumps are OFF. ______
- ALL available HPSI Pumps are RUNNING and ALL associated HPSI Header Injection valves are fully OPEN unless this configuration conflicts with HPSI run-out considerations (640 gpm maximum per pump). ______

B. ALIGN the LPSI System by performing the following **in order:**

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
1A LPSI Pump RTGB Hand Switch	LPSI Pump 1A	STOP	
V3206	LPSI Pump Disch Isol Va (CRAC)	CLOSE	
V3444	LPSI Pump Suct Isol Va (CRAC)	CLOSE	
MV-03-1A	A SDC Warm-up Va (CRAC)	OPEN	
HCV-3625	LPSI Header to Loop 1A1 Valve	CLOSED	
HCV-3615	LPSI Header to Loop 1A2 Valve	CLOSED	

/R28

(continued on Next Page)

APPENDIX O
HOT AND COLD LEG INJECTION
(Page 5 of 16)

INITIAL

2. B. (continued)

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
HCV-3635	LPSI Header to Loop 1B1 Valve	CLOSED	
HCV-3645	LPSI Header to Loop 1B2 Valve	CLOSED	
V3480	SDC Loop 1A	OPEN	
V3481	SDC Loop 1A	OPEN	

C. CLOSE MV-03-2, FCV-3306 Bypass Va (CRAC). ______

D. PLACE FCV-3306, SDC Return Flow, keyswitch in AUTO. ______

E. PLACE FIC-3306, SDC Return Flow, in MAN and SET to 5% OPEN output. ______

CAUTION
Limit LPSI Pump operation in simultaneous Hot and Cold Leg Injection alignment to 3500 gpm.

F. START 1B LPSI Pump. ______

G. ADJUST FIC-3306 to control LPSI flow between 250 to 3500 gpm. ______

/R28

(Continued on Next Page)

APPENDIX O

HOT AND COLD LEG INJECTION

(Page 6 of 16)

INITIAL

3. Aligning HPSI Pump for Hot and Cold Leg Injection

A. ENSURE BOTH HPSI Pumps are RUNNING AND ALL HPSI Header Injection valves are fully OPEN unless this configuration conflicts with HPSI run-out considerations (640 gpm maximum per pump). ______

B. STOP ALL Charging Pumps. ______

C. PERFORM ALL of the following local operations:

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
V2336	1C Charging Pump Disch Isol	LOCKED CLOSED	
V2337	1B Charging Pump Disch Isol	LOCKED CLOSED	
V2339	1A Charging Pump Disch Isol	LOCKED CLOSED	
V2340	Charging Pump Disch Hdr to Aux HPSI Hdr Isol (1A Charging Pump room)	LOCK OPEN	

/R28

(Continued On Next Page)

APPENDIX O

HOT AND COLD LEG INJECTION

(Page 7 of 16)

3. (continued)

D. PERFORM **ALL** of the following RTGB operations:

> NOTE
>
> SE-02-03 is a non-EQ valve. During a LBLOCA and initiation of Hot and Cold Leg injection, this valve MAY NOT operate. The required flow path for Hot and Cold Leg injection is still available and adequate through SE-02-04.

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
SE-02-1	1B1 Loop Charging Isol	CLOSED	
SE-02-2	1A2 Loop Charging Isol	CLOSED	
PCV-1100E	[Pzr] Spray Valve 1B2	CLOSED	
PCV-1100F	[Pzr] Spray Valve 1B1	CLOSED	
SE-02-03	Pressurizer Auxiliary Spray Valve	OPEN	
SE-02-04	Pressurizer Auxiliary Spray Valve	OPEN	

/R28

(Continued On Next Page)

APPENDIX O
HOT AND COLD LEG INJECTION
(Page 8 of 16)

3. (continued)

> NOTE
> The 1B HPSI will need to be running for Core Heat Removal post RAS while the 1A HPSI is aligned for Hot Leg Injection.

E. PERFORM **ALL** of the following RTGB operations:

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
HCV-3627	Aux HPSI Hdr to Loop 1A1 Valve	CLOSED	
HCV-3617	Aux HPSI Hdr to Loop 1A2 Valve	CLOSED	
HCV-3637	Aux HPSI Hdr to Loop 1B1 Valve	CLOSED	
HCV-3647	Aux HPSI Hdr to Loop 1B2 Valve	CLOSED	

F. MAINTAIN minimum flow at 150 gpm, as indicated on Charging flow indicator FIA-2212 (RTGB 105).

/R28

(continued on Next Page)

APPENDIX O
HOT AND COLD LEG INJECTION
(Page 9 of 16)

INITIAL

4. Aligning 1A CS Pump for Hot and Cold Leg Injection

   A. VERIFY ALL of the following conditions exist:

   - 1A Containment Spray Pump is RUNNING. ______
   - RCS Pressure is less than 250 psia. ______
   - RCS Pressure:Containment Pressure differential pressure is less than 150 psid. ______
   - ENSURE ALL available HPSI Pumps are RUNNING AND ALL associated HPSI Header Injection valves are fully OPEN unless this configuration conflicts with HPSI run-out considerations (640 gpm maximum per pump). ______

   B. PERFORM ALL of the following:

   1. ENSURE V3456, A SDC Hx Outlet Isol Va, is OPEN (CRAC). ______
   2. ENSURE BOTH LPSI Pumps are STOPPED. ______
   3. PLACE FCV-3306, SDC Return Flow, keyswitch to AUTO. ______
   4. CLOSE FCV-3306 using FIC-3306, SDC Return Flow. ______

/R28

(Continued On Next Page)

APPENDIX O
HOT AND COLD LEG INJECTION
(Page 10 of 16)

4. (continued)

C. If 1A LPSI injection flow path is to be used,
Then ALIGN the A LPSI Train by performing **ALL** of the following:

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
V3206	LPSI Pump Disch Isol Va (CRAC)	CLOSE	
V3444	LPSI Pump Suct Isol Va (CRAC)	CLOSE	
MV-03-1A	A SDC Warm-up Va (CRAC)	OPEN	
HCV-3480	SDC Loop 1A	OPEN	
HCV-3481	SDC Loop 1A	OPEN	

D. If 1B LPSI injection flow path is to be used,
Then ALIGN **ALL** of the following valves as indicated:

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
V3207	LPSI Pump Disch Isol Va (CRAC)	CLOSE	
V3432	LPSI Pump Suct Isol Va (CRAC)	CLOSE	
MV-03-1B	B SDC Warm-up Va (CRAC)	OPEN	
HCV-3651	SDC Loop 1B	OPEN	
HCV-3652	SDC Loop 1B	OPEN	

/R28

(Continued On Next Page)

APPENDIX O
HOT AND COLD LEG INJECTION
(Page 11 of 16)

4. (continued) INITIAL

C. CLOSE **ALL** of the following LPSI Header Isolation Valves:

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
HCV-3615	LPSI Header to Loop 1A2 Valve	CLOSED	
HCV-3625	LPSI Header to Loop 1A1 Valve	CLOSED	
HCV-3635	LPSI Header to Loop 1B1 Valve	CLOSED	
HCV-3645	LPSI Header to Loop 1B2 Valve	CLOSED	

> NOTE
> 1A Containment Spray Pump is still supplying cooled water to 1A HPSI Pump and is now aligned to the LPSI Header, except for opening HCV-3657.

F. PLACE HCV-3657, SDC Temp Control, keyswitch to MAN. ______

G. SLOWLY OPEN HCV-3657 using HIC-3657, SDC Temp Control, to maintain a minimum of 250 gpm on FIC-3306. ______

/R28

(Continued On Next Page)

APPENDIX O
HOT AND COLD LEG INJECTION
(Page 12 of 16)

4. (continued)

> NOTE
> Total SI flow should be equally divided between hot and cold legs.

H. If the 1A LPSI injection flow path was used,
Then ADJUST the A HPSI Header Isolation Valves to maintain total hot and cold leg injection between 250 and 1500 gpm:

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
HCV-3627	Aux HPSI Hdr to Loop 1A1 Valve	THROTTLED	
HCV-3617	Aux HPSI Hdr to Loop 1A2 Valve	THROTTLED	
HCV-3637	Aux HPSI Hdr to Loop 1B1 Valve	THROTTLED	
HCV-3647	Aux HPSI Hdr to Loop 1B2 Valve	THROTTLED	

I. If the 1B LPSI injection flow path was used,
Then ADJUST the B HPSI Header Isolation Valves to maintain total hot and cold leg injection between 250 and 1500 gpm:

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
HCV-3626	HPSI Hdr B to Loop 1A1 Valve	THROTTLED	
HCV-3616	HPSI Hdr B to Loop 1A2 Valve	THROTTLED	
HCV-3636	HPSI Hdr B to Loop 1B1 Valve	THROTTLED	
HCV-3646	HPSI Hdr B to Loop 1B2 Valve	THROTTLED	

/R28

(Continued On Next Page)

APPENDIX O
HOT AND COLD LEG INJECTION
(Page 13 of 16)

INITIAL

5. Aligning 1B CS Pump for Hot and Cold Leg Injection

   A. VERIFY ALL of the following conditions exist:

   - 1B Containment Spray Pump is RUNNING. ______
   - RCS Pressure is less than 250 psia. ______
   - RCS Pressure:Containment Pressure differential pressure is less than 150 psid. ______
   - ENSURE ALL available HPSI Pumps are RUNNING AND ALL associated HPSI Header Injection valves are fully OPEN unless this configuration conflicts with HPSI run-out considerations (640 gpm maximum per pump). ______

   B. PERFORM ALL of the following:

   1. ENSURE V3457, B SDC Hx Outlet Isol Va, is OPEN (CRAC). ______
   2. ENSURE BOTH LPSI Pumps are STOPPED. ______
   3. PLACE FCV-3306, SDC Return Flow, keyswitch to AUTO. ______
   4. CLOSE FCV-3306 using FIC-3306, SDC Return Flow. ______

/R28

(Continued On Next Page)

APPENDIX O
HOT AND COLD LEG INJECTION
(Page 14 of 16)

5. (continued)

C. If 1A LPSI injection flow path is to be used, Then PERFORM ALL of the following:

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
V3206	LPSI Pump Disch Isol Va (CRAC)	CLOSE	
V3444	LPSI Pump Suct Isol Va (CRAC)	CLOSE	
MV-03-1A	A SDC Warm-up Va (CRAC)	OPEN	
HCV-3480	SDC Loop 1A	OPEN	
HCV-3481	SDC Loop 1A	OPEN	

D. If 1B LPSI injection flow path is to be used, Then PERFORM **ALL** of the following:

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
V3207	LPSI Pump Disch Isol Va (CRAC)	CLOSE	
V3432	LPSI Pump Suct Isol Va (CRAC)	CLOSE	
MV-03-1B	B SDC Warm-up Va (CRAC)	OPEN	
HCV-3651	SDC Loop 1B	OPEN	
HCV-3652	SDC Loop 1B	OPEN	

/R28

(Continued On Next Page)

APPENDIX O

HOT AND COLD LEG INJECTION

(Page 15 of 16)

INITIAL

5. (continued)

E. CLOSE **ALL** of the following LPSI Header Isolation Valves:

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
HCV-3615	LPSI Header to Loop 1A2 Valve	CLOSED	
HCV-3625	LPSI Header to Loop 1A1 Valve	CLOSED	
HCV-3635	LPSI Header to Loop 1B1 Valve	CLOSED	
HCV-3645	LPSI Header to Loop 1B2 Valve	CLOSED	

> NOTE
> 1B Containment Spray Pump is still supplying cooled water to 1B HPSI Pump and is now aligned to the LPSI Header, except for opening HCV-3657.

F. PLACE HCV-3657, SDC Temp Control, keyswitch to MAN. ______

G. SLOWLY OPEN HCV-3657 using HIC-3657, SDC Temp Control, to maintain a minimum of 250 gpm on FIC-3306. ______

/R28

(Continued On Next Page)

APPENDIX O
HOT AND COLD LEG INJECTION
(Page 16 of 16)

5. (continued)

> NOTE
> Total SI flow should be equally divided between hot and cold legs.

H. If the 1A LPSI injection flow path was used,
Then ADJUST the A HPSI Header Isolation Valves to maintain total hot and cold leg injection between 250 and 1500 gpm:

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
HCV-3627	Aux HPSI Hdr to Loop 1A1 Valve	THROTTLED	
HCV-3617	Aux HPSI Hdr to Loop 1A2 Valve	THROTTLED	
HCV-3637	Aux HPSI Hdr to Loop 1B1 Valve	THROTTLED	
HCV-3647	Aux HPSI Hdr to Loop 1B2 Valve	THROTTLED	

I. If the 1B LPSI injection flow path was used,
Then ADJUST the B HPSI Header Isolation Valves to maintain total hot and cold leg injection between 250 and 1500 gpm:

COMPONENT ID	COMPONENT NAME	POSITION	PERF INITIAL
HCV-3626	HPSI Hdr B to Loop 1A1 Valve	THROTTLED	
HCV-3616	HPSI Hdr B to Loop 1A2 Valve	THROTTLED	
HCV-3636	HPSI Hdr B to Loop 1B1 Valve	THROTTLED	
HCV-3646	HPSI Hdr B to Loop 1B2 Valve	THROTTLED	

/R28

END OF APPENDIX O

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

OPEN CCW SUPPLY VALVES TO THE RCP's WITH DEGRADED INSTRUMENT AIR SYSTEM PRESSURE – UNIT 1

CANDIDATE ______________________________

EXAMINER ______________________________

JOB PERFORMANCE MEASURE

Task:

Open CCW Supply Valves to the RCP's with Degraded Instrument Air System Pressure – Unit 1

Alternate Path:

Facility JPM #:

0821074

K/A Rating(s):

B.01.03.038	B.01.03.040	B.01.04.025	B.01.05.026
B.01.05.101	B.01.06.044	B.01.06.197	(3.22 Average)

Task Standard:

This JPM is complete when one (1) nitrogen connection has been successfully completed, the selected HCV is verified open, and the N2 hose has been verified as documented.

Evaluation Location:

Simulator _____ In-Plant ___X__

Evaluation Method:

Perform _____ Simulate __X___

References:

ONOP 1-0120034, Appendix A

Validation Time: 10 min. **Time Critical:** NO

Candidate: ______________________________ Time Start: ________
NAME Time Finish: ________

Performance Rating: SAT ____ UNSAT ____ Performance Time ____

Examiner: ______________________ ______________________/________
NAME SIGNATURE DATE

COMMENTS

Tools/Equipment/Procedures Needed:

None

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All in-plant steps, including any required communications, **shall be simulated** for this JPM. Under no circumstances are you to operate any plant equipment. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you. **Any safety infraction during this task performance evaluation will be corrected immediately prior to continuing the JPM.**

INITIAL CONDITIONS:

Unit 1 is at 100% power and is combating a degradation of instrument air system pressure.

Initial operator actions have placed the Unit in a relatively stable condition.

Annunciators J-9, J-12, J-27, and J-30, "RCP Low Cooling Water Flow" have alarmed.

The ANPS has directed that the nitrogen connections to the CCW valve HCV 14-1 be hooked-up to restore CCW flow to the RCP's.

INITIATING CUES:

Make up the nitrogen connections required to reopen the RCP CCW supply valve HCV-14-1 IAW ONOP 1-0120034, Appendix A.

START TIME: _______

<u>STEP 1:</u> Enter the RCA, review RWP, obtain Merlin Gerlin monitor, consult survey map, inform H.P. of intentions and request further radiological protection requirements. <u>STANDARD:</u> Remain in compliance with H.P. precautions and recommendations. **<u>INSTRUCTOR NOTE:</u>** This is **<u>NOT</u>** to be a rapid entry into the RAB. **EXAMINER'S CUE: ALL HP PRECAUTIONS AND RECOMMENDATIONS HAVE BEEN MET.** <u>COMMENTS:</u>	_____ SAT _____ UNSAT
<u>STEP 2:</u> Close instrument air supply valve T-V18134 to HCV-14-1. <u>STANDARD:</u> **<u>CLOSE</u>** IA valve to HCV-14-1. **EXAMINER'S CUE: T-V18134 HAS BEEN TURNED FULLY CLOCKWISE.** <u>COMMENTS:</u>	**CRITICAL STEP** _____ SAT _____ UNSAT
<u>STEP 3:</u> Attach the nitrogen flex hose (female end, supplied to HCV-14-1) to the male quick disconnect fitting in the air supply line to HCV-14-1 <u>STANDARD:</u> **<u>ATTACH</u>** the nitrogen supply flex hose to the fitting in the air supply line for HCV-14-1"CCW Supply HDRN to PENETR. 23 Isol.", **EXAMINER'S CUE: HOSE ATTACHED FROM NITROGEN TO HCV-14-1 AIR LINE.** <u>COMMENTS:</u>	**CRITICAL STEP** _____ SAT _____ UNSAT

STEP 4: Verify HCV-14-1 has opened. STANDARD: **VERIFY** HCV OPENS **EXAMINER'S CUE: HCV HAS OPENED** COMMENTS:	_____ SAT _____ UNSAT
STEP 5: Ensure hoses are documented in accordance with AP 0010124, "Temporary System Alteration Control". STANDARD: **VERIFY** documentation of TSAs installed in AP 0010124. **EXAMINER'S CUE: TSAs DOCUMENTED.** COMMENTS:	_____ SAT _____ UNSAT

STOP TIME: _____

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

Unit 1 is at 100% power and is combating a degradation of instrument air system pressure.

Initial operator actions have placed the Unit in a relatively stable condition.

Annunciators J-9, J-12, J-27, and J-30, "RCP Low Cooling Water Flow" have alarmed.

The ANPS has directed that the nitrogen connection to the CCW valve HCV-14-1 be hooked-up to restore CCW flow to the RCPs.

INITIATING CUES:

Make up the nitrogen connections required to reopen the RCP CCW supply valve HCV-14-1 IAW ONOP 1-0120034, Appendix A.

APPENDIX A
LOCAL RESTORATION OF CCW TO RCPS
(Page 1 of 3)

¶2

NOTE

- All temporary hose connections must be documented in accordance with AP 0010124, Temporary System Alteration Control.
- After movement of the position of the vent ball valves, operability of the containment isolation valves is required to be verified by ASME stroke testing in accordance with OP 1-0010125A when the valves are restored to normal configuration.

1. If loss of CCW is due to an air supply failure, Then perform the following local actions:

   A. CLOSE the instrument air supply valve to the affected HCV(s).

HCV NUMBER	HCV-14-1	HCV-14-7	HCV-14-2	HCV-14-6
IA SUPPLY VLV NUMBER	T-V18134	T-V18137	T-V18135	T-V18136

   B. ATTACH the nitrogen flex hose (female end, supplied at each HCV) to the male quick disconnect fitting in the air supply line to each HCV.

   C. VERIFY the HCV has opened.

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

MAKEUP TO THE SPENT FUEL POOL UNIT 1

CANDIDATE ______________________________

EXAMINER ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST LUCIE NUCLEAR PLANT

Task: Fill the Spent Fuel Pool

Alternate Path: **Yes** _____ **No** __X__

Facility JPM #: New

Task Standard: Successfully align the RWT to fill the Unit 1 SFP

Preferred Evaluation Location:

Simulator ______ Control Room ______ In-Plant __X__

Preferred Evaluation Method:

Perform ______ Simulate __X__

References: ONOP 1-02350030, "Fuel Pool Cooling System"

Validation Time __20 minutes__ **Time Critical** __No__

Candidate: ______________________________ Time Start __________
Name Time Finish __________

Performance Rating: Sat _______ Unsat _______

Examiner: ______________________ **Signature:** ____________________
Name

Tools/Equipment/ Procedures Needed:

ONOP 1-02350030, "Fuel Pool Cooling System"

Read to Candidate

Directions to candidate for In-Plant or Control Room JPMs:

I will explain the initial conditions and state the task to be performed. All in-plant or control room JPM steps, including any communications, shall be simulated for this JPM. Under no circumstances, unless directed by the examiner, are you to operate any plant equipment. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Directions to candidate for Simulator JPMs:

I will explain the initial conditions and state the task to be performed. All simulator JPM steps, including any communications, shall be performed for this JPM. You are you to operate any plant equipment that is necessary for the completion of this JPM. The simulator will provide the cues as you perform this JPM. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Initial Conditions:

FUEL POOL LEVEL HIGH/LOW annunciator in the control room is locked in alarm. The SNPO has determined that the level is low and makeup to the Spent Fuel Pool is needed.

Initiating Cues:

The ANPS has directed you to align makeup from the RWT to the Spent Fuel Pool IAW ONOP 1-02350030, "Fuel Pool Cooling System". Chemistry reports that Fuel Pool boron concentration is 1750 ppm.

Start Time ________

Step 1: Stop the Fuel Pool Purification Pump. (step 2A) Standard: Operator simulates stopping the fuel pool purification pump by turning the local control switch to OFF Cue: (SFP purification pump room on 19.5"elevation) **Pump not rotating** Comments:	**Critical Step** Sat ____ Unsat ____
Step 2: LOCK OPEN V07104, RWT to Fuel Pool Loop isolation. (step 2B1) Standard: Operator simulates removing lock, opening V07104 and re-installing lock Cue: (At RWT) **Valve rotated until stop is reached and lock installed** Comments:	**Critical Step** Sat ____ Unsat ____
Step 3: LOCK CLOSE V07101, Fuel Pool IX outlet to RWT isolation. (step 2B2) Standard: Operator simulates removing lock, closing V07101 and re-installing lock Cue: (At RWT) **Valve rotated until stop is reached and lock installed** Comments:	**Critical Step** Sat ____ Unsat ____
Step 4: CLOSE V4220, Fuel Pool outlet to Purification pump isolation. (step 2B3) Standard: Operator simulates closing V4220 Cue: (SFP purification pump room in corner below floor level) **Valve rotated until stop is reached**	**Critical Step** Sat ____ Unsat ____

Step 4: CLOSE V4220, Fuel Pool outlet to Purification pump isolation. (step 2B3) Standard: Operator simulates closing V4220 Cue: (SFP purification pump room in corner below floor level) **Valve rotated until stop is reached** Comments:	**Critical Step** Sat _____ Unsat _____
Step 5: CLOSE V4201, Fuel Pool Makeup isolation. (step 2B4) Standard: Operator simulates closing V4201 Cue: (SFP purification pump room in corner below floor level) **Valve rotated until stop is reached** Comments:	**Critical Step** Sat _____ Unsat _____
Step 6: OPEN V4252, Fuel Pool inlet from Fuel Pool Purification IX isolation. (step 2B5) Standard: Operator simulates opening V4252 Cue: (SFP purification pump room in corner below floor level) **Valve rotated until stop is reached** Comments:	**Critical Step** Sat _____ Unsat _____

Step 7: Start the SFP purification pump. (step 2C) Standard: Operator simulates starting the SFP purification pump by placing the local control switch to START Cue: (SFP purification room) **Pump is rotating** Comments:	**Critical Step** Sat ______ Unsat ______
Step 8: When Fuel Pool level rises above the low-level setpoint, Then verify annunciator N-20 , Fuel Pool Sump Pump Moisture/Lvl High/Low Clears. (step 2D) Standard: Operator simulates contacting control room to verify the status of the annunciator Cue: **Control Room reports N-20 not in alarm** Comments: **End of Task**	Sat ______ Unsat ______

Stop Time __________

CANDIDATE CUE SHEET

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF TASK)

Initial Conditions:

FUEL POOL LEVEL HIGH/LOW annunciator in the control room is locked in alarm. The SNPO has determined that the level is low and makeup to the Spent Fuel Pool is needed.

Initiating Cues:

The ANPS has directed you to align makeup from the RWT to the Spent Fuel Pool IAW ONOP 1-02350030, "Fuel Pool Cooling System". Chemistry reports that Fuel Pool boron concentration is 1750 ppm.

S_1_OPS

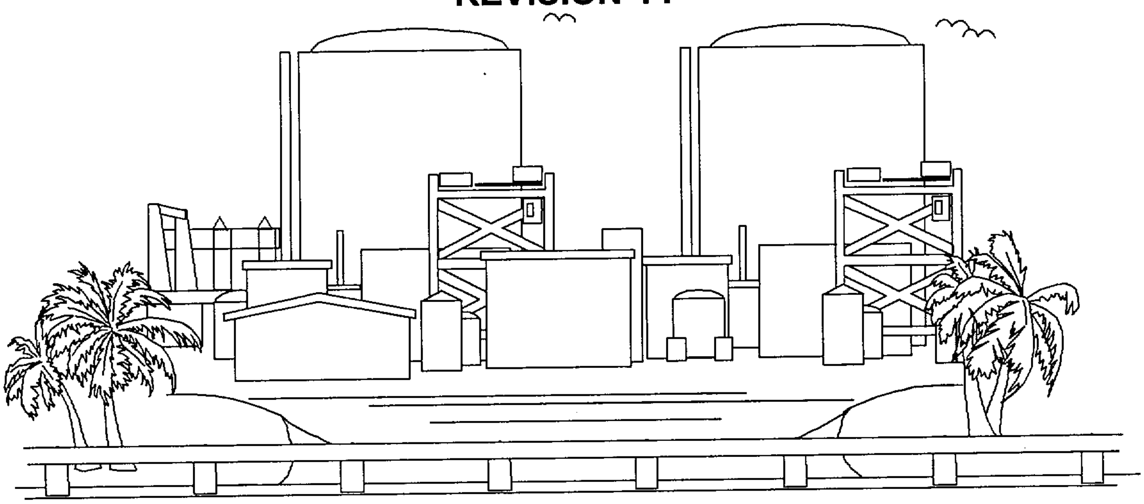
DATE________
DOCT PROCEDURE
DOCN 1-0350030
SYS________
COMP COMPLETED
ITM 14

FLORIDA POWER & LIGHT

ST. LUCIE PLANT

UNIT NO. 1

1-0350030
REVISION 14



FUEL POOL COOLING SYSTEM

OFF-NORMAL OPERATING PROCEDURE

REVISION	REVIEWED BY FRG ON	APPROVED BY	DATE
0	5/22/74	K. N. Harris Plant Manager	5/23/74
14	7/7/98	J. Scarola Plant General Manager	7/7/98

This procedure had a minor editorial change (/R14A) on page 3 Effective 7/28/98.

Responsible Department: OPERATIONS

smb 7/16/98

1.0 TITLE:

FUEL POOL COOLING SYSTEM

2.0 PURPOSE:

This procedure provides instructions to be followed when Fuel Pool cooling capacity is lost or restricted or when abnormal water level exists in the Fuel Pool.

3.0 REFERENCES:

3.1 St. Lucie Unit 1 FUSAR, Section 9.1.3.

3.2 Ebasco P&ID 8770-G-078, Sheet 140, Fuel Pool Cooling

3.3 1-0350020, "Fuel Pool Cooling and Purification System-Normal Operation."

3.4 1-NOP-14.01, "Component Cooling Water System Initial Alignment." /R14

3.5 1-0310020, "Component Cooling Water System - Normal Operation."

3.6 1-0030131, "Plant Annunciator Summary."

3.7 AP 1-0010123, "Administrative Control of Valves, Locks and Switches."

3.8 PSL-ENG-SENS-97-050, Safety Evaluation - Routine Performance of Full Core Fuel Offloads.

3.9 One or more of the following symbols may be used in this procedure.

1. § Indicates a Regulatory commitment made by technical specifications, condition of license, audit, LER, bulletin, etc. and should NOT be revised without Facility Review Group approval.

2. ¶ Indicates a management directive, vendor recommendation, plant practice or other non-regulatory commitment that should NOT be revised without consultation with the plant staff.

3. Ψ Indicates a step that requires a sign off on a data sheet.

4.0 RECORDS REQUIRED:

4.1 Normal log entries.

5.0 ENTRY CONDITIONS:

5.1 Symptoms indicate an abnormal condition in the Fuel Pool Cooling System. One or more of the following may be present:

1. Annunciator N-36, Fuel Pool Temp High, alarm. /R14A

2. Annunciator N-20, Sump Pump Moisture/Lvl High/Low, alarms. /R14A

3. Annunciator N-28, Fuel Pool Pump Disch Hdr Press Low, alarm. /R14A

4. Annunciator N-44, Fuel Pool Pumps Motor Ovrld, alarm. /R14A

5. Annunciator R-5, SIAS Channel A/B Actuation.

6.0 EXIT CONDITIONS:

Fuel Pool Cooling has been returned to normal operation and no unexplained annunciators exits.

7.0 OPERATOR ACTIONS:

7.1 Immediate Operator Actions:

1. None

7.2 Subsequent Operator Actions:

INSTRUCTIONS	CONTINGENCY ACTIONS
1. VERIFY Control Room annunciators are valid.	1. If the Control Room annunciators are NOT valid, Then PERFORM the following: A. If a refueling outage is NOT in progress, Then initiate an NPWO. **B. If a refueling outage is in progress, Then GO TO OP 1-1600023, Refueling Sequencing Guidelines, And INITIATE an NPWO.**
2. If a full core offload outage is in progress, Then VERIFY **both** Fuel Pool Pumps are OPERATING.	2. SUSPEND core offload activities. A. VERIFY at least one Fuel Pool Pump is OPERATING. B. If NO Fuel Pool Pumps are operating, Then PERFORM the following: 1. RESET **either** of the following breakers: • 1-41501, Fuel Pool Pump 1A • 1-42301, Fuel Pool Pump 1B

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2.	2. (continued) B. (continued) 2. START at least one Fuel Pool Pump. C. CONTACT EM for troubleshooting and repairs. D. CONTINUE troubleshooting and repair efforts until **both** Fuel Pool Pumps are OPERATING. **E. GO TO STEP 7.2.4**
3. VERIFY at least one Fuel Pool Pump is OPERATING.	3. START the standby Fuel Pool Pump A. If NO Fuel Pool Pumps are operating, Then PERFORM the following: 1. RESET **either** of the following breakers: • 1-41501, Fuel Pool Pump 1A • 1-42301, Fuel Pool Pump 1B 2. START at least one Fuel Pool Pump.

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
3.	3. (continued) B. CONTACT EM for troubleshooting and repairs. **C. GO TO STEP 7.2.4.**

NOTE

The Fuel Pool Cooling System is designed to limit fuel pool temperature to 150°F with 3 1/3 cores stored in the pool. During normal operations, the fuel pool temperature is maintained less than 120°F with one cooling pump in operation; however, due to the enlarged capacity of the fuel racks and possible shorter unloading times for the annual refuelings, it may be necessary to operate both spent fuel cooling pumps for a short period of time after a refueling offload to maintain pool water temperature less than 125°F .

NOTE

If CCW has been lost due to SIAS, conditions required to reset the safeguards signal should be met before restoring CCW.

INSTRUCTIONS	CONTINGENCY ACTIONS
4. If Fuel Pool cooling is degraded, Then locally verify Fuel Pool temperature to be less than 125°F. (TIA-4420, west side of Fuel Pool 62' elev.).	4. If Fuel Pool temperature is greater than 125°F, Then: A. Manually isolate Fuel Pool Ion Exchangers. B. Ensure proper CCW alignment to the Fuel Pool Hx. Refer to 1-NOP-14.01, Component Cooling Water System Initial Alignment. /R14

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

> **NOTE**
> The fuel pool piping is arranged to prevent inadvertent uncovering of the fuel. A leak in the cooling loop could only reduce the water level by 6 feet, which would still leave adequate level to provide shielding. Worst case loss of cooling capability would result in the pool water reaching the bulk boiling point in approximately 5 hours with a full core offload in the pool.

5. If Fuel Pool High/Lo level is indicated (Annunciator N-20), Then locally check Fuel Pool level and perform the following as required:

> **CAUTION**
> During refueling operations with the reactor cavity full and the fuel transfer tube gate valve open, changes with the containment/fuel handling building ventilation systems can change the fuel pool level.

A. If a high level exists, Then:

1. Determine the source of in-leakage either from an open or leaking valve on the purification pump suction or demineralized makeup water supply.

2. Isolate the source of in-leakage and restore level to normal per Appendix A.

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
5. (continued)	
B. If low level is indicated, Then:	
1. Determine if leakage is from the cooling pump or purification loop.	
2. Verify no open vent(s) or drain(s) on the demineralizer and filters.	
3. Isolate the source of leakage and restore level to normal per Appendix B.	

CAUTION

Make-up capability from the Intake Cooling Water System is available ONLY as a last resort.

INSTRUCTIONS	CONTINGENCY ACTIONS
6. If Fuel Pool cooling capability has been lost and cannot be reestablished, Then perform the following:	
A. Determine the cause of failure and estimate the time necessary to make repairs.	

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	
B. Verify the availability of makeup from the RWT.	
C. Verify Fuel Pool ventilation is in service.	
D. Ensure Fuel Pool Ion Exchangers are isolated.	
E. Notify the Operations Supervisor, Chemistry Supervisor and Health Physics Supervisor.	
F. Provide makeup from the RWT as required to maintain level.	

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	**CONTINGENCY ACTIONS**
6. (continued)	

CAUTION

Plant Management or Technical Support Center must approve any use of the Intake Cooling Water System for makeup to the Fuel Pool.

G. Provide makeup from the Intake Cooling Water System using the flex hose connections only as a last resort. These connections are located on the East Side of the Fuel Handling Bldg. and on the West Side of the CCW platform.

APPENDIX A
RESTORATION OF FUEL POOL LEVEL
CAUSED BY A HIGH LEVEL CONDITION
(Page 1 of 2)

> NOTE
> A dedicated fuel pool level watch must be maintained during level changes if the Fuel Pool level annunciation in the control room is out of service.

1. Ensure compliance with AP 1-0010123, "Administrative Control of Valves, Locks and Switches," when repositioning locked valves.

2. Restore the Fuel Pool level as follows:

   A. Stop the Fuel Pool purification pump.

   B. To decrease the Fuel Pool level:

      1. Lock closed V07104, RWT to Fuel Pool Purif. Loop Isol.

      2. Lock open V07101, Fuel Pool IX Outlet to RWT Isol.

      3. Open V4220, Fuel Pool Outlet to Purification Pump Isol.

      4. Close V4252, Fuel Pool Inlet from Fuel Pool Purif. IX Isol.

   C. Start the Fuel Pool purification pump.

   D. Verify the Fuel Pool Level annunciator in control room clears as level decreases below the high level setpoint.

   E. When normal level is established (Approx. 2' below the top of the Fuel Pool), Then:

      1. Stop the Fuel Pool purification pump.

      2. If RWT purification is required, Then:

         a. Close V4220, Fuel Pool Outlet to Purification Pump Isol.

APPENDIX A
RESTORATION OF FUEL POOL LEVEL
CAUSED BY A HIGH LEVEL CONDITION
(Page 2 of 2)

2. (continued)

   E. (continued)

      2. (continued)

         b. Lock open V07104, RWT to Fuel Pool Purif. Loop Isol.

         c. Start the Fuel Pool Purification Pump.

      3. If RWT Purification is NOT required, Then:

         a. Align Fuel Pool Purification System to normal line-up per 1-0350020, "Fuel Pool Cooling and Purification System - Normal Operation."

      4. Check for possible intrusion of borated water into ventilation ductwork.

END OF APPENDIX A

APPENDIX B
RESTORATION OF FUEL POOL LEVEL
CAUSED BY A LOW LEVEL CONDITION
(Page 1 of 3)

> NOTE
> A dedicated fuel pool level watch must be maintained during level changes if the Fuel Pool level annunciation in the control room is out of service.

1. Ensure compliance with AP 1-0010123, "Administrative Control of Valves, Locks and Switches," when repositioning locked valves.

2. If Fuel Pool level is to be increased using the Fuel Pool Purification System, Then PERFORM the following:

   A. Stop the Fuel Pool purification pump.

   B. PERFORM the following valve alignment:

      1. Lock open V07104, RWT to Fuel Pool Purif. Loop Isol.
      2. Lock closed V07101, Fuel Pool IX Outlet to RWT Isol.
      3. Close V4220, Fuel Pool Outlet to Purification Pump Isol.
      4. Close V4201, Fuel Pool M/U Isol.
      5. Open V4252, Fuel Pool Inlet from Fuel Pool Purif. IX Isol.

> CAUTION
> To prevent boric acid intrusion into the Fuel Pool Ventilation System, Fuel Pool level shall NOT be allowed to exceed elevation 61'1" by observing the local level indicator.

> NOTE
> Increased awareness is required while pumping the transfer canal to the Spent Fuel Pool. If a Fuel Pool high level exists, RCOs shall ensure prompt notification of the SNPO.

   C. Start the Fuel Pool purification pump.

APPENDIX B
RESTORATION OF FUEL POOL LEVEL
CAUSED BY A LOW LEVEL CONDITION
(Page 2 of 3)

2. (continued)

   D. When Fuel Pool level rises above the low level alarm setpoint, Then VERIFY annunciator N-20, Fuel Pool Sump Pump Moisture/Lvl High/Low CLEARS.

   E. When normal level is established (Approx. 2' below the top of the Fuel Pool), Then:

      1. Stop the Fuel Pool purification pump.

      2. If RWT purification is required, Then:

         a. Close V4252, Fuel Pool Inlet from Fuel Pool Purif. IX Isol.

         b. Lock open V07101, Fuel Pool IX Outlet to RWT Isol.

         c. Start the Fuel Pool Purification Pump.

      3. If RWT Purification is NOT required, Then:

         a. Align Fuel Pool Purification System to normal line-up per 1-0350020, "Fuel Pool Cooling and Purification System - Normal Operation."

3. If the Fuel Pool bulkhead is installed and the NPS determines that water is to be transferred to the Fuel Pool using submersible pumps, Then PERFORM the following:

   A. ENSURE submersible pump(s) are placed in the transfer canal with discharge hose(s) routed to the Spent Fuel Pool.

APPENDIX B
RESTORATION OF FUEL POOL LEVEL
CAUSED BY A LOW LEVEL CONDITION
(Page 3 of 3)

3. (continued)

CAUTION

To prevent boric acid intrusion into the Fuel Pool Ventilation System, Fuel Pool level shall NOT be allowed to exceed elevation 61'1" by observing the local level indicator.

NOTE

Increased awareness is required while pumping the transfer canal to the Spent Fuel Pool. If a Fuel Pool high level exists, RCOs shall ensure prompt notification of the SNPO.

B. START submersible pump(s).

C. MONITOR Fuel Pool local level indicator.

D. When Fuel Pool level rises above the low level alarm setpoint, Then VERIFY annunciator N-20, Fuel Pool Sump Pump Moisture/Lvl High/Low CLEARS.

E. When either of the following occur:

- Normal Fuel Pool level is reached (approximately elevation 60' 0" on the local level indicator)

  OR

- Submersible pump(s) lose suction,

Then STOP submersible pump(s).

F. REMOVE discharge hose from submersible pump(s) to prevent siphoning.

END OF APPENDIX B

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST. LUCIE NUCLEAR PLANT

LOCALLY START THE 1B EMERGENCY DIESEL GENERATOR DURING A STATION BLACKOUT

CANDIDATE ______________________________

EXAMINER ______________________________

REGION II
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE
ST LUCIE NUCLEAR PLANT

Task: Start an EDG

Alternate Path: Yes __X__ **No** ____

Facility JPM #: 0821072 / modified

Task Standard: Locally start the 1B Emergency Diesel Generator

Preferred Evaluation Location:

Simulator ______ Control Room ______ In-Plant __X__

Preferred Evaluation Method:

Perform ______ Simulate __X__

References: 1-EOP-99, Appendix C

Validation Time __15 minutes__ **Time Critical** __No__

Candidate: ______________________________ Time Start __________
Name Time Finish __________

Performance Rating: Sat ______ Unsat ______

Examiner: ______________________________ **Signature:** ______________________
Name

Tools/Equipment/ Procedures Needed:
1-EOP-99, Appendix C

Read to Candidate

Directions to candidate for In-Plant or Control Room JPMs:

I will explain the initial conditions and state the task to be performed. All in-plant or control room JPM steps, including any communications, shall be simulated for this JPM. Under no circumstances, unless directed by the examiner, are you to operate any plant equipment. .I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Directions to candidate for Simulator JPMs:

I will explain the initial conditions and state the task to be performed. All simulator JPM steps, including any communications, shall be performed for this JPM. You are you to operate any plant equipment that is necessary for the completion of this JPM. The simulator will provide the cues as you perform this JPM. Ensure you indicate to me when you finish your assigned task by returning the handout sheet I provided you.

Initial Conditions: A Station Blackout has occurred on Unit 1. 1-EOP-10 is being carried out and the unit is in a stable Mode 3 condition. The NORMAL/ISOLATE switch at the 1B EDG output breaker has been placed in the ISOLATE position.

Initiating Cues: The ANPS has instructed you to proceed to the 1B EDG room to locally reset and start the 1B EDG IAW 1-EOP-99, APPENDIX C.

Start Time ________

Step 1: Investigate the statue of the local alarm panel at the diesel control station. If no alarms present, verify the overspeed level has not tripped (step 1B) Standard: Operator observes the panel for no alarms, and trip latches on the 12 and 16 cylinder diesel engines are down such that the latch is horizontal and the limit switch is set. Cue: (1B EDG room) **No alarms present, both trip latches horizontal, limit switches depressed** Comments:	Sat _____ Unsat _____
Step 2: Ensure that the lockout relay is reset (step 1C) Standard: Operator observes position of lockout relay Operator simulates positioning the lockout relay to the RESET position Cue: (1B EDG control panel) **1.) Lockout indicates green flag** **2.) Lockout indicates red flag, engine does not start** Comments:	**Critical Step** Sat _____ Unsat _____
Step 3: If the diesel does not start, then place the engine start switch to START (step 1D) Standard: Operator simulates placing the engine start switch to START Cue: (1B EDG control panel) **Engine start switch in START, engine does not start** Comments:	**Critical Step** Sat _____ Unsat _____

Step 4: If diesel still does not start, then position the following NORMAL/ISOLATE switches in the ISOLATE position: Voltage Control, Frequency Control, Start Circuit (step 1E1 a,b,c) Standard: Operator simulates placing Voltage Control, Frequency Control, Start Circuit in the isolate position Cue: (1B EDG control panel) **a.) Voltage Control, b.) Frequency Control, c.) Start Circuit switches in the isolate position** Comments:	**Critical Step** Sat _____ Unsat _____
Step 5: Place engine control switch to START (step 1E2) Standard: Operator simulates placing the engine control switch to the START position Cue: (1B EDG control panel) **Engine control switch to start, 1B EDG starts** Comments:	**Critical Step** Sat _____ Unsat _____
Step 6: When diesel generator reaches 900 RPM, adjust voltage control and governor control switches to obtain 4160 volts and 60 hertz (step 1E3) Standard: Operator observes voltage and frequency indications and simulates adjustment to 4160 volts and 60 hertz Cue: (1B EDG control panel) **Diesel generator is at 4160 volts and 60 hertz** Comments:	Sat _____ Unsat _____

Step	Critical Step
Step 7: Place the following NORMAL/ISOLATE switches back to the NORMAL position: Voltage Control, Frequency Control, Start Circuit (step 1E4) Standard: Operator simulates placing the Voltage Control, Frequency Control, Start Circuit back to the NORMAL position Cue: (1B EDG control panel) **a.) Voltage Control, b.) Frequency Control, c.) Start Circuit NORMAL/ISOLATE switches in the NORMAL position** Comments:	Sat _____ Unsat _____
Step 7: Check that the diesel generator is operating normally (step 2) Standard: Operator checks EDG parameters and verifies normal operation Cue: **1B EDG running normally** Comments:	Sat _____ Unsat _____
Step 8: Notify RCO that diesel generator is ready to accept load and check the diesel generator to be operating normally (step 3) Standard: Operator simulates notifying the control room and observes proper operation of 1B EDG Cue: **Control room acknowledges, 1B EDG operating properly** Comments: **End of Task**	Sat _____ Unsat _____

Stop Time __________

CANDIDATE CUE SHEET

(TO BE RETURNED TO THE EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A Station Blackout has occurred on Unit 1. 1-EOP-10 is being carried out and the unit is in a stable Mode 3 condition. The NORMAL/ISOLATE switch at the 1B EDG output breaker has been placed in the ISOLATE position.

INITIATING CUE:

The ANPS has instructed you to proceed to the 1B EDG room to locally reset and start the 1B EDG IAW 1-EOP-99, APPENDIX C.

APPENDIX C
DIESEL GENERATOR LOCAL START
(Page 1 of 2)

1. If manual start of emergency diesel generator is unsuccessful, Then perform the following steps:

   A. Place the Diesel Generator Output breaker, 1A (1B) D/G 4.16 KV Breaker 1-20211 (1-20401, NORMAL/ISOLATE switch in ISOLATE.

   B. Investigate status of local alarm panel at diesel local control station. If there are no alarms present, Then verify that the overspeed trip lever has NOT tripped.

   CAUTION
   If auto-start signal is present and the lockout relay is reset, the diesel generator will automatically start.

   C. Ensure that the lockout relay is reset.

   D. If the diesel does NOT start, Then place the engine start switch to START.

   E. If diesel still does NOT start, Then perform the following steps:

      1. Place the following NORMAL/ISOLATE switches to ISOLATE position:

         a. Voltage Control

         b. Frequency Control

         c. Start Circuit

      2. Place engine control to START.

      3. When diesel generator reaches 900 rpm, adjust voltage control and electric governor control switches to obtain 4160 volts and 60 hertz.

(Continued on Next Page)

APPENDIX C
DIESEL GENERATOR LOCAL START
(Page 2 of 2)

1. (continued)

   E. (continued)

      4. Place the following NORMAL/ISOLATE switches back to the NORMAL position:

         a. Voltage Control

         b. Frequency Control

         c. Start Circuit

2. Check that the diesel generator is operating normally.

3. Notify the Control Room that the diesel generator is ready to be restored in accordance with Appendix E.

END OF APPENDIX C

INITIAL SUBMITTAL

ST. LUCIE EXAM 2000-301
50-335/2000-301 & 50-389/2000-301

FEBRUARY 7 - 11, 2000

INITIAL SUBMITTAL

OPERATING TEST
SIMULATOR SCENARIOS

Y2000
NRC
Operating Test
Sim Scenarios

FPL
POWER
PLANT
SIMULATOR
cae

Set-Up / Validated By:

J. Charles Couture

Table of Contents

Facility: St. Lucie
Examination Level (circle one): RO / SRO

Date of Examination: 2/7/00
Operating Test Number: 1

	Administrative Topic/Subject Description	Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1	Plant Parameter Verification K2.17 - 3.7 / 4.4	JPM / Perform Estimated Critical Condition Calculation Unit 1
	Overtime Guidelines K2.1.1 - 3.7/3.8	Question 1/ Evaluate Overtime Guidelines Question 2/ Minimum level of approval for deviation
A.2	Surveillance Procedures K2.2.12 - 3.0/3.4	JPM / Verify Boric Acid Makeup Tank Operability
A.3	Knowledge of 10 CFR 20 and facility radiation control requirements K2.3.1 - 2.6 / 3.0	Question 1 / Determine Posting Requirements from a Survey Question 2 / When an area is posted for Airborne Radioactivity
A.4	Knowledge of the emergency plan K2.4.29 - 2.6/4.0 (RO Only)	JPM / Complete the State of Florida Notification Form
A.4	Knowledge of the Emergency Plan. K2.4.44-2.1/4.0 (SRO Only)	JPM / Determine Protective Action Recommendations

Facility: St. Lucie
Exam Level (circle one): RO / SRO(I) / SRO(U)

Date of Examination: 2/7/00
Operating Test No.: 1

B.1 Control Room Systems

System / JPM Title	Type Code*	Safety Function
a. RPS 012 / Perform a Logic Matrix Test Unit 2 (15 minutes)	M, S, A	07
b. ECCS 006 / Fill a Safety Injection Tank Unit 2 (15 minutes)	N, S	03
c. RHRS 005 / Respond to an "A" SDC Loop Suction Valve Closure while on SDC (20 minutes) (SRO-U)	D, S, L	04P
d. AFW 061 / Manually Actuate AFAS Unit 2 (10 minutes)	D, S, A	04S
e. CRDS 001 / Recover a Slipped CEA Unit 2 (15 minutes) (SRO-U)	N, S, A	01
f. HRPS 028 / Operate the Hydrogen Recombiner Unit 1 (10 minutes)	N, C	05
g. ECCS 006 / Initiate Hot and Cold Leg Injection Unit 1 (20 minutes) (SRO-U)	N, C	02

B.2 Facility Walk-Through

a. HRPS 028 / Hydrogen Purge System Operation Unit 1 (20 Minutes) (SRO-U)	D, R	05
b. SFPCS 033 / Makeup to the Spent Fuel Pool Unit 1 (20 minutes)	N, R	08
c. EDG 064 / Locally Start the 1B EDG During a Station Blackout (15 minutes) (SRO-U)	M, A	06

* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (R)CA

Facility: St. Lucie Scenario No.: 1 Op-Test No.: 1

Objectives: To evaluate the students ability to implement the ONOPs for various instrument and component failures; perform a normal plant power reduction; and to execute the EOPs for a Small Break LOCA combined with a Loss of Offsite Power and subsequent total loss of High Pressure Safety Injection. (Functional Recovery)

Initial Conditions: Unit 2 is at 100% power MOC

Turnover: The plant is operating at 100% power, MOC. The 2B Heater Drain Pump has developed a discharge flange leak and management has made the decision to reduce power to 90% in order to facilitate repairs. 2A Emergency Diesel Generator is out of service for relay replacement, expected back in four hours. 2A Auxiliary Feedwater Pump is out of service for bearing replacement, not expected back this shift. Chemistry reports a .5 GPD tube leak in the 2A Steam Generator. Severe thunderstorms have been forcasted for St. Lucie and Martin counties. Instructions to the shift is to reduce power to 90% and remove the 2B Heater Drain Pump from service.

Preexisting Malfunctions: 2B HPSI pump becomes air bound 10 minutes after SIAS

Event No.	Malf. No.	Event Type*	Event Description
1	0	R-RO N-BOP N-BOP	Power decrease from 100% to 90% Start Second Charging Pump Place Pressurizer on Recirc
2	1	C-BOP C-BOP	DEH power supply failure, turbine control swaps to manual, 2B heater drain pump trips two minutes later
3	2	I-RO	PT-1100X setpoint (selected pressurizer pressure controller) drifts high
4	3	I-BOP	LT-9011(2A steam generator level transmitter) develops noise signal causing the valve to cut-off feedwater flow.
5	4	C-RO	Reference leg for LT-1110X ruptures (common leg failure) Starts RCS leak
6	5	M-RO M-BOP	Small break LOCA, Loss of Offsite Power on reactor trip
7	6	C	2B HPSI pump becomes air bound when started after SIAS, loss of all High Pressure Safety Injection until vented.

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Op-Test No.: 1	Scenario No.: 1	Event No.: 1	Page 2 of 12
Event Description:	Power decrease from 100% to 90%		

Time	Position	Applicant's Actions or Behavior
	BOP	Refers to appropriate procedure for decrease of turbine and reactor power: NOP-2-0030125, "Turbine Shutdown - Full Load to Zero Load"
		Operates DEH to decrease turbine load
		Monitors secondary parameters during power change
	RO	Places pressurizer on recirc IAW NOP-2-0030123, "Reactor Operating Guidelines during Steady State and Load Changes"
		Starts second Charging Pump IAW 2-NOP-02.02, "Charging and Letdown."
		Operates CVCS and BCC to decrease RCS temperature IAW 2-NOP-02.24, "Boron Concentration Control."
		Operates control rods to maintain ASI at 100% value
		Remains cognizant of RCS parameters during power increase
	SRO	Performs shift brief prior to power decrease
		Directs RO to place pressurizer on recirc and start additional charging pump
		Directs RO to maintain ASI at 100% value
		Directs RO to decrease RCS temperature by CVCS addition
		Directs BOP to decrease turbine power by DEH
		Notifies System of impending power decrease

Op-Test No.: 1 Scenario No.: 1 Event No.: 2

Event Description: DEH power supply failure, turbine control swaps to manual **(Examiner must cue trigger sometime between 98-96%)**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes DEH in manual control, loss of control power.
		Reduce turbine power using DEH in manual using ONP2-22.03 DEH Off-Normal procedure
		Recognizes 2B heater high amps and low flow alarms
		Manually trips 2B heater drain pump on high amps if not already tripped
		Communicates with RO as to when turbine power must be decreased
	RO	Recognizes RCS temperature is decreasing, turbine power not automatically decreasing, mismatch developing.
		Recognizes DEH in manual control
		Recognizes 2B heater drain pump is tripped
		Communicates with BOP as to when turbine power must be decreased to remain constant with RCS Tavg
		Borates RCS to reduce temperature, Inserts CEAs for rapid temperature control if required.
	SRO	Recognizes DEH in manual control, Implements DEH Off-Normal Procedure . ONP 2-22.03
		Contact I&C for assistance with Turbine DEH condition
		Directs BOP to continue with power reduction in manual DEH control
		Recognizes 2B heater high amps and low flow alarms
		Directs BOP to manually trip 2B heater drain pump
		Directs RO and BOP to perform a rapid downpower due to the 2B heater drain pump trip to 90% power.

Op-Test No.: 1	Scenario No.: 1	Event No.: 3	

Event Description: PT-1100X setpoint (selected pressurizer pressure controller) drifts high, **(Examiner must cue trigger)**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes PT-1100X setpoint drifting high or actual pressurizer pressure increasing
		Swaps to operable alternate channel (PIC-1100Y) (May place Spray Controller HIC-1100 in manual to stop event)
		Recognizes and reports Entry into DNB Tech Spec LCO Action statement T.S. 3.2.5 P ¾ 2-14 (<2225 psi)
		Places HIC-1100 in manual
		Restores pressurizer pressure to normal value (2250 psia)
		(if time allows) Resets, Restores Pressurizer Heaters and returns HIC-1100 to Automatic Control.
		Secures dilution (optional)
	BOP	Recognizes PT-1100X setpoint drifting high or actual pressurizer pressure increasing
		Refers to ONOP 2-0120035, "Pressurizer Pressure and Level"
		Secures turbine increase (optional)
		Assists RO in monitoring RCS parameters

Op-Test No.: 1	Scenario No.: 1	Event No.: 3	Page 5 of 12

Event Description: PT-1100X setpoint (selected pressurizer pressure controller) drifts high.

Time	Position	Applicant's Actions or Behavior
	SRO	Recognizes PT-1100X setpoint drifting high or actual pressurizer pressure increasing
		Directs RO to swap pressure channels to PIC-1100Y
		Directs RO to take manual control of pressurizer pressure by placing HIC-1100 in manual and increasing spray flow
		Directs RO and BOP to stop power decrease (optional, if not already done)
		Refers to ONOP 2-0120035, "Pressurizer Pressure and Level"
		Recognizes and Reviews Entry into DNB Tech Spec LCO Action statement T.S. 3.2.5 P ¾ 2-14(<2225 psi)
		Directs RO to restore pressurizer pressure to normal value (2250 psia)
		Notifies I&C or RMS to report pressure channel failures
		Notifies Plant Management

Op-Test No.: 1	Scenario No.: 1	Event No.: 4	Page 6 of 12
Event Description:	LT-9011(2A steam generator level controller) fails high **(Examiner must cue trigger)**		

Time	Position	Applicant's Actions or Behavior
	BOP	Recognize LT-9011 is failing High, or 2A steam generator level is Decreasing.
		Transfer FIC-9011 to manual and control 2A steam generator level manually
		Stops turbine increase (optional if not already done)
		Restores 2A steam generator level to normal value (60-70% NR)
	RO	Recognize LT-9011 has failed high or decreasing 2A steam generator level
		Refers to ONOP 2-0700030, Main Feedwater
		Stops dilution (optional if not already done)
		Monitors plant parameters during transient
	SRO	Recognize LT-9011 has failed high or decreasing 2A steam generator level
		Directs BOP to take manual control of 2A steam generator level
		Refers to ONOP 2-0700030, Main Feedwater
		Directs RO and BOP to stop power decrease (optional, if not already done)
		Directs BOP to restore 2A steam generator level to normal value (60-70% NR)
		Notifies I&C or RMS of level channel failure
		Notifies Plant Management

Op-Test No.: 1 Scenario No.: 1 Event No.: 5

Event Description: Reference leg for LT-1110X ruptures (common leg failure) **(Examiner must cue trigger)**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes common leg failure by the following indications: LT-1110 X fails high, PT-1100X fails low, reactor cavity leakage increases.
		Notifies SRO of increasing reactor cavity leakage, and decreasing Pressurizer pressure.
		Starts a third charging pump as RCS leakage increases. May take manual control of letdown. (pressure affected more than level, 3rd pump start may not occur)
		Isolates letdown as RCS leakage increases
		Operates CVCS and control rods to decrease reactor power and temperature as directed by SRO
	BOP	Recognizes common leg failure by the following indications: LT-1110 X fails high, PT-1100X fails low, reactor cavity leakage increases.
		Refers to ONOP 2-0120035, "Pressurizer Pressure and Level"
		Refers to 2-ONP-22.01, "Rapid Downpower"
		Operates DEH in Manual to reduce turbine power
		Manually trips reactor and turbine when pressurizer level can no longer be maintained
		Refers to "RCS Leakage ONP" for guidance if time allows.

Op-Test No.: 1	Scenario No.: 1	Event No.: 5	Page 8 of 12
Event Description: Reference leg for LT-1110X ruptures (common leg failure)			

Time	Position	Applicant's Actions or Behavior
	SRO	Recognizes common leg failure by the following indications: LT-1110 X fails high, PT-1100X fails low, reactor cavity leakage increases.
		Directs RO to start a third charging pump as leakage increases. (pressure affected more than level, 3rd pump start may not occur)
		Directs RO to isolate letdown as leakage increases
		Refers to ONOP 2-0120035, "Pressurizer Pressure and Level"
		Directs RO and BOP to perform a plant shutdown IAW 2-ONP-22.01, "Rapid Downpower"
		Recognizes need to place PT-1102A RPS, and ESFAS SIAS channels in Bypass per Tech Specs, (T.S. 3.3.1 and 3.3.2 RPS and ESFAS) and Tech Spec Instrument Off-Normal. 2-ONP-99.01 (Bypass may NOT occur because of attention needed for multiple controllers in Manual). May assess this T.S. knowledge during post exercise questioning.

Op-Test No.: 1	Scenario No.: 1	Event No.: 6	Page 9 of 12
Event Description:	Small break LOCA, Loss of Offsite Power on reactor trip		

Time	Position	Applicant's Actions or Behavior
	RO	Manually trips the reactor when pressurizer pressure can no longer be maintained
		Perform systematic board walkdown
		Perform Standard Post Trip actions (2-EOP-1)
		Report all safety function status to SRO
		Verifies B train SI actuation
		Performs a plant cooldown and depressurization when directed by SRO
	<u>Critical Task</u>	Recover HPSI flow to the core for inventory control.
	BOP	Manually trips the reactor and turbine when pressurizer level can no longer be maintained
		Perform systematic board walkdown
		Perform Standard Post Trip actions (2-EOP-1)
		Report all safety function status to SRO
		Performs safety function status checks for 2-EOP-3 (If STA is unavailable)
		Verifies SI flow per 2-EOP-99, Figure 2
		Notifies NPO to restore instrument air per 2-EOP-99, Appendix H
		Open ADVs Manually to provide heat removal flowpath due to loss of SBCS. (reduce pressure below SG SRV lift pressure)

Op-Test No.: 1	Scenario No.: 1	Event No.: 6	Page 10 of 12
Event Description:	Small break LOCA, Loss of Offsite Power on reactor trip		

Time	Position	Applicant's Actions or Behavior
	SRO	Directs RO and BOP to manually trip reactor and turbine when pressurizer level can no longer be maintained
		Directs RO and BOP in the performance of 2-EOP-1
		Performs shift brief and directs entry into 2-EOP-03, "Loss of Coolant Accident," (EOP-15 acceptable if recognized early that No HPSI is available)
		Directs BOP or STA to perform safety function status checks for 2-EOP-3
		Directs RO to perform a plant cooldown and depressurization
		Contacts Chemistry to perform steam generator samples
		Directs BOP to contact NPO and restore instrument air
		Directs verification of 2-EOP-99, Figure 2 (SI flow)

Op-Test No.: 1	Scenario No.: 1	Event No.: 7	Page 11 of 12

Event Description: 2B HPSI pump becomes air bound when started on SIAS, loss of all High Pressure Safety Injection
(Examiner must cue trigger) When called to investigate HPSI pp. SNPO must communicate to crew 'pump is very quiet and no discharge pressure'

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes 2B HPSI pump amps fluctuating and no flow
		Stops 2B HPSI pump
		Notifies SRO that there is currently no SI flow
		Monitors plant parameters and continues cooldown and depressurization
	Critical Task	Recover HPSI flow to the core for inventory control.
	BOP	Recognizes no HPSI flow
		Contacts SNPO to investigate
		Performs safety function status checks for 2-EOP-3 or EOP-15 (If STA is unavailable)
		Reports to SRO that multiple safety functions are not being met (RCS inventory control and RCS pressure control)
		Assists RO with maintenance of safety functions as directed by SRO
		Notifies SNPO to vent 2B HPSI pump
	Critical Task	Starts 2B HPSI pump after vent to establish SI flow for one train per 2-EOP-99 Figure 2

Op-Test No.: 1 Scenario No.: 1 Event No.: 7

Event Description: 2B HPSI pump becomes air bound 10 minutes after SIAS, loss of all High Pressure Safety Injection

Time	Position	Applicant's Actions or Behavior
	SRO	Recognizes 2B HPSI pump amps fluctuating and no flow
		Directs RO to stop 2B HPSI pump
		Contacts Mechanical Maintenance to investigate (air bound) 2B HPSI pump
		Directs entry into 2-EOP-15, "Functional Recovery" if HPSI flow is not restored within 15 minutes of loss
	Critical Task	Directs outside operator to vent 2B HPSI pump when notified the pump is air bound
		This scenario can be terminated when 2B HPSI pump is vented and running and SI flow per 2-EOP-99, Figure 2 is met.

Shift Turnover

- The plant is operating at 100% power MOC.
- 2B Heater Drain Pump has developed a discharge flange leak and management has made the decision to reduce power to 90% to facilitate repairs.
- 2A Emergency Diesel Generator is out of service for relay replacement, expected back in 4 hours
- 2A Auxiliary Feedwater pump is out of service for bearing replacement, not expected back this shift.
- Chemistry reports a .5 gpd tube leak in the 2A Steam Generator.
- Severe thunderstorms have been forcasted for St. Lucie and Martin counties.
- Instructions to the shift is to reduce power to 90% and remove the 2B Heater Drain Pump from service.

3.0 REFERENCES: (continued)

3.9 2-NOP-02.24, "Boron Concentration Control." /R8

3.10 JPN Evaluation, Power Ramp Rates Following Refueling Outages for PSL 1/2, JPN-PSL-SEFJ-94-024.

§3 3.11 FPL Letter L-96-93, Reply to Notice of Violation EA 96-040.

4.0 PREREQUISITES:

4.1 Plant is at Power Operation (Mode 1), except for performance of Appendix A, "Pressurizer Recirculation Guidelines," which may be performed in any Mode if there is a bubble established in the Pressurizer.

5.0 PRECAUTIONS/LIMITATIONS:

5.1 At or above 50% power, boration/dilution should be the primary means to compensate for changes in power level and transient xenon. This subjects the majority of the fuel rods to uniform and smooth power transients.

5.2 During steady state base load operations, the CEA Mode Selector switch should be maintained in OFF.

5.3 Continuous (in excess of 10 inches) regulating group withdrawals or insertions are undesirable. CEA motion should be in small increments, primarily in response to deviations of ASI from ESI.

5.4 ASI control bands about the ESI: (ASI values are in RPS units)

1. Steady State Band:

   ESI plus or minus 0.5 during steady state base load operation

2. Transient Band:

   A. ESI plus or minus 0.2 during load transients.

   B. ASI control to plus or minus 0.1 is recommended whenever practical.

3. Refer to 0-NOP-100.02, "Axial Shape Index Control," for specific guidance. /R8C

5.0 PRECAUTIONS/LIMITATIONS: (continued)

5.5 Pressurizer boron concentration should be maintained within 25 ppm of RCS boron concentration.

§1 5.6 RCS T-cold shall be maintained less than or equal to 549°F, refer to Technical Specification 3.2.5.

5.7 With the reactor critical, the RCS T-avg should be maintained greater than 525°F.

1. If T-avg decreases below 525°F, Then at least once per 30 minutes, verify RCS T-avg greater than or equal to 515°F.

§1 2. If T-avg decreases below 515°F, Then restore T-avg to greater than or equal to 515°F within 15 minutes or be in Hot Standby within the next 15 minutes. Refer to Technical Specification 3.1.1.5.

6.0 RECORDS REQUIRED:

6.1 Normal log entries.

7.0 INSTRUCTIONS: (continued)

7.1 (continued)

3. If available, Then ensure two Charging Pumps are operating. If necessary, start an additional Charging Pump in accordance with 2-NOP-02.02, "Charging and Letdown." /R8B

4. Place the Pressurizer on recirculation in accordance with Appendix A, "Pressurizer Recirculation Guidelines."

5. Continue to load the Main Generator in accordance with 2-GOP-201, Reactor Plant Startup, Mode 2 to Mode 1.

7.2 Power Level Reductions:

1. At or above 50% power:

   A. All planned reactivity additions should be made by boration or dilution in accordance with 2-NOP-02.24, "Boron Concentration Control." /R8

   B. Use CEAs for ASI control, consider the reactivity effect of CEAs when adjusting boron concentration.

   C. Refer to 0-NOP-100.02, "Axial Shape Index Control," for specific instructions regarding ASI control during planned or unplanned load reductions. /R8C

2. If available, Then ensure two Charging Pumps are operating. If necessary, start an additional Charging Pump in accordance with 2-NOP-02.02, "Charging and Letdown." /R8B

3. Place the Pressurizer on recirculation in accordance with Appendix A, "Pressurizer Recirculation Guidelines."

4. Unload the Main Generator in accordance with OP 2-0030125, "Turbine Shutdown - Full to Zero Load."

APPENDIX A
PRESSURIZER RECIRCULATION GUIDELINES
(Page 1 of 2)

> **NOTE**
> The purpose of placing the Pressurizer on recirculation is to keep the Pressurizer and RCS boron concentration within 25 ppm when changing RCS boron concentration.

> **NOTE**
> From measured data, the estimated time in minutes to correct a greater than or equal to 25 ppm boron mismatch by operating 6 Backup Bank heaters may be determined as follows:
>
> Time (in minutes) to correct mismatch = [(Pzr ppm - RCS ppm) - 25 ppm] x 3

1. To place the Pressurizer on recirculation:

   A. Place all available Backup Bank heater control switches to ON.

   B. Slowly reduce the AUTO setpoint on PIC-1100X or PIC-1100Y, the selected "Pressurizer Pressure" controller, to maintain normal operating pressure.

   C. Observe HIC-1100, "Pressurizer Spray" output and PCV-1100E/1100F, "Pressurizer Spray Valve" position indication to verify Main Spray flow.

APPENDIX A
PRESSURIZER RECIRCULATION GUIDELINES
(Page 2 of 2)

NOTE

Normally, the required number of Backup Bank heaters in service is dependent upon:

1. The magnitude of thermal losses from the system, including leakage to the Quench Tank.
2. The number of heater elements out of service.

The normal configuration is to have enough Backup Bank heaters in service to keep the Proportional Bank heaters at approximately 50% output.

2. To take the Pressurizer off recirculation:

   A. Remove the additional Backup Bank heaters from service one at a time by returning the control switch to AUTO.

   B. ADJUST the AUTO setpoint on PIC-1100X or PIC-1100Y, the selected "Pressurizer Pressure" controller, to maintain normal operating pressure.

   C. Observe HIC-1100, "Pressurizer Spray" output and PCV-1100E/1100F, "Pressurizer Spray Valve" position indication to ensure:

      1. Main Spray flow has stopped.

         AND

      2. Proportional Bank heaters are at approximately 50% output.

END OF APPENDIX A

6.5 Normal Plant Operation

NOTE
Selecting the following positions will allow the backup Charging Pump to start on low pressurizer level (2.5% less than setpoint.)

1. During normal steady state operation, only one Charging Pump should be running. The Charging Pump control switches should be aligned as follows:

   A. The running Charging Pump control switch is in START.

   B. The backup Charging Pump control switch is in AUTO.

   C. The other Charging Pump control switch is in AUTO.

   D. The Chrg Pump Sel Running-B/U PP switch selected in accordance with Table 1, Charging Pump Combinations vs. Selector Switch Position.

NOTE
The following switch positions will allow the third Charging Pump to start on SIAS.

2. During abnormal circumstances, two charging pumps may be operating (i.e. RCS clean up, scheduled load changes, etc.). The Charging Pump control switches should be aligned as follows:

   A. Both running charging pump control switches in START.

   B. The other charging pump control switch in AUTO.

   C. The Chrg Pump Sel Running-B/U PP switch selected in accordance with Table 1, Charging Pump Combinations vs. Selector Switch Position.

6.5 Normal Plant Operation (continued)

NOTE

Steps 6.5.3.A and 6.5.3.B below satisfy the logic to allow the 2C Charging Pump to start on SIAS and Steps 6.5.3.D and 6.5.3.E align the backup Charging Pump to start on low pressurizer level.

3. Operation of the 2C Charging Pump (with the 2A or 2B Charging Pump out of service) should be as follows:

A. ALIGN the 480 LC 2AB to the side with the inoperable Charging Pump in accordance with 2-NOP-52.02, Transfer of 2AB Buses and Components. /R0A

B. PLACE the inoperable Charging Pump Control switch to STOP.

C. PLACE the running Charging Pump control switch in START.

D. PLACE the backup Charging Pump control switch in AUTO.

E. PLACE the Chrg Pump Sel Running-B/U PP switch in accordance with Table 1, Charging Pump Combinations vs. Selector Switch Position.

4. If Charging Pump (s) are to be started, Then PERFORM the following:

A. ENSURE that each Charging pump that is desired to be started is ready to operate by local inspection by the SNPO.

B. If the associated Charging Pump Recirc Valve is operable, Then ENSURE that it is OPEN prior to starting the Charging Pump.

C. START the Charging pump.

D. ADJUST the bias on HIC-1110, Level, using the upper knurled knob, to control the letdown flow to maintain the actual Pressurizer Level to program RRS Pressurizer Level for current plant conditions.

E. If FIA-2212, Charging to Regen Hx, is in service, Then VERIFY proper Charging Header Flow by observing FIA-2212 raise and stabilize for the number of Charging Pumps that are running.

6.5 Normal Plant Operation (continued)

4. (continued)

F. If FIA-2212, Charging to Regen Hx, is NOT in service, Then VERIFY proper Charging Header Flow by observing Letdown flow and expected changes in Pressurizer level for the number of Charging pumps that are running.

G. ENSURE the running Charging Pump Recirc Valve is CLOSED.

H. When the Charging Header flow has stabilized at the expected value, Then PERFORM the following:

1. STOP one of the charging pumps.

2. ADJUST the bias on HIC-1110, Level, using the upper knurled knob, to control the letdown flow to maintain the actual Pressurizer Level to program RRS Pressurizer Level for current plant conditions.

3. VERIFY the secured charging pump recirc valve OPENS.

4. VERIFY the charging flow is at the expected value.

NOTE

Placing a second or third charging pump in service will increase letdown flow which may cause the general area dose rates in the vicinity of the letdown line in the 19.5' Pipe Penetration room or 19.5' Letdown Cubicle room to exceed 1000 mr/hr (Locked High Radiation Area limit) due to reduced transport time of short lived radioactive isotopes.

I. If continued operation of two or more charging pumps is desired, Then PERFORM the following:

1. ADJUST the bias on HIC-1110, Level, using the upper knurled knob, to control the letdown flow to maintain the actual Pressurizer level to program RRS Pressurizer level for current plant conditions.

2. NOTIFY Health Physics of the current charging pump alignment.

J. PLACE the Chrg Pump Sel Running-B/U PP switch in accordance with Table 1, Charging Pump Combinations vs. Selector Switch Position.

6.6 Aligning for MANUAL Boration INITIAL

1. ENSURE Section 3.0, Prerequisites is completed at least once per shift. ____ ____ ____
2. ENSURE Section 4.0, Precautions / Limitations, has been reviewed at least once per shift. ____ ____ ____
3. DETERMINE the desired volume of boric acid to be added. ____ ____ ____
4. PLACE the Makeup Mode Selector switch in MANUAL. ____ ____ ____
5. PLACE FRC-2210X, Reactor Water Flow, in MANUAL and REDUCE the controller output to ZERO. ____ ____ ____
6. ENSURE FCV-2210X, Reactor Makeup. control switch is in CLOSED. ____ ____ ____
7. PLACE FRC-2210Y, Boric Acid Flow, in MANUAL and REDUCE the controller output to ZERO. ____ ____ ____
8. ENSURE FCV-2210Y, Boric Acid, control switch is in CLOSED. ____ ____ ____
9. ENSURE one of the Primary Makeup Water Pumps 2A or 2B is running. ____ ____ ____
10. START either BA Pump 2A or 2B. ____ ____ ____
11. PLACE FCV-2210Y control switch in AUTO. ____ ____ ____
12. If borating to the VCT, Then OPEN V2512, Reactor Makeup Water Stop Vlv. ____ ____ ____
13. If borating to the Charging Pump suction, Then OPEN V2525, Boron Load Control Valve. ____ ____ ____
14. ADJUST FRC-2210Y to the desired flowrate. ____ ____ ____
15. MAINTAIN VCT pressure less than or equal to 30 psig by opening and closing V2513, VCT Vent, as needed. ____ ____ ____

6.6 Aligning for MANUAL Boration (continued) INITIAL

16. If necessary to maintain the desired VCT level, Then DIVERT the letdown flow to the Waste Management System by placing V2500, VCT Divert Valve, in the WMS position. ____ ____ ____

17. When the desired VCT level is reached, Then PERFORM the following:

    A. PLACE V2500 to the AUTO position. ____ ____ ____

    B. ENSURE V2500 indicates CLOSED. ____ ____ ____

18. When the desired amount of boric acid has been added, Then CLOSE FCV-2210Y, Boric Acid. ____ ____ ____

19. If additional Borations are desired, or if the expected changes to Tave, or Boron concentration are NOT achieved, Then REPEAT Steps 6.6.1. through 6.6.18. ____ ____ ____

CAUTION

¶1 Stopping either BAM pump with the Makeup Mode Selector switch in any position other than MANUAL could cause the pump breaker to trip.

20. STOP the running Boric Acid Pump and PLACE the control switch in AUTO. ____ ____ ____

NOTE

If Plant conditions require multiple or constant borations, the following step is not required to be performed until conditions allow flushing of the CVCS piping following boration.

21. If flushing the CVCS piping after a boration, Then PERFORM the following:

    A. PLACE FCV-2210X, Reactor Makeup, control switch in AUTO. ____ ____ ____

6.6 Aligning for MANUAL Boration (continued)

INITIAL

21. (continued)

B. PLACE FRC-2210X, Makeup Water Flow, controller in MANUAL. ____ ____ ____

C. ADJUST FRC-2210X to the desired flowrate to flush the piping with at least 30 gallons of Primary Water. ____ ____ ____

D. When the desired amount of PMW has been added, Then PLACE FCV-2210X control switch in CLOSE. ____ ____ ____

E. ENSURE FRC-2210X is in MANUAL and REDUCE the controller output to ZERO. ____ ____ ____

22. When the boration is complete, Then ENSURE V2512, Reactor Makeup Water Stop Vlv, Control Switch is in AUTO or CLOSED. ____ ____ ____

23. When the boration is complete, Then ENSURE V2525, Boron Load Control Valve, is CLOSED. ____ ____ ____

24. ENSURE FRC-2210Y, Boric Acid Flow, is in MANUAL and REDUCE the controller output to ZERO. ____ ____ ____

25. §1 RECORD on Data Sheet 1, Boration/Dilution Log, the number of gallons of Boric Acid added as indicated on FQI-2210Y, Flow Totalizer. ____ ____ ____

26. §1 RECORD on Data Sheet 1, Boration/Dilution Log, the number of gallons of Primary Makeup water added as indicated on FQI-2210X, Water Flow Totalizer. ____ ____ ____

27. MONITOR for any abnormal change in Tave. ____ ____ ____

28. MONITOR for any undesired change in the RCS boron concentration by boronometer indication. ____ ____ ____

6.6 Aligning for MANUAL Boration (continued) INITIAL

29. If it is desired to restore the Boron Concentration Control system to the AUTOMATIC Mode of Operation, Then REFER to Section 6.1, Aligning for AUTOMATIC Mode of Operation. ____ ____ ____

30. Section 6.6 is complete, ANPS review. ____

END OF SECTION 6.6

3.0 REFERENCES: (continued)

¶1 3.2 Westinghouse Steam Turbine Technical Manual

¶2 3.3 Condition Report 96-670

¶3 3.4 PSL-ENG-SEMS-97-017, Manual Operation of the TCV for the Hydrogen Coolers (TCV-13-15).

§1 3.5 St. Lucie Unit 2 Technical Specifications

3.6 2-ONP-22.01, Rapid Down Power.

3.7 CR 98-0658

4.0 PREREQUISITES:

4.1 For pre-planned evolutions a load reduction request should be submitted by Work Control Department personnel and routed to the Division Load Dispatcher as early as possible to allow sufficient time for replacement power to be arranged. Responsible Department Heads should also be given prior notification to make appropriate arrangements in support of the load reduction.

4.2 For emergency load reductions the Division Load Dispatcher should be notified as quickly as possible and the following information relayed to him, if available:

1. The rate at which the load reduction is expected to occur.

2. The power level at which the load reduction is expected to be stopped or that the Unit will be removed from service.

3. The reason for the load reduction.

4.3 If the NPS/ANPS determines that a rapid down power is required, Then refer to 2-ONP-22.01, Rapid Down Power.

5.0 PRECAUTIONS/LIMITATIONS:

¶1 5.1 Maximum permissible backpressure for on-line operation at loads less than 30% power is 3.5 inches of Hg. absolute. If this limit is exceeded, Then immediately TRIP the unit.

5.0 PRECAUTIONS/LIMITATIONS: (continued)

¶1 5.2 Maximum permissible backpressure for on-line operation at loads greater than 30% power is 5.5 inches of Hg. absolute. If this limit is exceeded, Then immediately TRIP the unit.

¶1 5.3 Maximum permissible pressure differential between the condensers is 2.5 inches of Hg. absolute. If this limit is exceeded, Then immediately TRIP the unit.

5.4 For steady state operation at loads greater than 30% power, the following operational guidelines are recommended:

1. With four waterboxes in operation: Maintain condenser backpressure less than the low vacuum alarm setpoint, but it should NOT exceed 4.5 inches of Hg. absolute by the average of the two condensers. Unit load may be adjusted to accomplish this.

2. With less than four waterboxes in operation: Backpressure should NOT exceed 4.5 inches of Hg. absolute by the highest indication. Unit load may be adjusted to accomplish this.

¶1 5.5 Turbine bearing related temperatures should be adhered to as follows:

Maximum bearing metal temperature	225°F
Maximum discharge temperature	180°F
Normal operating temperature	110°F to 120°F
Minimum for turbine roll or turning gear operation	70°F
Minimum for any motor operated pump operation	50°F

¶1 5.6 To avoid unnecessary stress due to expansion of parts of the exhaust chamber and misalignment of the low pressure turbine inner cylinder and rotor, exhaust hood temperatures should be adhered to as follows:

High exhaust hood temperature Turbine trip	250°F
High exhaust hood temperature alarm	175°F
Exhaust hood sprays automatic actuation	160°F
Maximum exhaust hood differential between the low pressure turbines	50°F

5.0 PRECAUTIONS/LIMITATIONS: (continued)

¶1 5.7 A Moisture Separator Reheater (MSR) may be removed from service or placed in service while the unit is in operation. A 50°F instantaneous change of steam temperature to a low pressure turbine is allowed provided a maximum rate of change of 100°F per hour is **NOT** exceeded.

¶1 5.8 Operation at low frequency is to be avoided due the probable occurrence of blade resonance. Lifetime total accumulative time limits are as follows:

59.5 to 60.5 HZ	Continuous operation
58.5 to 59.5 HZ	60 minutes
56.0 to 58.5 HZ	10 minutes

¶1 5.9 The high initial response exciter is designed to respond to system disturbances too rapid for operator intervention prior to the onset of major equipment damage. If any voltage excursion was limited and controlled, Then ensure the following parameters are within allowable limits:

Generator amperes	Less than or equal to 26 kiloamps per phase
Generator terminal voltage	21 KV to 23 KV
Exciter field current	Less than or equal to 310 amps
2A3 and 2B3 4.16 KV bus voltage	3.95 KV to 4.35 KV

5.10 Main generator reactive load should be maintained greater than or equal to 50 MVARs in the lag (out). This limit is imposed by Power System Technical Services to account for a 3-phase fault at Midway's 500/230 KV auto transformer. This limit is not applicable while removing the unit from service.

6.0 RECORDS REQUIRED:

6.1 This procedure, with each step dispositioned, shall be maintained in the plant files in accordance with QI-17-PSL-1, Quality Assurance Records.

6.2 Normal log entries.

7.0 INSTRUCTIONS:

INITIAL

7.1 Prepare the unit for the load reduction in accordance with NOP-2-0030123, Reactor Operating Guidelines During Steady State and Scheduled Load Changes. ______

7.2 Prepare the CEA Control Panel for the load reduction by performing the following:

1. PLACE the Mode Select switch in MS. ______

AND

2. Verify the Manual Sequential Reg light is LIT. ______

7.3 If Group 5 CEAs are fully withdrawn, Then verify CEA operability by INSERTING Group 5 just until the upper electrical limit (UEL) lights clear for all the CEAs in that group or until all the CEAs in that group have been inserted approximately one inch. ______

7.4 If CEA motion is unavailable at any time during the load reduction, Then perform the following:

1. STOP the load reduction and refer to ONOP 2-0110030, CEA Off-Normal Operation and Realignment. ______

OR

2. If the load reduction can **NOT** be stopped, Then contact Reactor Engineering for recommendation on ASI control. ______

7.0 INSTRUCTIONS: (continued) INITIAL

7.5 If the DEH is **NOT** in Turbine Manual, Then program the DEH System for the load reduction by performing the following on the Turbine DEH Cont Panel:

1. DEPRESS the Ref pushbutton. ______

> **NOTE**
> In the event an error is made in depressing a numerical pushbutton, the number in the Demand display can be removed by depressing the Cancel pushbutton.

2. Enter the desired load by DEPRESSING the numerical pushbuttons on the keyboard. Verify the desired number appears in the Demand display. ______
3. DEPRESS the Enter pushbutton. ______
4. Verify the Hold pushbutton illuminates. ______
5. DEPRESS the Load Rate MW/Min pushbutton. ______
6. Enter the desired load rate by DEPRESSING the numerical pushbuttons on the keyboard. Verify the desired number appears in the Demand display. ______
7. DEPRESS the Enter pushbutton. Verify the desired load rate appears in both the Reference and Demand displays. ______
8. DEPRESS the Ref pushbutton. ______

7.0 INSTRUCTIONS: (continued) INITIAL

7.6 If a rapid load reduction is necessary, Then GO TO 2-ONP-22.01, Rapid Down Power.

7.7 If a rapid load reduction is **NOT** required, Then perform the following:

1. Begin borating the RCS to reduce RCS temperature in accordance with 2-NOP-02.24, Boron Concentration Control. ______

> NOTE
> If the power reduction is being performed in Turbine Manual, Then Fast Action on the turbine valves should be avoided to preclude an uncontrolled transient.

2. When a decrease in RCS temperature is noted, Then begin the load reduction by performing the following:

   A. DEPRESS the Go pushbutton on the Turbine DEH Cont Panel. ______

   OR

   B. If in Turbine Manual, Then DEPRESS and RELEASE the GV Lower pushbutton on the Turbine DEH Cont Panel as necessary to control the load reduction rate. ______

3. Control ASI with CEAs in accordance with 0-NOP-100.02, Axial Shape Index Control, or as recommended by Reactor Engineering.

7.8 As the load reduction progresses verify the turbine valve positions on the Turbine DEH Cont Panel indicate that the turbine valves are closing. ______

7.9 If there is indication that the turbine valves are **NOT** closing, Then investigate and correct the cause of the failure. ______

7.0 INSTRUCTIONS: (continued) INITIAL

¶3 7.10 ADJUST TCV-13-15, H2 Cooler Outlet, as necessary to maintain Hydrogen Cold Gas Temperature between the Hydrogen Dew Point of 45°F (7.2°C) and 114°F (46.1°C).

7.11 Maintain T-avg and T-ref as close as possible during the load reduction by adjusting the reactivity addition rate and/or the Turbine load rate. _______

7.12 Monitor heater drain pump amperage and 4A and 4B heater levels as the load reduction proceeds. _______

7.13 If heater drain pump amperage is abnormal or 4A or 4B heater low level alarms annunciate and remain in alarm, Then consider stopping heater drain pumps. _______

> **NOTE**
>
> Indications that a TCW Pump is operating at less than desired flow are as follows:
> 1. Abnormally high discharge and/or suction pressure as compared to its redundant pump.
> 2. Abnormally low amps as compared to its redundant pump.
> 3. Pump casing hot to the touch.

7.14 Monitor Turbine Cooling Water Pump parameters as the load reduction proceeds. If there is indication that a TCW Pump is operating at less than desired flow, Then STOP one TCW Pump as follows:

1. OPEN SB13139, "TCW Pumps Disch Cross-Tie Isol." _______ NPO

2. STOP the 2A TCW Pump. _______

OR

3. STOP the 2B TCW Pump. _______

7.0 INSTRUCTIONS: (continued) INITIAL

7.15 Continue with the remaining steps of this procedure until the desired power level or plant condition is reached or this procedure is complete. ______

CAUTION

Main Feed Pump suction pressure should be maintained greater than 400 PSIG to preclude tripping of one or both Main Feed Pumps on low suction pressure.

7.16 When **total** feedwater flow is between 20,000 and 15,000 GPM, as indicated on FI-09-1A, "2A Feedwater Pump Flow," and FI-09-1B, "2B Feedwater Pump Flow," Then perform the following:

1. PLACE the control switch for the Main Feed Pump to be stopped in RECIRC. ______

2. Verify the associated Main Feed Pump Recirculation Valve is automatically positioned as follows:

COMPONENT	POSITION	
FCV-09-1A2, "Pump 2A Disch Recirc Valve"	OPEN	______
OR		
FCV-09-1B2, "Pump 2B Disch Recirc Valve"	OPEN	______

3. Verify that Main Feed Pump suction pressure is stable at greater than or equal to 400 PSIG as indicated on PI-12-19, "Feedwater Pumps Header Pressure Suction." ______

4. Verify that Steam Generators are being maintained within the normal operating band of 55% to 75% narrow range level. ______

7.0 INSTRUCTIONS: (continued) INITIAL

7.16 (continued)

5. If Main Feed Pump suction pressure can **NOT** be maintained greater than or equal to 400 PSIG or Steam Generator levels can **NOT** be maintained within the normal operating band of 55% to 75% narrow range level, Then PLACE the control switch for the Main Feed Pump to be stopped in AUTO RECIRC. ______

CAUTION

When **total** feedwater flow is less than 10,000 GPM, only one Main Feed Pump should be operating.

7.17 When power is approximately 45%, Then perform the following:

1. STOP the Main Feed Pump that has its control switch in RECIRC. ______

2. Verify the associated Main Feed Pump components are automatically positioned as follows:

COMPONENT	POSITION	
MV-09-1, "Pump 2A Disch Valve"	CLOSED	______
FCV-09-1A2, "Pump 2A Disch Recirc Valve"	CLOSED	______
OR		
MV-09-2, "Pump 2B Disch Valve"	CLOSED	______
FCV-09-1B2, "Pump 2B Disch Recirc Valve"	CLOSED	______

6.0 OPERATOR ACTIONS

6.1 Transfer – Automatic To Manual

INSTRUCTIONS	CONTINGENCY ACTIONS

1. Ψ RECORD initial conditions on Data Sheet 1, Initial and Final Conditions.

> **NOTE**
>
> - The GV Raise and GV Lower pushbuttons operate on an exponential component. The longer the pushbutton is depressed, the faster the change in load will be made.
> - Changing Turbine load will change Reactor power.

2. If load changes are necessary, Then PERFORM the following:

   A. CHANGE load using the following pushbuttons:

   - GV Raise
   - GV Lower

   B. PERFORM load changes in accordance with **ONE** of the following:

   - NOP-2-0030124, Turbine Startup Zero Load to Full Load.
   - NOP-2-0030125, Turbine Shutdown Full Load to Zero Load.

3. **When ready to return to automatic operation, Then GO TO Appendix A, Return To Automatic Operation.**

END OF SECTION 6.1

6.2 Loss Of DEH Computer

INSTRUCTIONS | **CONTINGENCY ACTIONS**

1. Ψ RECORD initial conditions on Data Sheet 1, Initial Conditions.

> **NOTE**
> - The GV Raise and GV Lower pushbuttons operate on an exponential component. The longer the pushbutton is depressed, the faster the change in load will be made.
> - Changing Turbine load will change Reactor power.

2. If load changes are necessary, Then PERFORM the following:

A. CHANGE load using the following pushbuttons:

- GV Raise
- GV Lower

B. PERFORM load changes in accordance with **ONE** of the following:

- NOP-2-0030124, Turbine Startup Zero Load to Full Load.
- NOP-2-0030125, Turbine Shutdown Full Load to Zero Load.

3. NOTIFY I&C.

4. CHECK the following indication:

- CONT OFF light NOT LIT on Operator Console A.
- CONT RESET light LIT on Operator Console B.

6.2 Loss Of DEH Computer (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
5. DEPRESS the CONT RESET pushbutton on Operator Console B.	
6. VERIFY the CONT RESET light NOT LIT.	
7. **When ready to return to automatic operation, Then GO TO Appendix A, Return To Automatic Operation.**	

END OF SECTION 6.2

6.3 Loss Of Power Supply To DEH Control Cabinet

INSTRUCTIONS | **CONTINGENCY ACTIONS**

1. If **EITHER** of the following conditions exist:

   - Annunciator D-19, DEH DC Supply Trouble, is ALARMED
   - EMERG POWER SUPPLY light is LIT,

   Then PERFORM the following:

   A. NOTIFY I&C.

   B. WAIT for direction from I&C.

2. If the CONT OFF light is LIT, Then PERFORM the following:

   A. NOTIFY I&C.

   B. WAIT for direction from I&C.

3. If the TRANS RELAY 24V MONITOR light is LIT, Then PERFORM the following:

   A. CHECK the following indication:

   - CONT OFF light NOT LIT on Operator Console A.
   - CONT RESET light LIT on Operator Console B.

   B. If the CONT RESET light is NOT LIT, Then PERFORM the following: /R1

   1. NOTIFY I&C. /R1

   2. WAIT for direction from I&C. /R1

6.3 Loss Of Power Supply To DEH Control Cabinet (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

3. (continued)

C. DEPRESS the CONT RESET pushbutton on Operator Console B.

D. VERIFY the following:

- CONT RESET light NOT LIT.
- TRANS RELAY 24V MONITOR light is NOT LIT.

4. Ψ RECORD initial conditions on Data Sheet 1, Initial and Final Conditions.

NOTE

- The GV Raise and GV Lower pushbuttons operate on an exponential component. The longer the pushbutton is depressed, the faster the change in load will be made.
- Changing Turbine load will change Reactor power.

5. If load changes are necessary, Then PERFORM the following:

A. CHANGE load using the following pushbuttons:

- GV Raise
- GV Lower

6.3 Loss Of Power Supply To DEH Control Cabinet

INSTRUCTIONS	CONTINGENCY ACTIONS
5. (continued) B. PERFORM load changes in accordance with **ONE** of the following: • NOP-2-0030124, Turbine Startup Zero Load to Full Load. • NOP-2-0030125, Turbine Shutdown Full Load to Zero Load.	
6. NOTIFY I&C.	
7. **<u>When</u> ready to return to automatic operation, <u>Then</u> GO TO Appendix A, Return To Automatic Operation.**	

END OF SECTION 6.3

7.0 OPERATOR ACTIONS: (continued

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
3. Loss of Heater Drain Pump(s)	
A. Attempt one restart of tripped pump or start standby heater drain pump if available.	
B. Perform plant downpower as required to maintain 3 of 4 SG Narrow Range Level Channels on both SGs greater than or equal to 40% and main feedwater pump suction pressure greater than 400 psig.	

CAUTION

If main feed regulating valve(s) is pinned open and a Reactor trip occurs, Then main feedwater block valve(s) must be closed.

NOTE

If manual or local control of MFRV or operation of 100% bypass valve is required for extended periods of time, it may be advantageous to utilize automatic 15% bypass valve control in conjunction with this. I&C Department should be contacted if this option is used.

INSTRUCTIONS	CONTINGENCY ACTIONS
4. If S/G levels are NOT being controlled, Then perform the following:	

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
4. (continued)	4. (continued)
C. Verify main feedwater isolation valves are open HCV-09-1A (HCV-09-2A) HCV-09-1B (HCV-09-2B)	
D. Verify main feedwater Reg. block valves are open. MV-09-5 (MV-09-6)	D. If main feedwater Reg. block valves are NOT open, Then: 1. Open main feedwater Reg. block valve OR 2. Open 100% bypass valve.
E. Verify condensate system Recirc. valve FCV-12-1 is closed.	E. If FCV-12-1 is NOT closed, Then: 1. Close upstream isolation V12304.

FPL	**ST. LUCIE UNIT 2** **OFF-NORMAL OPERATING PROCEDURE** SAFETY RELATED	Procedure No. **2-0120035** Current Rev. No. **22** Effective Date: **11/30/99**

Title:

PRESSURIZER PRESSURE AND LEVEL

Responsible Department: **OPERATIONS**

Revision Summary

Revision 22 - Deleted reference to Tech Spec 3.1.2.9 and Table 3.1.1. (Gene Boyd, 11/18/99)

Revision 21 - Added caution statement. (Carlos Diaz, 09/07/99)
AND
Alerted the user to technical specifications that are applicable to Pressurizer pressure and level instrument malfunctions. (Charles Pike, 09/03/99)

Revision 20A - Deleted 2-0210030 and superseded with 2-ONP-02.03.
(C. Simpkins, 06/02/99)

Revision 20 - Added direction to notify Health Physics when two or more charging pumps are in service. This will prompt HP to survey areas that contain letdown equipment to obtain accurate dose rates for the plant condition. (Alvin Robertson, 01/14/99)

Revision	FRG Review Date	Approved By	Approval Date
0	03/01/83	J. H. Barrow (for) Plant General Manager	03/01/83
Revision	FRG Review Date	Approved By	Approval Date
22	11/17/99	R. G. West Plant General Manager	11/18/99
		N/A Designated Approver	

S_2_OPS
DATE
DOCT PROCEDURE
DOCN 2-0120035
SYS
COMP COMPLETED
ITM 22

1.0 TITLE:

PRESSURIZER PRESSURE AND LEVEL

2.0 PURPOSE:

2.1 This procedure provides instructions for operator action in the event of a malfunction of the Pressurizer Pressure or Level Control Systems, or inadvertent operation of pressurizer spray valves.

3.0 REFERENCES:

NOTE

One or more of the following symbols may be used in this procedure:

§ Indicates a Regulatory commitment made by Technical Specifications, Condition of License, Audit, LER, Bulletin, etc., and shall NOT be revised without Facility Review Group review and Plant General Manager approval.

¶ Indicates a management directive, vendor recommendation, plant practice or other non-regulatory commitment that should NOT be revised without consultation with the plant staff.

Ψ Indicates a step that requires a sign-off on a data sheet.

3.1 2-ONP-02.03, "Charging and Letdown."

3.2 2-0120036, "Pressurizer Relief/Safety Valve Off-Normal Operating Procedure."

3.3 2-0120031, "Excessive Reactor Coolant System Leakage Off-Normal Operating Procedure."

3.4 0010134, "Component Cycles and Transients Administrative Procedure."

3.5 St. Lucie Unit 2 FUSAR, Section 7.7, "Control Systems," Section 15.0.2.6.2., Section 15.0.2.1.1.

3.6 PM 99-07-295

4.0 RECORDS REQUIRED:

4.1 Normal log entries.

4.2 Applicable chart recorders.

4.3 If pressure transient was caused by inadvertent auxiliary spray valve actuation, document transient per AP 0010134, "Component Cycles and Transients."

5.0 ENTRY CONDITIONS:

5.1 Control Room instrumentation indicates pressurizer pressure and/or level is NOT responding as expected for present conditions.

6.0 EXIT CONDITIONS:

6.1 Pressurizer pressure and/or level anomaly has been stabilized or is returning to expected parameters for present operating conditions.

OR

6.2 An appropriate, approved procedure is available for implementation.

7.0 OPERATOR ACTIONS:

INSTRUCTIONS	CONTINGENCY ACTIONS
7.1 Immediate Operator Actions:	
1. None.	
7.2 Subsequent Operator Actions:	

NOTE

- Technical Specifications 3.3.3.5, Remote Shutdown System Instrumentation, and 3.3.3.6, Accident Monitoring Instrumentation, are applicable for Pressurizer Level and Pressure Instrumentation malfunctions.
- If SIAS has actuated, SIAS must be RESET before Pressurizer Heaters can be energized.

INSTRUCTIONS	CONTINGENCY ACTIONS
1. **ABNORMAL PRESSURIZER PRESSURE CONDITION**	1.

NOTE

Appendix "A" contains a listing of pressurizer pressures which are associated with automatic actions.

INSTRUCTIONS	CONTINGENCY ACTIONS
A. Verify pressurizer spray, proportional and back-up heaters are operating properly in automatic. Refer to Appendix "A" for expected automatic responses.	A. If system is NOT operating properly in automatic, Then perform the following as necessary: 1. If selected pressure channel has failed, Then shift to the operable pressure channel.

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
	1. (continued) A. (continued) 2. If selected pressure channel has failed high (greater than 2340 psia), Then after selecting the operable channel, reset heater control switches on RTGB 203. 3. If both pressure channels are failed or automatic pressure control does NOT operate properly, Then operate spray controller in manual and energize or deenergize heaters as necessary. 4. If pressure continues to decrease due to a failed open main spray valve, Then consider manually tripping the reactor and securing the RCP in the affected loop. PCV 1100E - 2B2 RCP PCV 1100F - 2B1 RCP

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
1. (continued)	1. (continued) /R22
B. Verify SE-02-03, and SE-02-04, "Auxiliary Spray Valve(s)" CLOSED.	B. If auxiliary spray valve(s) is OPEN, Then: 1. Attempt to close using key switch. 2. If auxiliary spray valves will NOT close, Then stop all charging and isolate letdown. Refer to 2-ONP-02.03, "Charging and Letdown." 3. Review AP 0010134, "Component Cycles and Transients," for applicability when plant is stabilized.

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
1. (continued)	1. (continued)

NOTE
Normally one PORV is isolated at power.

C. Verify power operated relief valves are closed.	C. If PORV is OPEN and pressure is less than 2300 psia, Then close PORV block valve(s) V-1476 and/or V-1477. Refer to 2-0120036, "Pressurizer Relief/Safety Valve Off-Normal Operating Procedure."
D. Ensure that PORV's V-1474 and V-1475 hand switches are in the proper position for existing plant conditions; see below:	

Switch in NORMAL RANGE:	Switch in LTOP:
1. (Lift Setpoint 2370 psia) RCS temperature greater than 255°F during heatup or greater than 240°F during a cooldown.	1. (Lift Setpoint 470 psia) RCS temperature less than 255°F during heatup or less than 240°F during cooldown.

E. Verify pressure anomaly is NOT caused by a large rate of change of T-avg.	E. Slow the rate of change of T-avg or stabilize until pressure anomaly is controlled.

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
1. (continued)	
F. If (LOOP) Loss of Offsite Power has occurred with diesel generators supplying power and pressurizer level is greater than 27%, Then perform the following to regain pressurizer heaters:	
1. Manually close the breakers for pressurizer heater buses on 4160V buses 2A3 and 2B3.	
2. Manually reset the backup heater breakers B1 and B4 only (200 kw each).	
2. **ABNORMAL PRESSURIZER LEVEL CONDITION**	2.

> NOTE
> Appendix "B" contains a listing of pressurizer levels which are associated with automatic actions.

INSTRUCTIONS	CONTINGENCY ACTIONS
A. Verify selected RRS channel is operating properly.	A. If the selected RRS channel has failed, Then shift to the operable channel.

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	2. (continued)
B. Ensure backup charging pump starts and letdown flow is decreasing, or the backup charging pump stops and letdown flow is increasing, whichever is applicable. (Appendix "B" contains expected automatic responses.)	B. If automatic actions have NOT occurred, Then manually control charging and letdown flow as required.
C. Verify level anomaly is NOT caused by a large rate of change in T-avg.	C. Slow the rate of change of T-avg or stabilize until level anomaly is controlled.
D. Verify "Letdown Isol. Valves", V-2515, V-2516, and V-2522 are open.	D. If letdown has isolated, Then secure charging and refer to 2-ONP-02.03, "Charging and Letdown."
E. Verify selected pressurizer level control valve (LCV-2110P/LCV-2110Q) is operating properly.	E. If selected level control valve is NOT operating properly, Then take manual control of level control valve and refer to 2-ONP-02.03, "Charging and Letdown."
F. Verify selected letdown pressure control valve (PCV-2201P/PCV-2201Q) is operating properly.	F. If selected pressure control valve is NOT operating properly, Then take manual control of pressure control valve and refer to 2-ONP-02.03, "Charging and Letdown."

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	2. (continued)

NOTE

With less than 27% level on Channel X, the "A" pressurizer heater transformer feeder breaker (2-20204) trips and the "B" side 480V power supplies deenergize. With less than 27% level on Channel Y, the "B" pressurizer heater transformer feeder breaker (2-20403) trips and the "A" side 480V power supplies deenergize. The backup interlock bypass keyswitch selected to the level position, allows the 480V heater power supplies to be reset.

G. Verify pressurizer level indicating controllers (selected and non-selected) are operating properly and power is available to pressurizer heaters.

G. If pressurizer heaters are deenergized or level indicating controller(s) failed, Then perform the following:

1. If either level control channel has failed, Then shift to the operable channel and reset heaters as follows:

a. Place the backup interlock bypass keyswitch (RTGB-203) to the LEVEL position. (This regains power to the proportional and backup heater banks controlled by the selected channel.)

b. Reset pressurizer heater banks as needed.

OR

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	2. (continued)
	G. (continued)
	2. If actual pressurizer level had decreased below 27% and has been restored, Then reset pressurizer heaters by:
	a. Resetting 4160KV feeder breakers 2-20204 and 2-20403, and Then resetting pressurizer heater control switches.
H. Verify that pressurizer PORV's/Safeties are NOT leaking or actuated as indicated by:	H. If leakage is indicated, Then close PORV block valve(s) V-1476 and/or V-1477 as required, and refer to 2-0120036, "Pressurizer Relief/Safety Valve Off-Normal Operating Procedure."
1. PORV/Safety Valve acoustic flow monitors.	
2. Downstream tailpipe temperatures.	
3. Quench tank level, temperature, and pressure.	

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	
I. Manually start a third charging pump, if conditions require.	
J. Ensure letdown valve limiter bypass switch is in the NORMAL position.	
K. If pressurizer level decrease cannot be immediately explained, Then refer to 2-0120031, "Excessive Reactor Coolant System Leakage Off-Normal Operating Procedures."	

NOTE

Placing a second or third charging pump in service will increase letdown flow which may cause the general area dose rates in the vicinity of the letdown line in the 19.5' Pipe Penetration room or 19.5' Letdown Cubicle room to exceed 1000 mr/hr (Locked High Radiation Area limit) due to reduced transport time of short lived radioactive isotopes.

INSTRUCTIONS	CONTINGENCY ACTIONS
L. If letdown is in service and continued operation of two or more charging pumps is required, Then notify Health Physics of the current charging pump alignment.	

APPENDIX A
AUTOMATIC RESPONSES TO PRESSURIZER PRESSURE DEVIATIONS
(Page 1 of 1)

PRESSURIZER PRESSURE SETPOINTS

(2500 PSIA) pressurizer safety valves open.

(2437 PSIA) ATWAS diverse scram system initiates Rx trip.

(2370 PSIA) high pressure Rx trip and PORV's open.

(2340 PSIA) high press. alarm, backup signal to deenergize all pzr. heaters.

(2325 PSIA) spray valves fully open.

(2275 PSIA) proportional heaters at minimum output, spray valves fully closed.

(2250 PSIA)-NORMAL PRESSURIZER PRESSURE OPERATING SETPOINT

(2225 PSIA) proportional heaters at maximum output.

(2220 PSIA) backup heaters deenergize (increasing pressure).

(2200 PSIA) backup heaters energize.

(2100 PSIA) low pressure alarm.

(1900 PSIA) TM/LP Rx trip minimum pressure.

(1736 PSIA) SIAS initiation.

END OF APPENDIX A

APPENDIX B

AUTOMATIC RESPONSES TO PRESSURIZER LEVEL DEVIATIONS

(Page 1 of 1)

PRESSURIZER LEVEL SETPOINTS

(67% indicated level) high level alarm.

(+9% inc.) letdown flow increases to maximum (128 GPM).

(+4% inc.) all backup heaters energize. Backup charging pump receives a backup stop signal.

0% DEVIATION FROM RRS SETPOINT FOR PRESSURIZER LEVEL

(-1% dec.) letdown flow decreases to minimum (29 GPM).

(-1% inc.) backup charging pump stops.

(-3% dec.) backup charging pump starts.

(-5% dec.) low level alarm. Backup charging pump receives a backup start signal.

(27% indicated level) all pressurizer heaters deenergize and respective pressurizer heater transformer feeder breaker opens.

END OF APPENDIX B

FPL	ST. LUCIE UNIT 2 OFF-NORMAL OPERATING PROCEDURE SAFETY RELATED	Procedure No. **2-ONP-99.01** Current Revision No. **8** Effective Date **05/12/99**

Title:

LOSS OF TECH SPEC INSTRUMENTATION

Responsible Department: **OPERATIONS**

REVISION SUMMARY:

REVISION 8 – THIS PROCEDURE HAS BEEN COMPLETELY REWRITTEN. Consolidated the information from Wide Range Nuclear Instrument Malfunction (ONOP 2-1210030) and Linear Range Instrument Malfunction (ONOP 2-1220030). Placed in upgraded format. (Steve Willett, 05/06/99)

Revision	FRG Review Date	Approved By	Approval Date
0	03/07/97	J. Scarola Plant General Manager	03/10/97
8	05/06/99	R. G. West Plant General Manager	05/06/99

S_2_OPS	
DATE	
DOCT	PROCEDURE
DOCN	2-ONP-99.01
SYS	
COM	COMPLETED
ITM	8

TABLE OF CONTENTS

1.0 PURPOSE

1.1 To provide direction, in conjunction with the referenced Technical Specifications, for RPS, ESFAS and AFAS safety channel bypass or trip in the event of an instrument failure.

2.0 ENTRY CONDITIONS

2.1 Wide Range Nuclear Instrumentation:

1. Alarms
   - Annunciator L-33, Start-up Rate High Channel Pre Trip
   - Annunciator L-25, Start-up Rate High Channel Trip
   - Annunciator L-40, NI Channel Inoperative
2. Significant disagreement between channels located on the local drawer meters or on RTGB 204.

   No easy way to determine voltage indication without I&C Department. "New Style" NI drawers have no direct read meters like the control and start-up NIs.
3. NI drawer Log Trouble light ON.

2.2 Linear Range Nuclear Instrumentation:

1. Alarms

   - Annunciator K-14, RRS Selected Inoperative
   - Annunciator L-9, Reactor Power High Channel Trip
   - Annunciator L-17, Reactor Power High Channel Pre Trip
   - Annunciator L-22, Local Power Density Channel Trip
   - Annunciator L-30, Local Power Density Channel Pre Trip
   - Annunciator L-34, Nuclear / ΔT Power Channel Deviation
   - Annunciator L-36, TM / LP Channel Trip
   - Annunciator L-40, NI Channel Inoperative
   - Annunciator L-43, Reactor Power Ratio Deviation
   - Annunciator L-44, TM/LP Channel Pre Trip

2. Significant disagreement between channels indicated on the local drawer meters or on RTGB-204.

3. LR NI Drawer loss of power to the drawer. No easy way to tell if detector has high voltage (or low voltage) without I&C.

4. LR NI drawer LINEAR trouble light lit.

2.3 ESFAS channels

1. Automatic Test Insertion (ATI) fault
2. Failed indication occurring on **ANY** of the following vital instrumentation channels:
   - Reactor Coolant Flow
   - Pressurizer Level
   - Pressurizer Pressure
   - RCS T_{cold} Instrument
   - RCS T_{hot} Instrument
   - Containment Pressure
   - Containment Radiation
   - Component Cooling Water to RCP Seals
   - Turbine EH Fluid Pressure
   - Steam Generator Level
   - Steam Generator Pressure
   - Feedwater Header Pressure
   - 4160 / 480V AC Vital Bus Undervoltage
   - 4160 / 480V AC Vital Bus Degraded Voltage
3. Any failed or failing indication causing an alarm whose annunciator summary actions direct the user to this procedure.

3.0 EXIT CONDITIONS

3.1 **ALL** of the following conditions occur:

- Applicable Tech Spec LCO action requirements complied with.
- Affected / malfunctioning channel properly bypassed or tripped as applicable to instructions.
- No unexplained alarms or abnormal conditions exist outside of initiating malfunction.

4.0 OPERATOR ACTIONS

4.1 Diagnostic

INSTRUCTIONS	**CONTINGENCY ACTIONS**
1. If a process measurement channel malfunction / failure occurs, Then COMPARE all redundant meter indication channels to determine the validity of the alarm/indication.	**1.1** If redundant instrumentation shows actuation logic is COMPLETE and actuation has NOT occurred, Then PERFORM the following: **A.** MANUALLY TRIP the Reactor. **B.** MANUALLY TRIP the Turbine. **C.** **GO TO 2-EOP-01**, Standard Post Trip Actions.

END OF SECTION 4.1

4.2 Nuclear Instrumentation Malfunction

INSTRUCTIONS **CONTINGENCY ACTIONS**

NOTE

If reactor power is between 10^{-4}% and 15% power and 2 or more channels indicate greater than 1.3 DPM startup rate, a CWP is initiated and when greater than 2.49 DPM a reactor trip will occur.

1. If a wide range NI channel has failed,
   Then PERFORM the following:

   A. PLACE the failed channel high rate trip unit bistable in the bypass or tripped condition.

   B. NOTIFY I&C Department as soon as practical.

2. If a Linear Range NI malfunction of a Control Channel (RRS 9 or 10) has been determined,
   Then PERFORM the following:

   A. ENSURE operable RRS is selected.

   B. PLACE the failed channel toggle switch (channel 9 or 10) in the OUT position (At the rear of RPS cabinet D, Power Ratio Calculator).

   C. VERIFY annunciator L-43, Reactor Pwr. Ratio Calculator Deviation, clears.

   D. NOTIFY the I&C Department as soon as practical.

4.2 Nuclear Instrumentation Malfunction (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE

The linear range power drawer provides trip signals to the Variable High Power, Local Power Density (LPD), and Thermal Margin / Low Pressure (TM / LP) bistables and automatic bypasses for the High Startup Rate (HI RATE) and Loss of Load (LOSS LOAD) trip functions. Additionally, a CEA Withdrawal Prohibit (CWP) is initiated by two out of four pretrips on these trip bistables.

3. If a malfunction of a Linear Range Safety Channel (RPS A, B, C, or D) has occurred,
Then PERFORM the following:

A. PLACE the failed channel Variable High Power, TM / LP, and LPD Trip unit bistables in Bypass or Trip.

B. If power level is greater than or equal to 15%,
Then PLACE the affected channel LOSS LOAD trip bistable in Bypass or Trip.

C. If power level is at or between 10^{-4}% and 15%,
Then PLACE the HI RATE bistable in the Bypass or Trip.

D. DECLARE the failed channel out of service.

E. NOTIFY the I&C Department as soon as practical.

F. If power level is greater than or equal to 75%,
Then NOTIFY Reactor Engineering to determine Azimuthal Tilt once 12 hours using the Incore Detectors

4.2 Nuclear Instrumentation Malfunction (continued)

INSTRUCTIONS	**CONTINGENCY ACTIONS**
3. (continued) **G.** REFER to Technical Specifications, Table 3.3-1 and Section 3.2.4 to ensure compliance with all applicable actions.	

END OF SECTION 4.2

4.3 ESFAS Channel Malfunction

INSTRUCTIONS	CONTINGENCY ACTIONS

1. If the failed instrumentation is NOT required in the current plant mode, Then DO NOT CHANGE mode and PERFORM the following:

   A. BYPASS or TRIP the affected channel(s).

   B. REFER to the applicable Tech Spec for requirements on the affected channel(s).

   C. DO NOT ENTER the mode specified in Tech Specs until all requirements for the affected channel(s) have been met.

   D. INITIATE NPWOs for the faulty instrument channel(s) and NOTIFY the Rotating Maintenance Shift Supervisor (RMSS).

4.3 ESFAS Channel Malfunction (continued)

INSTRUCTIONS | **CONTINGENCY ACTIONS**

NOTE

If a channel is placed in TRIP or BYPASS, the following log entries may be necessary:

- Key Log entry (if a Bypass key is removed from a cabinet)
- Deviation in AP 2-0010123 Data Sheets
- Equipment OOS for affected protection channel

2. VERIFY normal operation of the following instrumentation:

CAUTION

Operation may continue for up to 48 hours with one 4160 / 480V AC Safety Related Under-voltage Relay failed, or operation may continue if EM places the failed relay in TRIP and the minimum channels operable requirement of Tech Spec 3.3.2, Table 3.3-3, is verified within one hour.

NOTE

4160 / 480V AC Safety Related Bus Under-voltage relays are covered by Tech Spec 3.3.2, Table 3.3-3.

A. 4160 / 480V AC Safety Related Bus Under-voltage relays are NORMAL:

- 4160V Bus 2A3
- 4160V Bus 2B3
- 480V Bus 2A2
- 480V Bus 2B2

A.1 CONTACT the RMSS to have EM PERFORM **ONE** of the following:

1. BEGIN repairs on the failed Under-voltage relay, to be completed within 48 hours.
2. PLACE the affected Under-voltage relay in TRIP <u>and</u> VERIFY minimum channels operable within 1 hour.

4.3 ESFAS Channel Malfunction (continued)

INSTRUCTIONS | **CONTINGENCY ACTIONS**

2. (continued)

CAUTION

The ESFAS keyswitch and bistable trip unit to which it applies do NOT, in some instances, directly line up. It is necessary to verify the labels of the bypass key, key switch, and actuation trip unit being placed in Bypass to ensure that the correct trip unit is bypassed.

NOTE

- RWT level indications are covered by Tech Spec 3.3.2, Table 3.3.-3.
- ESFAS cabinet door key and key 114, is required for bypassing ESFAS.

B. Refueling Water tank Level instrumentation indication LIS-07-2A / B / C / D.

B.1 PERFORM **ONE** of the following:

1. BYPASS the affected RAS channel using key 131.
2. PLACE the affected ESFAS trips units in TRIP in accordance with Appendix A, Placing Trip Units in Trip.

NOTE

RCS flow indicators are covered by Tech Spec 3.3.1, Table 3.3-1.

C. RCS flow instrumentation indication PDI-1101A/B/C/D.

C.1 PERFORM **ONE** of the following:

1. BYPASS the affected RAS channel using key 103.
2. PLACE the affected ESFAS trips units in TRIP in accordance with Appendix A, Placing Trip Units in Trip.

4.3 ESFAS Channel Malfunction (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	**2.** (continued)

NOTE

- Tech Spec action requirements for an inoperable channel process measurement circuit include the placing of all associated functional units (that is, trip units that also receive an input from the affected instrument), in BYPASS or TRIP, as applicable, within one hour of declaring the inoperable channel inoperable.
- PZR pressure indicators are covered by Tech Spec 3.3.1, Table 3.3-1 for RPS and Tech Spec 3.3.2, Table 3.3-3 for ESFAS.
- ESFAS cabinet door key, key 114, is required for bypassing ESFAS.
- ATWS is NOT an RPS or ESFAS trip unit, placing ATWS in TRIP is NOT required.

INSTRUCTIONS	CONTINGENCY ACTIONS
D. Pressurizer pressure instrumentation indication PI-1102A/B/C/D <u>or</u> TM / LP Setpoint PIA-1102A/B/C/D.	**D.1** PERFORM **ONE** of the following: 1. BYPASS the following channels affected by the failed Pressurizer pressure instrument: • Hi Pzr Press RPS trip unit (key 106) • TM/Lo Press RPS trip unit (key 107) • Pzr Press SIAS (key 132) • Pzr Press ATWS (key 157) OR 2. PLACE the affected RPS and ESFAS trip units in TRIP in accordance with Appendix A, Placing Trip Units in Trip.

4.3 ESFAS Channel Malfunction (continued)

INSTRUCTIONS

2. (continued)

CONTINGENCY ACTIONS

2. (continued)

NOTE

CCW flow to RCP seals indicators are covered by Tech Spec 3.3.1, Table 3.3-1.

E. CCW flow to RCP seals instrumentation indication FIS-14-15A/B/C/D.

E.1 PERFORM **ONE** of the following:

1. BYPASS the affected RPS trip unit using key 111

   OR

2. PLACE the affected RPS trip unit in TRIP in accordance with Appendix A, Placing Trip Units in Trip.

NOTE

- Containment radiation monitors are covered by Tech Spec 3.3.2, Table 3.3-3.
- ESFAS cabinet door key, key 114, is required for bypassing ESFAS.

F. Containment radiation instrumentation indication:

- RIS-26-3-2A
- RIS-26-4-2B
- RIS-26-5-2C
- RIS-26-6-2D

F.1 PERFORM **ONE** of the following:

1. BYPASS the CIS channel affected by the failed radiation monitor using key 130.

   OR

2. PLACE the affected ESFAS trip unit in TRIP in accordance with Appendix A, Placing Trip Units in Trip.

4.3 ESFAS Channel Malfunction (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	**2.** (continued)

NOTE

- Containment pressure monitors are covered by Tech Spec 3.3.1, Table 3.3-1 for RPS and Tech Spec 3.3.2, Table 3.3-3 for ESFAS.
- ESFAS cabinet door key, key 114, is required for bypassing ESFAS.
- Containment Pressure SIAS and MSIS share the same bistable and isolation modules.

INSTRUCTIONS	CONTINGENCY ACTIONS
G. Containment Pressure instrumentation indication PIS-07-2A/B/C/D.	**G.1** PERFORM **ONE** of the following: **1.** BYPASS the following channels affected by the failed Containment Pressure instrument: • Hi Cntmt Press RPS trip unit (key 109) • Cont Press SIAS (key 127) • Cntmt Press CIS (key 129) • Cntmt Press CSAS (key 128) OR **2.** PLACE the affected RPS and ESFAS trip units in TRIP in accordance with Appendix A, Placing Trip Units in Trip.

4.3 ESFAS Channel Malfunction (continued)

INSTRUCTIONS

2. (continued)

> **NOTE**
>
> - Feedwater Header Pressure instrumentation indicators are covered by Tech Spec 3.3.2, Table 3.3-3 for ESFAS.
> - ESFAS cabinet door key, key 114, is required for bypassing ESFAS.

H. ¶1 Feedwater Header Pressure instrumentation indication:

- PI-09-9A/B/C/D
- PI-09-10A/B/C/D

CONTINGENCY ACTIONS

2. (continued)

H.1 PERFORM **ONE** of the following:

1. BYPASS the following channels affected by the failed Feedwater Header Pressure instrument:

- AFAS-1 and AFAS-2
  AFAS cabinet door key 202
  chan A – key 203
  chan B – key 204
  chan C – key 205
  chan D – key 206

OR

4.3 ESFAS Channel Malfunction (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
	2. (continued)
	H.1 (continued)

CAUTION

¶1 An AFAS channel in the TRIPPED condition is administratively limited to 72 hours in accordance with AP 0010120, Conduct of Operations.

NOTE

Tech Spec action requirements for an inoperable channel process measurement circuit include the placing of all associated functional units (that is, trip units that also receive an input form the affected instrument), in BYPASS or TRIP, as applicable, within one hour of declaring the inoperable channel inoperable.

INSTRUCTIONS	CONTINGENCY ACTIONS
	2. PLACE the affected RPS and ESFAS trip units in TRIP in accordance with Appendix A, Placing Trip Units in Trip.

4.3 ESFAS Channel Malfunction (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	**2.** (continued)

NOTE

- S/G pressure indicators are covered by Tech Spec 3.3.1, Table 3.3-1 for RPS and Tech Spec 3.3.2, Table 3.3-3 for ESFAS.
- ESFAS cabinet door key, key 114, is required for bypassing ESFAS.

INSTRUCTIONS	CONTINGENCY ACTIONS
I. Steam Generator Pressure instrumentation indication: • PI-8013A/B/C/D • PI-8023A/B/C/D	**I.1** PERFORM **ONE** of the following: **1.** BYPASS the following channels affected by the failed S/G pressure instrument: • Lo Press S/G trip unit (key 105) • TM/Lo Press RPS trip unit (key 107) • AFAS-1 and AFAS-2 • AFAS cabinet door key 202 chan A – key 203 chan B – key 204 chan C – key 205 chan D – key 206 • <u>If</u> SG-2A, <u>Then</u> 2A S/G Press MSIS (key 134) • <u>If</u> SG-2B, <u>Then</u> 2B S/G Press MSIS (key 136) OR

4.3 ESFAS Channel Malfunction (continued)

INSTRUCTIONS	**CONTINGENCY ACTIONS**
	2. (continued)
	I.1 (continued)

CAUTION

¶1 An AFAS channel in the TRIPPED condition is administratively limited to 72 hours in accordance with AP 0010120, Conduct of Operations.

NOTE

- ¶1 It is preferable to leave the AFAS trip units in BYPASS if it is necessary to place the RPS and ESFAS trip units in TRIP.
- Tech Spec action requirements for an inoperable channel process measurement circuit include the placing of all associated functional units (that is, trip units that also receive an input form the affected instrument), in BYPASS or TRIP, as applicable, within one hour of declaring the inoperable channel inoperable.

INSTRUCTIONS	**CONTINGENCY ACTIONS**
	2. PLACE the affected RPS, AFAS and ESFAS trip units in TRIP in accordance with Appendix A, Placing Trip Units in Trip.

4.3 ESFAS Channel Malfunction (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	**2.** (continued)

NOTE

- S/G level indicators are covered by Tech Spec 3.3.1, Table 3.3-1 for RPS and Tech Spec 3.3.2, Table 3.3-3 for ESFAS.
- ESFAS cabinet door key, key 114, is required for bypassing ESFAS.

J. Steam Generator Level instrumentation indication:

- LIC-9013A/B/C/D
- LIC-9023A/B/C/D

J.1 PERFORM **ONE** of the following:

1. BYPASS the following channels affected by the failed instrument:

- Lo Lvl SG RPS trip unit (key 104)
- If SG-2A, Then AFAS-1
- If SG-2B, Then AFAS-2 AFAS cabinet door key 202
  chan A – key 203
  chan B – key 204
  chan C – key 205
  chan D – key 206

OR

CAUTION

¶1 An AFAS channel in the TRIPPED condition is administratively limited to 72 hours in accordance with AP 0010120, Conduct of Operations.

NOTE

¶1 It is preferable to leave the AFAS trip units in BYPASS if it is necessary to place the RPS and ESFAS trip units in TRIP.

2. PLACE the affected RPS and AFAS trip units in TRIP in accordance with Appendix A, Placing Trip Units in Trip.

END OF SECTION 4.3

4.4 RPS Specific Instrumentation Malfunction

INSTRUCTIONS	CONTINGENCY ACTIONS
1. If the failed instrumentation is NOT required in the current plant mode, Then DO NOT CHANGE mode and PERFORM the following: **A.** BYPASS or TRIP the affected channel(s). **B.** REFER to the applicable Tech Spec for requirements on the affected channel(s). **C.** Do NOT enter the mode specified in Tech Specs until all requirements for the affected channel(s) have been met. **D.** INITIATE NPWOs for the faulty instrument channel(s) and NOTIFY the RMSS.	

4.4 RPS Specific Instrumentation Malfunction (continued)

INSTRUCTIONS	**CONTINGENCY ACTIONS**

NOTE

If a channel is placed in TRIP or BYPASS, the following log entries may be necessary:

- Key log (if bypass key is removed from cabinet)
- Deviation in AP 2-0010123 Data Sheets
- Equipment OOS for affected protection channel

2. VERIFY normal operation of the following instrumentation:

NOTE

RCS T_{cold} indicators are covered by Tech Spec 3.3.1, Table 3.3-1.

A. RCS T_{cold} instrumentation indication TI-2201A/B/C/D.

A.1 PERFORM **ONE** of the following:

1. BYPASS the following channels affected by the failed T_{cold} instrument:

- Hi Pwr RPS trip unit (key 101)
- TM/Lo Press RPS trip unit (key 107)
- Loc Pwr Den RPS trip unit (key 110)

OR

2. PLACE the affected RPS trip units in TRIP in accordance with Appendix A, Placing Trip Units in Trip.

4.4 RPS Specific Instrumentation Malfunction (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	**2.** (continued)

> **NOTE**
> RCS T_{hot} indicators are covered by Tech Spec 3.3.1, Table 3.3-1.

B. RCS T_{hot} instrumentation indication TI-1102A/B/C/D.

B.1 PERFORM **ONE** of the following:

1. BYPASS the following channels affected by the failed T_{hot} instrument:
   - Hi Pwr RPS trip unit (key 101)
   - TM/Lo Press RPS trip unit (key 107)
   - Loc Pwr Den RPS trip unit (key 110)

   OR

2. PLACE the affected RPS trip units in TRIP in accordance with Appendix A, Placing Trip Units in Trip.

> **NOTE**
> Turbine EH fluid pressure indicators are covered by Tech Spec 3.3.1, Table 3.3-1.

C. Turbine EH fluid pressure.

C.1 PERFORM **ONE** of the following:

1. BYPASS the affected Loss Load RPS channel using key 108.

   OR

2. PLACE the affected RPS trip unit in TRIP in accordance with Appendix A, Placing Trip Units in Trip.

4.4 RPS Specific Instrumentation Malfunction (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
3. INITIATE NPWOs for failed instrument channel(s) and NOTIFY the RMSS.	
4. ENSURE proper log entries have been completed (i.e., deviation, equipment OOS, etc.).	
5. NOTIFY Operations Supervisor of channel failure.	

END OF SECTION 4.4

5.0 REFERENCES

NOTE

One or more of the following symbols may be used in this procedure:

§ Indicates a Regulatory commitment made by Technical Specifications, Condition of License, Audit, LER, Bulletin, Operating Experience, etc. and shall NOT be revised without Facility Review Group review and Plant General Manager approval.

¶ Indicates a management directive, vendor recommendation, plant practice or other non-regulatory commitment that should NOT be revised without consultation with the plant staff.

5.1 Technical Specifications

- Section 3.3.1
- Section 3.3.2

5.2 Updated Final Safety Analysis Report (UFSAR)

- Section 7.2, Reactor Protective System
- Section 7.3, Engineered Safety Features Systems

5.3 Management Directives and Regulatory Commitments

- ¶1 CR 97-1772, AFAS Channel Tripped Condition

5.4 Procedures

- AP 2-0010123, Administrative Control of Valves, Locks and Switches
- AP 0010120, Conduct of Operations
- 2-EOP-01, Standard Post Trip Actions
- 2-IMP-09.09, Auxiliary Feedwater Actuation System Place Channel in Trip Condition

5.5 Miscellaneous Documents

- 2998-G-078, Sh. 109 & 110, Reactor Coolant System
- 2998-G-079, Sh. 1, Main Steam
- 2998-G-088, Sh. 1 & 2, Containment Spray and Refueling Water Systems

6.0 RECORDS REQUIRED

6.1 RCO Chronological Log entries.

APPENDIX A
PLACING TRIP UNITS IN TRIP
(Page 1 of 1)

NOTE
The trip units should only be pulled out of the panel far enough to ensure they are disconnected but NOT far enough to be removed from the panel.

1. If placing an RPS trip unit in TRIP, Then PERFORM the following:

   A. LOOSEN the upper and lower bistable trip unit hold down screws.

   B. Slowly PULL the trip unit out until it begins to slide freely.

2. If placing an ESFAS isolation module in TRIP, Then PERFORM the following:

   A. LOOSEN the upper and lower isolation module hold down screws.

   B. Slowly PULL the module out until it begins to slide freely.

NOTE
AFAS isolation modules are placed in TRIP by I&C Department in accordance with 2-IMP-09.09, Auxiliary Feedwater Actuation System Place Channel in Trip Condition.

3. If required to place an AFAS isolation module in TRIP, Then CONTACT I&C Department.

END OF APPENDIX A

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
4. (continued)	4. (continued)
A. Verify main feedwater Reg. valves (MFRV) are responding properly for current condition.	A. If MFRVs are NOT controlling S/G levels, Then perform the following as needed to control S/G level: 1. Place MFRV(s) controller in MANUAL. 2. Operate 100% bypass valve(s) as required. 3. Adjust MFRV controller setpoint as necessary. /R21 4. Locally operate MFRV(s) using Appendix A. 5. Contact I&C Department for possible 15% bypass valve auto control.
B. Verify main feedwater pump Recirc. valve(s) are closed. FCV-09-1A2 (FCV-09-1B2)	B. If Recirc. valve is open, Then: 1. Perform downpower as required to control S/G levels. 2. Locally close downstream Isol. V09163 or (V09173).

FPL	ST. LUCIE UNIT 2 OFF-NORMAL OPERATING PROCEDURE SAFETY RELATED	Procedure No. **2-0120031** Current Rev. No. **20** Effective Date: **11/30/99**

Title:

EXCESSIVE REACTOR COOLANT SYSTEM LEAKAGE

Responsible Department: **OPERATIONS**

Revision Summary

Revision 20 - Deleted the caution that is no longer applicable due to the deletion of Tech Spec 3.1.2.9. (Gene Boyd, 11/18/99)

Revision 19 - Added caution statements before Steps 7.2.2.L and 7.2.3.L. (Carlos Diaz, 09/07/99)

Revision 18 - This revision adds guidance to consider SDC reliefs as a source of RCS leakage Modes 3-6. (Roger Weller, 02/26/99)

Revision	FRG Review Date	Approved By	Approval Date
0	02/25/83	J. H. Barrow (for) Plant General Manager	04/18/83
Revision	**FRG Review Date**	**Approved By**	**Approval Date**
20	11/17/99	R. G. West Plant General Manager	11/18/99
		N/A Designated Approver	

S_2_OPS
DATE
DOCT PROCEDURE
DOCN 2-0120031
SYS
COMP COMPLETED
ITM 20

5.0 ENTRY CONDITIONS: (continued)

5.3 Control Room instrumentation indicates leakage of reactor coolant to the containment or other systems. Instruments listed below may alarm or provide indication when excessive leakage is present:

> **NOTE**
>
> RCS leaks occurring in Modes 2 through 4 may be detected by the Reactor cavity sump inlet flow indication before the Containment air particulate and gaseous monitor detects the leak, especially when the Reactor is operating with no failed fuel.

1. Containment air particulate and gas monitor.
2. Reactor cavity sump level and flow indication.
3. CCW radiation monitor.
4. Containment area radiation monitors.
5. High level, pressure or temperature in the quench tank.
6. High temperature in reactor coolant relief or safety valve discharge line.
7. Low level in volume control tank.
8. High component cooling water surge tank level.
9. High SI (Safety Injection) loop header pressure.
10. Indication of flow on safety or PORV acoustic monitors.
11. Indication of Refueling Cavity seal ring or Steam Generator nozzle dam leakage.

6.0 EXIT CONDITIONS:

6.1 Any of the Safety Function Status Checks Acceptance Criteria from the Low Mode Off-Normal Procedure for the current plant condition are NOT met.

OR

6.2 Leakage has been identified and corrected.

OR

6.3 Leakage is in excess of charging pump capacity.

AND

6.4 An approved procedure is available for implementation.

7.0 OPERATOR ACTIONS:

7.1 Immediate Operator Actions:

1. None

7.2 Subsequent Operator Actions:

INSTRUCTIONS	CONTINGENCY ACTIONS

1. If in Modes 1 thru 3 and SIAS is NOT blocked, Then go to step 2.

If in Modes 3 thru Mode 6 and SIAS is blocked, Then go to step 3.

2. ACTIONS WHEN IN MODES 1 THRU MODE 3 (SIAS NOT BLOCKED)

A. If RCS leakage is indicated, Then analyze the information available and determine as accurately as possible the magnitude and seriousness of the leak.

B. If at any time RCS leakage exceeds the capacity of the charging pumps and pressurizer level cannot be maintained, Then:

1. In Modes 1 and 2, trip the reactor and turbine and perform 2-EOP-01, "Standard Post Trip Actions."

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	2. (continued)
B. (continued)	
2. If in Mode 3 (SIAS is NOT Blocked), Then enter 2-EOP-03, "Loss of Coolant Accident."	
C. If the containment CIS radiation monitors exceed the present alarm point level, Then ensure containment isolation signal is actuated.	C. Manually actuate CIAS.
D. If pressurizer PORV or safety valve leakage is indicated, Then ensure Off-Normal Operating Procedure 2-0120036, "Pressurizer Relief/Safety Valve" has been implemented.	

NOTE

RCV-14-1 CCW Surge Tank Vent, will align to the Chemical Drain Tank on high CCW activity.

E. If a CCW high activity alarm is received, Then refer to Off-Normal Operating Procedure 2-0310031, "Component Cooling Water Excessive Activity."

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	2. (continued)
F. Ensure charging and letdown is automatically controlling pressurizer level.	F. Manually control charging and letdown as required to maintain pressurizer level.
Ψ G. If plant conditions permit, Then determine the primary leak rate, per Data Sheet 1 of OP 2-0010125A, Reactor Coolant System Water Inventory Balance.	

NOTE

Pressure Boundary Leakage - is defined as leakage from any pressure containing components of the Reactor Coolant System, such as pressure vessels, piping, pumps and valves, which are:

a. Part of the RCS, or

b. Connected to the RCS, up to and including any and all of the following:

   1. The outermost containment isolation valve in system piping which penetrates primary reactor containment,
   2. The second of two valves normally closed during normal reactor operation in system piping which does not penetrate containment,
   3. The RCS safety and relief valves.

H. Initiate the emergency plan if necessary, in accordance with EPIP-01, "Classification of Emergencies."

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	
§1 I. If an increase in unidentified leakage has occurred that is less than Technical Specification limit (1 GPM), Then refer to Appendix A.	
J. After determining the magnitude of the leak, continue to evaluate all available information to identify leakage source.	

NOTE

When using the Reactor Cavity Sump Level instrument (LIS-07-06) on RTGB-205, 1" is approximately equal to 46 gallons.

INSTRUCTIONS	CONTINGENCY ACTIONS
K. If leak appears to be inside containment as indicated by an increase in cavity sump level, Then close LCV-07-11A or LCV-07-11B to isolate sump from pumping to the EDT.	

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	/R20
L. If leak appears to be outside containment, Then consider the following: 1. Local sample valve isolation, refer to Appendix B. 2. Isolating letdown 3. Isolating RCS sample lines: V5200 thru V5205 4. Inspect charging pumps for increased seal leakage.	
M. If charging pump seal leakage is the suspected source of leakage, Then perform Appendix C, Charging Pump Local Seal Leakage Determination, while continuing.	
N. Monitor secondary radiation levels for increasing trends on the condenser air ejector, blowdown and main steamline monitors.	N. If secondary radiation levels are increasing. Then refer to ONOP 2-0830030, "Steam Generator Tube Leak."

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	2. (continued)
O. Refer to Technical Specifications to ensure compliance with all applicable actions.	
P. Evaluate the need to perform a plant shutdown and/or cooldown.	
Q. If a plant shutdown is desired, Then perform a plant shutdown per Operating Procedure 2-0030125, "Turbine Shutdown - Full Load to Zero Load."	
R. If a plant cooldown is desired, Then perform a plant cooldown per Operating Procedure 2-0030127, "Reactor Plant Cooldown - Hot Standby to Cold Shutdown."	

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
☆ 5. If pressurizer pressure is less than 1736 psia or containment pressure greater than 3.5 psig, Then verify SIAS has actuated.	5. If SIAS does NOT occur automatically, Then manually initiate SIAS.
☆ 6. Ensure maximum safety injection and charging flow to the RCS by: A. Safety injection flow per Figure 2, "Safety Injection Flow vs. RCS Pressure." AND B. All available charging pumps operating.	6. If safety injection flow is NOT per Figure 2, "Safety Injection Flow vs. RCS Pressure", Then verify SIAS per Table 1, "Safety Injection Actuation Signal."
☆ 7. If pressurizer pressure lowers to less than 1300 psia following SIAS, Then PERFORM **ALL** of the following: A. STOP 1 RCP in each loop. B. If the RCS subcooling is less than 20°F, Then STOP **ALL** 4 RCPs.	7. If pressurizer pressure is NOT less than 1300 psia, Then RCP operation may continue provided CCW flow has NOT been lost for greater than 10 minutes.

(Continued on Next Page)

APPENDIX A
SAFETY FUNCTION STATUS CHECK SHEET
(Page 4 of 12)

3. RCS INVENTORY CONTROL

SAFETY FUNCTION	ACCEPTANCE CRITERIA	CHECK √
A. LOCA is NOT Isolated		
Charging Pumps	All available operating or HPSI throttling criteria met.	√
		AND
Safety Injection Pumps	Injection flow per Figure 2, "Safety Injection Flow vs. RCS Pressure" or HPSI throttling criteria met.	
		OR
	RAS with at least one HPSI pump operating.	
		AND
Reactor Vessel Level (page 212, QSPDS).	Core covered (Sensors 7 and 8 covered).	√
		OR
Representative CET temperature	NOT superheated	√

⇓

(Continued on Next Page)

Step #: 1
Step Description : Modification to IC
Delay Time : 0:00:00
Mode : Regular
InitialState : Triggered

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TAF4D01P - F4_2_20212 BREAKER POSITION P	REM	3		
2	TAQ5AIS1 - Q5_2A_EG SS-ISOL-1 ELECT GOVER	REM	0		
3	TAQ5AIS2 - Q5_2A_VR SS-ISOL-2 VOLT REGULA	REM	0		
4	TAQ5AIS3 - Q5_2A_EG SS-ISOL-3 HYD GOVERN	REM	0		
5	TAQ5072P - Q5_2_20211 2A3-11 BKR POSITION	REM	3		
6	TFQ5AA52 - Q5_LOA 2A OVERSPEED TRIP	MALF	TRUE		
7	TAMH3411 - MH_V3411 PORT AREA (NORM.)	REM	0.0		

Step #: 2
Step Description : SWAP DEAD -- DEH CPU Dies, Manual, Plus 2B HDP Trip +2 mins
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TCU2DEAD - UH_DEH P2000 COMPUTER DEAD	REM	TRUE		
2	TVDDPBFB - FA_HTR_DRP_2B BEARING FRICTION	MALF	1.000		0:02:00

Step #: 3
Step Description : PTX HIGH -- PT-1110X Drifts High
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TVH1M45G - H1_P1100X DRIFT INCREMENT	MALF	0.200		

Step #: 4
Step Description : SG LT FAIL -- HIGH Signal Noise Fails LT-9011
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION			TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TVF1S16N - SB_L9011	LE-9011	LEVEL SENSOR N	MALF	0.200	0:04:00	
2	TVF1S16N - SB_L9011	LE-9011	LEVEL SENSOR N	MALF	0.400	0:01:00	0:04:03
3	TVF1S16N - SB_L9011	LE-9011	LEVEL SENSOR N	MALF	0.200	0:01:00	0:07:00
4	TVF1S16N - SB_L9011	LE-9011	LEVEL SENSOR N	MALF	0.100		0:08:00

Step #: 5
Step Description : LEG GONE -- 6 Pzr Instruments Fail in response to Leg Tap Failure
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION		TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFH1M15B - H1_L1105	FAIL HIGH MALFUNCTION	MALF	TRUE		
2	TFH1M16B - H1_LT1110X	FAIL HIGH MALFUNCTION	MALF	TRUE		
3	TFH1M45C - H1_P1100X	FAIL LOW MALFUNCTION	MALF	TRUE		
4	TFH1M47C - H1_P1102A	FAIL LOW MALFUNCTION	MALF	TRUE		
5	TFH1M51C - H1_P1103	FAIL LOW MALFUNCTION	MALF	TRUE		
6	TFH1M56C - H1_P1108	FAIL LOW MALFUNCTION	MALF	TRUE		
7	TAHPTOPC - HP_LVPRZRHD	PRESS. TOP LEAK	REM	0.100	0:05:00	

Step #: 6
Step Description : BIG LOCA -- Penetration Fails, 200 GPM LOCA
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TAHPTOPC - HP_LVPRZRHD PRESS. TOP LEAK	REM	0.750		

Step #: 7
Step Description : LOOP - Automatic LOOP on Plant Trip
Step Condition : A1_A1_A1SI5_2
Delay Time : 0:00:00
Mode : Regular
InitialState : Triggered

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFP8D1ET - P8_52_1E FAIL TRIP	MALF	TRUE		
2	TFP8D1MT - P8_52_1M FAIL TRIP	MALF	TRUE		
3	TFP8L09F - P8_IDA FAULT ON MIDWAY LINE #1	MALF	TRUE		
4	TFP8L10F - P8_IDA FAULT ON MIDWAY LINE #2	MALF	TRUE		
5	TFP8L11F - P8_IDA FAULT ON MIDWAY LINE #3	MALF	TRUE		
6	TAKFPU1 - KF_IDA PRESSURE OF IAS OF UNIT 1	REM	60.000	0:11:00	

Step #:	8
Step Description :	HPSI DIE -- (Auto) "Air-Binds" 2B-HPSI after few minutes of Operation
Step Condition :	a206_a1_ds132_1
Delay Time :	0:01:00
Mode :	Regular
InitialState :	Triggered

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFMVMS2 - MH_HPSIPUMP2B HPSI MTR 2B SHEARED	MALF	TRUE		

Step #: 9
Step Description : HPSI BACK -- Restore NPSH to the 2B HPSI Pump
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFMVMS2 - MH_HPSIPUMP2B HPSI MTR 2B SHEARED	MALF	FALSE		
2	TAMH3411 - MH_V3411 PORT AREA (NORM.)	REM	1.000	0:00:20	

Step #: 10
Step Description : AB AIR -- NPO Aligns Emergency Cooling to A&B Inst Air Comp
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TAKFV109 - KF_V18109 2A AFTERCOOLER OUTLET	REM	1.000		
2	TAKFV118 - KF_V18118 2B AFTERCOOLER OUTLET	REM	1.000		
3	TCK5PB1O - KF_LOA PB-1/START OF COOLING FAN	REM	TRUE		
4	TCK5PB3O - KF_LOA PB-3/START OF RECIRC PUMP	REM	TRUE		
5	TAK5CS1 - KF_LOA CS-593-1 COMPR 2A CONT SW R	REM	1		0:00:30
6	TAK5CS2 - KF_LOA CS-594-1 COMPR 2B CONT SW R	REM	2		0:00:15
7	TAKFV660 - KF_V_18660 PORT AREA	REM	0.0		

Step #: 11
Step Description : ESSENT -- SNPO Resets Non-Essential Loads Breakers
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	tce3e30p - E3_LOA MCC 2A5 NIE CONTACTOR PB	REM	TRUE		
2	TCE3E31P - E3_LOA MCC 2A6 NIE CONTACTOR PB	REM	TRUE		0:00:45
3	TCE3E32P - E3_LOA MCC 2A8 NIE CONTACTOR PB	REM	TRUE		0:04:00
4	TCE3E33P - E3_LOA MCC 2BC NIE CONTACTOR PB	REM	TRUE		0:01:30
5	TCE3E34P - E3_LOA MCC 2B6 NIE CONTACTOR PB	REM	TRUE		0:02:00
6	TCE3E35P - E3_LOA MCC 2B8 NIE CONTACTOR PB	REM	TRUE		0:04:10

Facility: St. Lucie Scenario No.: 2 Op-Test No.: 1

Objectives: To evaluate the students ability to implement the ONOPs for various instrument and component failures; perform a normal plant power reduction; and to execute the EOPs for an Excess Steam Demand combined with loss of two of three Auxiliary Feedwater Pumps and total loss of Instrument Air.

Initial Conditions: Unit 2 is at 100% power MOC
Turnover: The plant is operating at 100% power, MOC. The 2B Main Feedwater Pump has developed a crack in an oil line and is leaking approximately .3 GPM. Maintenance is standing by and adding oil as needed. Management is in the process of evaluating the problem and will make a decision within the next hour whether or not to reduce power and repair the leak. 2B Auxiliary Feedwater Pump is out of service for bearing replacement, not expected back this shift. The Steam Jet Air Ejector Radiation Monitor is out of service, not expected back this shift. Chemistry reports a .5 GPD tube leak in the 2A Steam Generator. Severe thunderstorms have been forcasted for St. Lucie and Martin counties. Instructions to the shift are to maintain 100% power.

Preexisting Malfunctions: 2C Auxiliary Feedwater pump trips 10 minutes after AFAS actuation.
HCV-09-1A and HCV-09-1B fail to close on AFAS/MSIS

Event No.	Malf. No.	Event Type*	Event Description
1	1	C-BOP	PCV-8801 (Steam bypass control valve) drifts open
2	0	R-RO N-BOP N-RO	Power reduction to 45% Place Pressurizer on Recirc Start Second Charging Pump
3	3	C-RO	LCV-2110P (pressurizer level control valve) fails open, V2515 does not close automatically on high temperature*, (*High Temp may not reach setpoint, may be transparent, not counted)
4	0	N-BOP	Restoration of charging and letdown
5	2	I-RO	HIC-1100 (pressurizer spray controller) input fails high
6	4	I-BOP	PT-10-8 (condenser vacuum pressure transmitter) sensing line failure
7	5	M-RO M-BOP	Reactor trip on loss of vacuum, V-8201 and V-8202 (2A S/G main steam safety valves) stick fully open on the reactor trip
8	6	C	Loss of instrument air on reactor trip, Loss of CCW to RCPs, all 4 must be secured in 10 minutes
9	7	C	2C Auxiliary Feedwater pump trips 10 minutes after AFAS

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Op-Test No.:1	Scenario No.: 2 Event No.: 1	Page 2 of 10
Event Description:	PCV-8801 (Steam bypass control valve) drifts open **(Examiner must cue trigger)**	

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes reactor power increasing
		Recognizes RCS temperature decreasing
		Notifies SRO that a transient may be taking place
		Notifies NPO to investigate for a steam leak
		Operates DEH to reduce turbine power to reduce reactor power
		Directs NPO to manually isolate PCV-8801
	RO	Recognizes reactor power increasing
		Recognizes RCS temperature decreasing
		Assists BOP in investigation of event
		Monitors plant parameters while transient in progress
	SRO	Recognizes reactor power increasing (may exceed T.S.
		Recognizes RCS temperature decreasing
		Directs BOP to reduce reactor power by operation of DEH
		Directs the isolation of PCV-8801
		Notifies I&C or RMS of the event
		Notifies Management of the event

Op-Test No.: 1	Scenario No.: 2	Event No.: 2	Page 3 of 10
Event Description:	Power decrease from 100% to 45%		

Time	Position	Applicant's Actions or Behavior
	BOP	Refers to appropriate procedure for decrease of turbine and reactor power: NOP-2-0030125, "Turbine Shutdown - Full Load to Zero Load"
		Operates DEH to decrease turbine load
		Monitors secondary parameters during power change
	RO	Places pressurizer on recirc IAW NOP-2-0030123, "Reactor Operating Guidelines during Steady State and Load Changes"
		Starts second Charging Pump
		Operates CVCS to decrease RCS temperature
		Operates control rods to maintain ASI to curve
		Remains cognizant of RCS parameters during power increase
	SRO	Performs shift brief prior to power decrease
		Directs RO to place pressurizer on recirc and start additional charging pump
		Directs RO to maintain ASI to curve
		Directs RO to decrease RCS temperature by CVCS addition
		Directs BOP to decrease turbine power by DEH
		Notifies System of impending power decrease

Op-Test No.: 1	Scenario No.: 2	Event No.: 3	Page 5 of 10

Event Description: LCV-2110P (pressurizer level control valve) fails open. V2515 Hi-Temp interlock is disabled to ensure Letdown will not automatically isolate if hi-temp setpoint is reached. (should be transparent) **(Examiner must cue trigger)**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes letdown flow increasing (if annunciator comes in, use of the annunciator summary)
		Identifies LCV-2110 open
		Recognizes High Letdown Flow. Pressurizer level lowering
		Manually Isolates Letdown and secures charging
		Secures boration (if not already done)
		Monitors plant parameters after transient occurs
	BOP	Recognizes loss of Letdown and Charging
		Refers to ONOP 2-0210030, "Charging and Letdown"
		Secures turbine decrease (if not already done)
		Assists RO in monitoring plant parameters after transient occurs

Op-Test No.:1	Scenario No.: 2	Event No.: 3	

Event Description: LCV-2110P (pressurizer level control valve) fails open. V2515 Hi-Temp interlock is disabled to ensure Letdown will not automatically isolate if hi-temp setpoint is reached. (should be transparent) **(Examiner must cue trigger)**

Time	Position	Applicant's Actions or Behavior
	SRO	Recognizes loss of Letdown and Charging
		Refers to ONOP 2-0210030, "Charging and Letdown"
		Directs RO and BOP to secure power decrease (if not already done)
		Notifies I&C Supervisor
		Notifies plant management

Op-Test No.:1	Scenario No.: 2	Event No.: 4	Page 7 of 10
Event Description:	Restoration of charging and letdown		

Time	Position	Applicant's Actions or Behavior
	BOP	Restores charging and letdown IAW ONOP 2-0210030, "Charging and Letdown"
	RO	Monitors plant parameters while restoration of charging and letdown is taking place
	SRO	Works with BOP as procedure reader or in a position of oversight while restoration of charging and letdown is taking place

Op-Test No.:1	Scenario No.: 2	Event No.: 5	Page 4 of 10
Event Description:	HIC-1100 (pressurizer spray controller) input fails high **(Examiner must cue trigger)**		

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes RCS pressure decreasing (if alarm comes in first, use of annunciator summary)
		Recognizes pressurizer spray valves are open
		Recognizes HIC-1100 output has failed high
		Places HIC-1100 in manual
		Controls RCS pressure by manual control of heaters and sprays
		Restores RCS pressure to normal value (2250 psia)
		Stops boration (optional)
	BOP	Refers to ONOP 2-0120035, "Pressurizer Pressure and Level"
		Monitors plant parameters during transient
		Stops turbine decrease (optional)
	SRO	Recognizes HIC-1100 has failed high
		Refers to ONOP 2-0120035, "Pressurizer Pressure and Level"
		Directs RO to control pressurizer pressure by manual control of heaters and sprays
		Consults Tech Spec 3.2.5 (RCS pressure limit / DNB)
		Directs RO to restore RCS pressure to normal value (2250 psia)
		Directs RO and BOP to secure power decrease (optional)
		Notifies I&C or RMS
		Notifies Plant Management

Op-Test No.:1	Scenario No.: 2 Event No.: 6	Page 8 of 10
Event Description: PT-10-8 (condenser vacuum pressure transmitter) sensing line failure, loss of condenser vacuum **(Examiner must cue trigger)**		

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes condenser vacuum is decreasing (if annunciator comes in, use of the annunciator summary)
		Operates DEH to perform rapid downpower as directed by SRO
		Notifies SRO of actual condenser backpressure values during execution of rapid downpower.
		Ensures condenser backpressure does not exceed 5.5" HG with unit above 30% power.
		Trips reactor and turbine when condenser backpressure reaches 5.5" HG.
	RO	Recognizes condenser vacuum is decreasing
		Operates CVCS to perform rapid downpwer as directed by SRO
		Monitors plant parameters with transient in progress
		Trips reactor when condenser backpressure reaches 5.5" HG
	SRO	Recognizes condenser vacuum is decreasing
		Refers to ONOP 2-0610031, "Loss of Condenser Vacuum"
		Directs RO and BOP to perform a rapid downpower IAW 2-ONP-22.01," Rapid Downpower"
		Remains cognizant of condenser backpressure values during transient
		Ensures condenser backpressure does not exceed 5.5" HG with unit above 30% power
		Directs RO and BOP to trip the reactor and turbine when condenser backpressure reaches 5.5" HG

Op-Test No.:1	Scenario No.: 2	Event No.: 7	Page 9 of 10
Event Description:	Reactor trip on loss of vacuum, V-8201 and V-8202 (2A S/G main steam safety valves) stick fully open on the reactor trip, Main Feed isolation valves fail to close on AFAS/MSIS. Complete Loss of Instrument Air due to rupture of Turbine Header. Loss of Instrument Air causes loss of CCW to running RCPs		

Time	Position	Applicant's Actions or Behavior
	RO	Perform systematic board walkdown
		Perform Standard Post Trip actions (2-EOP-1)
		Recognizes Loss of Instrument Air and Loss of RCP CCW
		Throttle AFW flow after actuation, recognize 2C pump Trips
		Contact NPO to investigate 2C AFW pump trip
		Emergency Borate per ONP 2-ONP-2.02 if directed
		Stop 1 RCP prior to 500 ºF Tc
	Critical Task	Stop all RCPs 10 minutes after Loss of all CCW
	Critical Task	Stabilize RCS temperature after 2A Steam Generator blows dry
	BOP	Perform systematic board walkdown
		Perform Standard Post Trip actions (2-EOP-1)
		Report all safety function status to SRO
		Perform Safety function Status checks for 2-EOP-5, "Excess Steam Demand or 2-EOP-15, "Functional Recovery" (if STA is unavailable)
		Recognize HCV-09-1A and HCV-09-1B fail to close on AFAS/MSIS
		Manually closes HCV-09-1A and HCV-09-1B
		Recognize 2C AFW trips
		Refers to 2-NOP-09.02, "Auxiliary Feedwater"
		Recognize no AFW flow to either steam generator
	Critical Task	Contact NPO to crosstie the A and B auxiliary feedwater headers **OR** reestablish flow with 2C AFW pump
		Isolates 2A Steam Generator IAW 2-EOP-99, Appendix R

Op-Test No.:1	Scenario No.: 2	Event No.: 7	Page 10 of 10

Event Description: Reactor trip on loss of vacuum, V-8201 and V-8202 (2A S/G main steam safety valves) stick fully open on the reactor trip, Main Feed isolation valves fail to close on AFAS/MSIS. Complete Loss of Instrument Air due to rupture of Turbine Header. Loss of Instrument Air causes loss of CCW to running RCPs

Time	Position	Applicant's Actions or Behavior
	SRO	Directs RO and BOP to perform systematic board walkdown
		Directs the performance of 2-EOP-1
		Directs 1 RCP stopped prior to 500 ºF Tc.
		Direct Emergency Boration per ONP 2-ONP-2.02
		Directs all RCPs stopped 10 minutes after Loss of all CCW
		Directs entry into 2-EOP-5, Excess Steam Demand"
		Directs RO to throttle AFAS after actuation
		Directs BOP to perform safety function status checks for 2-EOP-5 (if STA is unavailable)
		Directs RO to stabilize RCS temperature and pressure after 2A Steam Generator blows dry
		Recognizes loss of instrument air
		Notifies HP to perform secondary surveys due to loss of sampling capability (loss of I/A)
		Recognizes loss of 2C AFW pump
		Directs BOP to carry out actions of 2-NOP-09.02, "Auxiliary Feedwater"
	Critical Task	Directs BOP to crosstie the A and B auxiliary feedwater headers **OR** reestablish flow using 2C AFW pump
		Directs entry into 2-EOP-15, "Functional Recovery" upon loss of feedwater (optional; feed must be restored within 15 minutes)
		Directs BOP to isolate 2A Steam Generator IAW 2-EOP-99, Appendix R

Shift Turnover

- The plant is operating at 100% power MOC.
- 2B Main Feedwater Pump has developed a crack in an oil line and is leaking approximately .3 gpm.
- Maintenance is adding oil as needed.
- Management is evaluating the problem and will make a decision within the next hour whether or not to reduce power and repair the leak.
- 2B Auxiliary Feedwater Pump is out of service for bearing replacement, not expected back this shift.
- The SJAE monitor is out of service, not expected back this shift.
- Chemistry reports a .5 gpd tube leak in the 2A Steam Generator.
- Severe thunderstorms have been forcasted for St. Lucie and Martin counties.
- Instructions to the shift is to maintain 100% power.

NOTE:

SEE SCENARIO #1 FOR ADDITIONAL PROCEDURES

6.0 OPERATOR ACTIONS

INSTRUCTIONS	CONTINGENCY ACTIONS
1. If letdown flow is lost, Then STOP the charging pumps.	
A. RETURN the charging pump control switches to AUTO.	
2. If charging flow is lost, Then ISOLATE letdown.	**2.1** ISOLATE Letdown by the following:
	A. CLOSE V2515, Stop Valve-IC
	B. CLOSE V-2516, Containment Isol Valve-IC.
	C. CLOSE V2522, Containment Isol Valve-OC.

NOTE

With Charging and Letdown isolated pressurizer level will lower slowly due to RCP controlled bleedoff flow.

INSTRUCTIONS	CONTINGENCY ACTIONS
3. If charging and letdown flow has been lost, Then MAINTAIN Reactor power and RCS temperature constant to minimize pressurizer level deviations.	
4. VERIFY all applicable automatic actions have occurred. Appendix A contains a listing of expected automatic actions.	

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
5. §1 MAINTAIN Pressurizer level between 27% and 68%.	**5.1** §1 If Pressurizer level can NOT be maintained between 27% and 68%, Then BE in at least HOT STANDBY with the reactor trip breakers OPEN within 6 hours and in HOT SHUTDOWN within the following 6 hours.
6. If charging and letdown flow has been lost, Then DETERMINE the cause.	
7. If a charging system leak has occurred, Then ISOLATE the leak and refer to applicable Technical Specifications for guidance.	
8. If the normal charging flow path becomes unavailable, Then REFER TO Appendix B, Alternate Charging Flow Path through A HPSI Header.	
9. If letdown is unavailable, Then MAINTAIN pressurizer level by temporarily cycling charging pumps.	

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE

If one or more charging pumps have lost pumping ability, gas binding may have occurred. This can result from pumping the VCT dry (hydrogen binding) or rupture of a charging pump suction accumulator (nitrogen binding). If this occurred, the charging pumps must be vented after restoring a source of water to the suction.

INSTRUCTIONS	CONTINGENCY ACTIONS
10. If the charging pumps are gas bound, Then REFER TO Appendix C, Venting a Gas Bound Charging Pump.	
11. If charging and letdown has been lost and can be restored, Then RE-ESTABLISH charging and letdown flow as follows:	**11.**
A. ENSURE adequate VCT level is indicated.	**A.1** RESTORE the VCT to a normal level in accordance with 2-ONP-02.01, Boron Concentration Control.
B. ENSURE the Level Control Valve selector switch and the Pressure Control Valve selector switch are selected to the level and pressure control valves presently in service.	
C. PLACE HIC-1110, Level, controller in MANUAL.	

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
11. (continued)	
D. ENSURE the Level Control Valves are CLOSED.	
E. ENSURE PIC-2201, Pressure controller is in AUTO and set to maintain 150 psig.	
F. PLACE the Position Limiter Bypass key switch in the BYPASS position.	
G. START one charging pump	
H. VERIFY charging flow is indicated.	
I. VERIFY the regenerative heat exchanger high temperature alarm, SIAS or CIS alarms are NOT present.	
J. OPEN V2515, Stop Valve-IC.	
K. OPEN V2516, Containment Isol Valve-IC.	
L. OPEN V2522, Containment Isol Valve-OC.	

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
11. (continued)	**11.**

NOTE

If V2515 reclosed due to high letdown temperature, it may be necessary to cycle V2515 while opening the Level control valve until flow is adequate to clear the high temperature alarm.

M. SLOWLY OPEN the Level Control Valve and ESTABLISH approximately 5 gpm letdown flow.

CAUTION

Prolonged use of charging without letdown could result in the pressurizer going solid. Pressurizer level must be closely monitored.

NOTE

Charging Temp Outlet Regen HX should NOT be allowed to increase more than 60°F per minute.

INSTRUCTIONS	CONTINGENCY ACTIONS
N. WHEN Letdown temperature stabilizes on TIC-2221,Temp Regen Hx Tube Out, Then RAISE letdown flow at a rate NOT to exceed 5 to 10 gpm over at least a 4 minute period.	**N.1** If letdown cannot be restored, Then INITIATE charging as required for restoring pressurizer level, seal injection, or boration.
O. ENSURE PIC-2201, Pressure controller is maintaining letdown pressure at 150 psig.	

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS | **CONTINGENCY ACTIONS**

11. (continued)

P. When PZR level is at its setpoint,
Then PERFORM the following:

1. BALANCE HIC-1110, LEVEL, controller AUTO to MANUAL output signals, using the BIAS control knob while previewing the AUTO signal.

2. PLACE HIC-1110, LEVEL, controller to AUTO.

3. MONITOR pressurizer level for abnormal trends.

Q. PLACE the Position Limiter Bypass key switch to the NORM position.

CAUTION
V2345, LTDN CNTL VLV STATION SAFETY RELIEF, will open at 600 psig.

R. SLOWLY RAISE PIC-2201, Pressure, setpoint to 430 psig.

S. ENSURE letdown pressure is being maintained at 430 psig.

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
12. If Letdown Level control is malfunctioning, Then PERFORM the following:	**12.**
A. VERIFY the output of HIC-1110, LEVEL, is responding as expected to current plant conditions.	**A.1** PLACE HIC-1110 in MANUAL by performing the following: **1.** BALANCE HIC-1110 MANUAL to AUTO controller output signals by previewing and using the MANUAL control knob to match the manual and auto controller output signals. **2.** PLACE HIC-1110 to MANUAL. **3.** ADJUST letdown flow to a value consistent with the current plant conditions. **4.** PERFORM a system walkdown observing for leaks or lifting relief valves.
B. VERIFY the selected level control valve is responding as expected to HIC-1110 output.	**B.1** PLACE the Alternate Level control valve in service in accordance with 2-NOP-02.02, Charging and Letdown.

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
13. If letdown pressure control is malfunctioning, Then PERFORM the following:	**13.**
A. VERIFY the output of PIC-2201, pressure, is responding as expected for current plant conditions.	**A.1** PLACE PIC-2201in MANUAL by performing the following: **1.** PLACE PIC-2201 to MANUAL. **2.** ADJUST letdown pressure to a value consistent with current plant conditions. **3.** PERFORM a system walkdown observing for leaks or lifting relief valves.
B. VERIFY the selected pressure control valve is responding as expected to PIC-2201 output.	**B.1** PLACE the Alternate letdown Pressure control valve in service in accordance with 2-NOP-02.02, Charging and Letdown.

END OF SECTION 6.0

7.0 OPERATOR ACTIONS:

7.1 Immediate Operator Actions:

INSTRUCTIONS	CONTINGENCY ACTIONS
1. Verify proper SJAE operation.	
2. If vacuum continues to decrease, Then place hogging ejector(s) in service per the following:	
A. To place 2A hogging ejector in service:	
1. Open V08181, Root Valve for Main Steam to Hogging Ejectors.	
2. Throttle open V16200, Isol. Valve for Aux. Steam Supply to Hogging Ejector 2A and maintain 200 psig on PI-12-48A.	
3. Open V12575, Isol. Valve for Hogging Ejector 2A Inlet from Condensers.	
4. Open V12995, 2A/2B Cndsr Crosstie to SJAE/Hogging Ejectors Isol.	

7.0 OPERATOR ACTIONS:

7.1 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

2. (continued)

   A. (continued)

      5. When hogging ejector is in service, Then remove SJAE(s) from service per OP 2-0610029, "Condenser Air Removal System Operations."

   B. To place 2B hogging ejector in service:

      1. Open V08181, Root Valve for Main Steam to Hogging Ejectors.

      2. Throttle open V16203, Isol. Valve for Aux. Steam Supply to Hogging Ejector 2B and maintain 200 psig on PI-12-48B.

      3. Open V12576, Isol. Valve for Hogging Ejector 2B Inlet from Condensers.

      4. Open V12995, 2A/2B Cndsr Crosstie to SJAE/Hogging Ejectors Isol.

7.0 OPERATOR ACTIONS: (continued)

7.1 (continued)

2. (continued)

B. (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
5. When hogging ejector is in service, Then remove SJAE(s) from service per OP 2-0610029, "Condenser Air Removal System Operations."	

7.2 Subsequent Operator Actions:

1. If vacuum cannot be maintained, Then begin a turbine/reactor shutdown in a controlled manner (≈5%/min.) per OP 2-0030125, "Turbine Shutdown, Full Load to Zero Load" and OP 2-0030128, "Reactor Shutdown."

> NOTE
> The following are maximum backpressure operating requirements and shall NOT be exceeded.

INSTRUCTIONS	CONTINGENCY ACTIONS
¶1 2. If unit is operating on line at less than 30% of rated load, Then verify backpressure is less than or equal to 3.5 inches Hg. absolute.	2. If backpressure exceeds 3.5 inches Hg. absolute, at less than 30% load, while on line, Then immediately trip the unit and carry out 2-EOP-01, "Standard Post Trip Actions."

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
¶1 3. If unit is operating at greater than 30% of normal load, Then verify backpressure is less than or equal to 5.5 inches Hg. absolute.	3. If backpressure exceeds 5.5 inches Hg. absolute, at loads greater than 30%, Then immediately trip the unit and carry out 2-EOP-01, "Standard Post Trip Actions."
4. Compare readings between PI-10-7A or PI-10-7B and PI-10-6 and verify the difference is NOT greater than or equal to 2.5" Hg.	4. If the pressure differential between PI-10-7A or PI-10-7B and PI-10-6, is greater than or equal to 2.5" Hg., Then immediately trip the reactor and trip the turbine and carry out 2-EOP-01, "Standard Post Trip Actions."
5. If turbine/reactor trip occurs, go to 2-EOP-01, "Standard Post Trip Actions."	
6. Check the following for possible cause of vacuum decrease.	6.
A. Verify steam header supply to turbine seals to be greater than 115 psig but less than 140 psig.	A. If steam header supply to turbine seals is less than 115 psig or greater than 140 psig, Then adjust gland steam bypass valve MV-08878 to regulate desired steam pressure.

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

6. (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
B. VERIFY each local turbine seal pressure is between 1.5 and 5.0 psig.	B.1 If any local turbine seal pressure is low, Then PERFORM the following for each seal with low pressure: • THROTTLE PCV Bypass to maintain 1.5 to 5.0 psig. • CONTACT I&C to troubleshoot. B.2 If any local turbine seal pressure is high, Then PERFORM the following for each seal with high pressure: • CHECK PCV for proper operation. • If alarming PCV is open, Then CLOSE PCV inlet. • THROTTLE PCV Bypass to maintain 1.5 to 5.0 psig. • CONTACT I&C to troubleshoot.

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7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	6. (continued)
C. Verify proper circulating water pump status, (i.e., discharge valve position, discharge pressure and amperage, Debris Filter and CTCS Ball Strainer D/P).	C. If circulating water pump(s) have tripped, Then perform the following: 1. If both circulating water pumps in one main condenser trip and differential pressure between condensers is 2.5" Hg Abs. or greater, Then trip reactor and turbine. 2. Locally close the associated SJAE suction for the affected circulating water pump(s). 2A1 - V12516 2B1 - V12518 2A2 - V12517 2B2 - V12519
D. Verify steam is being supplied and regulated at 400 psig to SJAE bank(s) in service.	D. Locally adjust steam supply to SJAE as required.

CAUTION

The condenser hotwell makeup line will uncover at approximately 33' indicated level in the CST.

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	6. (continued)
E. Verify adequate CST inventory and the absence of low level annunciator (annunciator G-39).	E. If CST level is low, Then isolate make up sprays to hotwell and begin refill of CST.
F. Verify monitor storage tank levels to be greater than or equal to 10 feet.	F. If monitor storage tank level is less than 10 feet, Then ensure vacuum drag is isolated from that tank.
G. Verify intake screens are free of debris.	G. Start screen wash pumps and monitor D/P indicators for decreasing trend.
H. Check condenser areas and connecting systems for leaking or misaligned valves. (Condensate or sweating on piping is indicative of such leakage).	
I. Verify proper drainage from after-condenser. (At gland steam recovery tank floor drain, V11800)	I. If drainage is NOT visible from after-condenser, Then contact Mechanical Maintenance to check SARCO drainer and remove plug to drain as necessary.

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	**CONTINGENCY ACTIONS**
6. (continued)	6. (continued)
J. Verify condenser water boxes are full.	J. If condenser water boxes are NOT full, Then ensure auxiliary priming system is operating properly per 2-OG-028, "Circulating Water System Normal Operation" and OP 2-0820020, "Auxiliary Steam System - Placing in Service."
7. Verify air in-leakage to the condenser is less than 5 CFM, NOT including nitrogen addition to the hotwell.	7. If, air in-leakage is greater than 5 CFM, Then make an inspection of the condenser and hotwell systems for: A. Defective expansion joints. B. Open and leaking valves. C. Defective packing. D. Repair work in progress on a section of the condenser. 1. Contact clearance holder(s) and verify that work being performed is NOT causing the leak.
8. If conditions are found which cannot be corrected with unit in operation, consider removing the unit from service.	

7.0 OPERATOR ACTIONS: (continued)

7.1 Immediate Operator Actions: (continued)

3. (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
B. OPEN SH18718, Service Air Cross-tie to Instrument Air Isol.	
C. <u>If</u> the Instrument Air header is fed from the Service Air header for greater than 1 hour, <u>Then</u> BLOW DOWN the Instrument Air header low point drains hourly to remove oil, water and crud build-up.	
4. <u>If</u> the Instrument Air header pressure indicates less than 60 psig <u>and</u> is still lowering, <u>Then</u> PERFORM the following:	
A. TRIP the Reactor and Turbine.	
B. GO TO 2-EOP-01, Standard Post Trip Actions.	

7.0 OPERATOR ACTIONS: (continued)

7.2 Subsequent Operator Actions:

INSTRUCTIONS	CONTINGENCY ACTIONS
1. Check pressure drop across the in service air dryer and filters, to be less than 13 psig.	1. If pressure drop is greater than or equal to 13 psig, Then open V18075, air dryer and filter bypass.
2. If instrument air pressure can be stabilized, Then: A. Investigate the instrument air system for leaks, failures, or malfunctions. B. Ensure dryers and filters are aligned properly and placed in service correctly.	
3. Ensure power available to the 2C and 2D instrument air compressors. A. "2C Air Compressor (MCC 2A1)", Bkr. 2-40802. B. "2D Air Compressor (MCC 2B1)", Bkr. 2-41608.	3. If power is NOT available, Then perform the following as required: A. Determine that malfunction of the motor or breaker was NOT the reason for loss of power. B. Restore power to the appropriate MCC and start the instrument air compressor. C. Start instrument air compressor 2A or 2B per Appendix A.

7.0 <u>OPERATOR ACTIONS</u>: (continued)

7.2 (continued)

INSTRUCTIONS | **CONTINGENCY ACTIONS**

> <u>CAUTION</u>
> The ability to maintain Steam Generator levels at full power conditions may be affected as instrument air pressure degrades below 75 PSIG. Air operated valves and instrumentation may lose full range operating capability. Appendix B contains a partial listing of air operated components and their mode of failure upon loss of air supply.

4. <u>If</u> instrument air pressure decreases to less than 75 psig, <u>Then</u> evaluate the need to shut down the unit in accordance with OP 2-0030125, "Turbine Shutdown Full Load to Zero Load" or 2-EOP-01, "Standard Post Trip Actions."

5. <u>If</u> feedwater regulating 15% bypass valves are being used to maintain S/G level, <u>Then</u> use of the Auxiliary Feedwater System will be required if air pressure continues to degrade.

6. <u>If</u> SDC is in service, <u>Then</u> refer to ONOP 2-0440030, "Shutdown Cooling Off-Normal."

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
7. If a loss of CCW to the RCP's occurs due to degraded instrument air pressure, Then:	
A. If CCW cannot be restored to RCP's within 10 minutes, Then:	
1. Trip the reactor.	
2. Trip the RCP's.	
3. Carry out 2-EOP-01, "Standard Post Trip Actions."	
8. If instrument air is lost to a feedwater regulating valve, Then take local control of valve as follows:	
A. Line up the hole in the jacking device with the hole in the valve stem.	
B. Insert the coupling pin.	
C. Use handjack to control valve position as directed by control room personnel.	

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
9. If letdown isolates, Then:	
A. Secure charging unless needed for RCP seal injection, or restoring pressurizer level, or for emergency boration.	
B. Place the control switches for letdown isolation valves V2515, V2516, V2522 to close to prevent uncontrolled restoration of letdown.	
10. If SBCS was being used, Then control RCS heat removal by atmospheric dump valves.	
11. Refer to Appendix B for a listing of critical valves that may fail with a loss of instrument air.	

FPL	ST. LUCIE UNIT 2 OFF-NORMAL OPERATING PROCEDURE SAFETY RELATED	Procedure No. **2-ONP-02.02** Current Revision No. **2** Effective Date **11/11/99**

Title:

EMERGENCY BORATION

Responsible Department: **OPERATIONS**

REVISION SUMMARY:

REVISION 2 – Added guidance for emergency boration from RWT contingency. (M. Gilmore, 11/02/99)

REVISION 1 – Changed entry conditions to reflect emergency boration while in Modes 3 and 4 without a reactor trip. (Gene Boyd, 10/05/99)

REVISION 0 – *Previously issued as 2-0250030.* This procedure provides more detailed direction and an easier to read format. Section 2.0 Included Tech Spec sections and headings and Included UFSAR section numbers and headings. Section 6.0 added the correct equipment nomenclature to all pumps and valves that are operated in this procedure. The purpose of this procedure is to provide instructions to inject concentrated boric acid solution into the Reactor Coolant System via the charging pumps. (Charlie Simpkins, 03/02/99)

Revision	FRG Review Date	Approved By	Approval Date
0	03/02/99	R. G. West Plant General Manager	03/02/99
2	11/02/99	R. G. West Plant General Manager N/A Designated Approver	11/02/99

S_2_OPS	
DATE	
DOCT	PROCEDURE
DOCN	2-ONP-02.02
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1.0 PURPOSE

1.1 The purpose of this procedure is to provide instructions to inject concentrated boric acid solution into the Reactor Coolant System (RCS) via the charging pumps.

2.0 REFERENCES

> **NOTE**
>
> One or more of the following symbols may be used in this procedure:
>
> § Indicates a Regulatory commitment made by Technical Specifications, Condition of License, Audit, LER, Bulletin, Operating Experience, etc. and shall NOT be revised without Facility Review Group review and Plant General Manager approval.
>
> ¶ Indicates a management directive, vendor recommendation, plant practice or other non-regulatory commitment that should NOT be revised without consultation with the plant staff.
>
> Ψ Indicates a step that requires a sign off on an attachment.

2.1 Technical Specifications

- Section 3.1.2.1 Boration Flow Paths Modes 5 and 6.
- Section 3.1.2.2 Boration Flow Paths Modes 1 thru 4.

2.2 Updated Final Safety Analysis Report (UFSAR)

- Section 7.4 Systems Required for Safe Shutdown.
- Section 7.4.1.2 CVCS Boron Addition.
- Section 9.3.4 Chemical and Volume Control System

2.3 Management Directives and Regulatory Commitments

- ¶1 CR 98-1016, 1A Boric Acid Makeup Pump Trip (PM 98-08-069)
- ¶2 CR 99-0952

2.4 Procedures

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

3.0 RECORDS REQUIRED

3.1 Normal Log Entries.

4.0 ENTRY CONDITIONS

ANY of the Following Conditions exist:

4.1 ¶2 Unanticipated or uncontrolled RCS cooldown in Modes 1 & 2 following a reactor trip or in Modes 3 & 4 as indicated by:

1. Uncontrolled decrease in RCS temperature.
2. Uncontrolled decrease in pressurizer pressure or level.
3. Uncontrolled decrease in secondary steam pressure.

4.2 Unexplained or uncontrolled reactivity increase as indicated by:

1. Abnormal increase in RCS temperature or Reactor power.
2. Abnormal increase in Reactor power or count rate when shut down.

4.3 Loss of shutdown margin due to excessive CEA insertion as indicated by:

1. Power dependent insertion alarm (DDPS).
2. Power dependent insertion alarm (ADS).

4.4 More than one CEA NOT fully inserted following a Reactor Trip as indicated by:

1. The CEA Lower Electrical Limit lights (green) indicate more than one CEA NOT fully inserted.
2. The CEA Bottom lights (amber) indicate more than one CEA NOT fully inserted.
3. ADS Display indicates more than one CEA NOT fully inserted.

5.0 EXIT CONDITIONS

5.1 RCS cooldown and/or reactivity excursion has been terminated.

AND

5.2 Shutdown margin has been restored to greater than 5000 PCM.

6.0 OPERATOR ACTIONS

INSTRUCTIONS	CONTINGENCY ACTIONS
1. ¶1 PLACE the Makeup Mode Selector switch in MANUAL.	
2. ENSURE V2525, Boron Load Control Valve, is CLOSED.	
3. START 2A or 2B BA Pump.	
4. CLOSE V2650, Tank 2A Recirc. Valve	
5. CLOSE V2651, Tank 2B Recirc Valve.	
6. OPEN V2514, Emergency Borate.	**6.** **A.** If V2514 fails to open, PERFORM the following: **1.** OPEN V2508, BA Gravity Feed B. **2.** OPEN V2509, BA Gravity Feed A. **3.** CLOSE V2501 VCT Outlet Valve. **4.** If VCT level is greater than 5%, Then PLACE and hold V2501 in the CLOSE position. **5.** OPEN Bkr 2-42118, V2501, at MCC-2B6

/R2

6.0 OPERATOR ACTIONS

INSTRUCTIONS	CONTINGENCY ACTIONS
	6. (continued)

CAUTION
The RWT to Charging Pump Suction line shall not be used during a seismic event.

B. If the Boric Acid Makeup Tanks are unavailable or both Gravity Feed valves failed to open, Then perform the following:

1. OPEN V2504 VCT Bypass / Chrg Pp Suct from RWT.
2. CLOSE V2501 VCT Outlet Valve.
3. If the VCT level is greater than 5%, Then perform the following:
   a. PLACE and hold V2504 VCT Bypass / Chrg Pp Suct from RWT in the OPEN position.
   b. PLACE and hold V2501 VCT Outlet Valve in the CLOSED position.
   c. OPEN Bkr 2-42036, V-2504, at MCC-2B5.
   d. OPEN Bkr 2-42118, V-2501, at MCC-2B6.

/R2

6.0 OPERATOR ACTIONS

INSTRUCTIONS	**CONTINGENCY ACTIONS**
	6. (continued) **B.** (continued) **4.** STOP the running BAM pumps. **5.** ENSURE V2508 BA Gravity Feed B CLOSED. **6.** ENSURE V2509 BA Gravity Feed A CLOSED. **7.** ENSURE V2514 Emergency Borate CLOSED.
7. If Unit 2 is in Mode 3 thru 6 with SIAS Blocked and Emergency Boration is **NOT** available, Then PERFORM the following: **A.** PERFORM Safety Function Status Check of the Low Mode Off Normal for the current plant condition. **B.** IMPLEMENT the Low Mode Off-Normal Operating Procedure if required.	

/R2

6.0 OPERATOR ACTIONS

INSTRUCTIONS | **CONTINGENCY ACTIONS**

8. If the Emergency Boration is complete, Then PERFORM the following to restore the system to normal alignment:

A. CLOSE V2514, Emergency Borate.

B. ¶1 ENSURE the Makeup Mode Selector switch is in MANUAL

C. STOP the running BAM pump and PLACE the control switch in AUTO.

D. OPEN V2650, Tank 2A Recirc. Valve

E. OPEN V2651, Tank 2B Recirc. Valve

F. If Gravity Feed was used, Then PERFORM the following:

1. CLOSE Bkr 2-42118, V2501, at MCC-2B6.
2. OPEN V2501, VCT Outlet Valve.
3. CLOSE V2508, BA Gravity Feed B.
4. CLOSE V2509, BA Gravity Feed A.
5. PLACE the Makeup Mode Selector switch in the desired position.

6.0 OPERATOR ACTIONS

INSTRUCTIONS | **CONTINGENCY ACTIONS**

8. (continued)

G. If the RWT to Charging Pump Suction was used, Then perform the following:

1. CLOSE Bkr 2-42118, V-2501, at MCC-2B6.

2. CLOSE Bkr 2-42036, V-2504, at MCC-2B5.

3. OPEN V2501 VCT Outlet Valve.

4. CLOSE V2504 VCT Bypass / Chrg Pp Suct from RWT.

/R2

END OF SECTION 6.0

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
5. If RCP oil temperatures are at or above their alarm setpoint, Then:	
A. Continue to monitor the affected pump.	
B. Ensure adequate CCW flow to the affected RCP.	

§1

> **NOTE**
> Valves HCV-14-11A1, HCV-14-11A2, HCV-14-11B1, and HCV-14-11B2, "Seal Cooler Isolations" close on high seal cooler outlet temperature (200°F) and fail open on loss of instrument air or loss of power.

INSTRUCTIONS	CONTINGENCY ACTIONS
6. If RCP low cooling water flow alarms are present, Then:	6.
A. Ensure non-essential header valves and CCW containment isolation valves are open:	A. If non-essential header valves or CCW containment isolation valves are closed, Then reset and attempt to open.
1. Non-essential header valves: HCV-14-8A, HCV-14-8B, HCV-14-9, HCV-14-10.	

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	
A. (continued)	
2. Containment isolation valves: HCV-14-1, HCV-14-2, HCV-14-6, HCV-14-7.	
¶1 B. If CCW flow is lost and can NOT be reestablished to the RCPs within 10 minutes, Then:	
1. If the reactor is critical, Then trip the reactor and turbine and refer to 2-EOP-01, "Standard Post Trip Actions."	
2. Stop all 4 RCPs.	
3. If an immediate reactor plant cooldown is not to be performed, Then depressurize the RCS to approximately 1850 psia to maintain RCP lower seal cavity temp less than 300°F.	/R25

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	/R25
¶3 C. If CCW flow is lost and can NOT be reestablished to the RCPs within 30 minutes, Then ISOLATE RCP Controlled Bleedoff as follows:	/R25
1. CLOSE V2505, RCP Bleedoff.	
2. CLOSE V2524, RCP Bleedoff.	
3. ENSURE V2507, RCP Bleedoff Relief Stop Vlv is CLOSED.	
¶4 D. If CCW flow is lost and CBO is isolated, Then BEGIN natural circ cooldown in accordance with ONP 2-0120039 within 4 hours.	/R25

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	
E. If low CCW flow to RCPs is due to degraded instrument air pressure, Then refer to Off-Normal OP 2-1010030, "Loss of Instrument Air."	
7. Ensure the following RCP seal cooler CCW valves on RTGB 203 are open: HCV-14-11A1, HCV-14-11A2, HCV-14-11B1, HCV-14-11B2.	7. If valves are closed, Then attempt to reset and open.

> **NOTE**
> RCP lower seal cavity temperature may exceed alarm value during plant heatup, prior to starting the RCP. Lower seal cavity temperature must be limited to less than or equal to 300°F in this case.

INSTRUCTIONS	CONTINGENCY ACTIONS
8. Verify oil temperature, stator temperature and seal cavity temperatures are stable and below alarm values.	8. If temperature is stable but above the alarm values, Then: A. Consider making containment entry to adjust CCW flow to the affected RCP to greater than 190 gpm.

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	**CONTINGENCY ACTIONS**
2. (continued)	
C. 2-ONP-01.03, Plant Condition 3: Shutdown Cooling in Operation - No Reduced Inventory.	
D. 2-ONP-01.04, Plant Condition 4: Shutdown Cooling in Operation - Reduced Inventory Operations.	
E. 2-ONP-01.05, Plant Condition 5: Shutdown Cooling in Operation - Reactor Head Removed.	
3. If 2C AFW Pump overspeed trip has occurred, Then PERFORM Appendix A, Resetting 2C AFW Pump Following Overspeed Trip.	
4. If 2C AFW pump can NOT be controlled from the Control Room, Then CONSIDER local operation using Appendix B, Local Operation of 2C AFW Pump.	

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
5. If steam binding occurs on any Auxiliary Feedwater pump, Then PERFORM the following:	
A. STOP the affected pump.	
B. ESTABLISH feedwater flow to S/Gs by performing **ONE** of the following:	
1. INJECT feedwater flow to the affected S/G with 2C AFW Pump.	**1.** If 2C AFW Pump overspeed trip has occurred, Then PERFORM Appendix A, Resetting 2C AFW Pump Following Overspeed Trip.
OR	
2. INJECT feedwater flow to the affected S/G with the unaffected electric driven AFW Pump using Appendix C, Cross-Connecting AFW.	
C. REESTABLISH Auxiliary Feedwater flow with the affected steam bound pumps using Appendix D, Reestablishing AFW Flow Following Steam Binding.	

END OF SECTION 6.0

APPENDIX A
RESETTING 2C AFW PUMP FOLLOWING OVERSPEED TRIP
(Page 1 of 3)

INITIAL

1. If 2C AFW pump tripped due to mechanical overspeed trip, Then PERFORM the following:

   A. Locally RESET MV-08-3, 2C AFW Pump Throttle/Trip, trip lever.

   B. CLOSE MV-08-12, SG 2B Stm To AFW Pp 2C.

   C. CLOSE MV-08-13, SG 2A Stm To AFW Pp 2C.

   D. VERIFY pump has stopped rotating.

   E. PERFORM the following to re-latch and open MV-08-3, 2C Pump, on RTGB-202:

      1. PLACE MV-08-3, 2C Pump Key 78, key-switch to CLOSE.

      2. RETURN MV-08-3, 2C Pump Key 78, key-switch to OPEN. _______

   F. PERFORM **ONE** of the following to drain oil from the underside of the governor main speed piston:

      1. Wait 3 minutes after pump stops rotating. _______

         OR

      2. PERFORM the following:

         a. PLACE manual control knob on turbine governor FULLY COUNTER-CLOCKWISE (idle speed). _______

         b. RETURN manual control knob on turbine governor FULLY CLOCKWISE (normal speed). _______

   G. OPEN MV-08-12, SG 2B Stm To AFW Pp 2C. _______

   H. OPEN MV-08-13, SG 2A Stm To AFW Pp 2C. _______

APPENDIX A
RESETTING 2C AFW PUMP FOLLOWING OVERSPEED TRIP
(Page 2 of 3)

1. (continued) INITIAL

I. PERFORM Independent Verification of the following:

COMPONENT	POSITION	IV INITIAL
MV-08-12, SG 2B Stm To AFW Pp 2C	OPEN	_______
MV-08-13, SG 2A Stm To AFW Pp 2C	OPEN	_______
Manual Control Knob on AFW Pp 2C Turbine Governor	FULLY CLOCKWISE	_______
MV-08-3, 2C Pump Key 78	OPEN	_______

2. If 2C AFW pump tripped due to electrical overspeed trip, Then PERFORM the following:

A. CLOSE MV-08-12, SG 2B Stm To AFW Pp 2C.

B. CLOSE MV-08-13, SG 2A Stm To AFW Pp 2C.

C. VERIFY pump has stopped rotating.

D. PERFORM the following to re-latch and open MV-08-3, 2C Pump, on RTGB-202:

1. PLACE MV-08-3, 2C Pump Key 78, key-switch to CLOSE.

2. RETURN MV-08-3, 2C Pump Key 78, key-switch to OPEN. _______

APPENDIX A

RESETTING 2C AFW PUMP FOLLOWING OVERSPEED TRIP

(Page 3 of 3)

INITIAL

2. (continued)

E. PERFORM **ONE** of the following to drain oil from the underside of the governor main speed piston:

1. Wait 3 minutes after pump stops rotating.

OR

2. PERFORM the following:

a. PLACE manual control knob on turbine governor FULLY COUNTER-CLOCKWISE (idle speed).

b. RETURN manual control knob on turbine governor FULLY CLOCKWISE (normal speed). ______

F. OPEN MV-08-12, SG 2B Stm To AFW Pp 2C. ______

G. OPEN MV-08-13, SG 2A Stm To AFW Pp 2C. ______

H. PERFORM Independent Verification of the following:

COMPONENT	POSITION	IV INITIAL
MV-08-12, SG 2B Stm To AFW Pp 2C	OPEN	______
MV-08-13, SG 2A Stm To AFW Pp 2C	OPEN	______
Manual Control Knob on AFW Pp 2C Turbine Governor	FULLY CLOCKWISE	______
MV-08-3, 2C Pump Key 78	OPEN	______

Reviewed by: ______________________

ANPS

END OF APPENDIX A

APPENDIX C
CROSS-CONNECTING AFW
(Page 1 of 3)

INITIAL

1. If 2A AFW Pump is to feed 2B S/G, Then PERFORM the following:

   A. START Auxiliary Feedwater Pump 2A. /R2

   B. If 2A S/G is NOT to be fed, Then ENSURE MV-09-9, Pump 2A Disch To SG 2A Valve, is CLOSED.

   C. OPEN 1-SE-09-2, 2A Pump Disch To 2A S/G Vlv Key 83. /R2

   NOTE
   Key-switches for MV-09-13 and MV-09-14 are located in 2A/2B AFW Pump Room. Two keys are required since the keys are removable in CLOSE only.

   D. Locally OPEN MV-09-13, 2A To 2B AFW Hdr Cross-tie.

   E. Locally OPEN MV-09-14, 2B To 2A AFW Hdr Cross-tie.

   F. THROTTLE MV-09-10, Pump 2B Disch To SG 2B Valve, to establish desired flow rate.

   G. If feeding 2A S/G, Then THROTTLE MV-09-9, Pump 2A Disch To SG 2A Valve, to establish desired flow rate.

   H. When the system is to be returned to normal, Then PERFORM the following:

      1. CLOSE MV-09-10, Pump 2B Disch To SG 2B Valve. ______

      2. If 2A S/G is being fed, Then CLOSE MV-09-9, Pump 2A Disch To SG 2A Valve. ______

      3. STOP Auxiliary Feedwater Pump 2A. ______ /R2

      4. CLOSE 1-SE-09-2, 2A Pump Disch To 2A S/G Vlv Key 83. ______ /R2

      5. Locally CLOSE MV-09-13, 2A To 2B AFW Hdr Cross-tie. ______

APPENDIX C
CROSS-CONNECTING AFW
(Page 2 of 3)

INITIAL

1. (continued)

   H. (continued)

      6. Locally CLOSE MV-09-14, 2B To 2A AFW Hdr Cross-tie. ______

      7. PERFORM Independent Verification of the following:

COMPONENT	POSITION	IV INITIAL
MV-09-9, Pump 2A Disch To SG 2A Valve	CLOSED	______
MV-09-10, Pump 2B Disch To SG 2B Valve	CLOSED	______
1-SE-09-2, 2A Pump Disch To 2A S/G Vlv Key 83	CLOSED	______
MV-09-13, 2A To 2B AFW Hdr Cross-tie	CLOSED	______
MV-09-14, 2B To 2A AFW Hdr Cross-tie	CLOSED	______

/R2

2. If 2B AFW Pump is to feed 2A S/G, Then PERFORM the following:

   A. START Auxiliary Feedwater Pump 2B. /R2

   B. If 2B S/G is NOT to be fed, Then ENSURE MV-09-10, Pump 2B Disch To SG 2B Valve, is CLOSED.

   C. OPEN 1-SE-09-3, 2B Pump Disch To 2B S/G Vlv Key 84. /R2

NOTE
Key-switches for MV-09-13 and MV-09-14 are located in 2A/2B AFW Pump Room. Two keys are required since the keys are removable in CLOSE only.

   D. Locally OPEN MV-09-13, 2A To 2B AFW Hdr Cross-tie.

   E. Locally OPEN MV-09-14, 2B To 2A AFW Hdr Cross-tie.

APPENDIX C
CROSS-CONNECTING AFW
(Page 3 of 3)

INITIAL

2. (continued)

F. THROTTLE MV-09-9, Pump 2A Disch To SG 2A Valve, to establish desired flow rate.

G. If feeding 2B S/G, Then THROTTLE MV-09-10, Pump 2B Disch To SG 2B Valve, to establish desired flow rate.

H. When the system is to be returned to normal, Then PERFORM the following:

1. CLOSE MV-09-9, Pump 2A Disch To SG 2A Valve. ______
2. If 2A S/G is being fed, Then CLOSE MV-09-10, Pump 2B Disch To SG 2B Valve. ______
3. STOP Auxiliary Feedwater Pump 2B. ______ /R2
4. CLOSE 1-SE-09-3, 2B Pump Disch To 2B S/G Vlv Key 84. ______ /R2
5. Locally CLOSE MV-09-13, 2A To 2B AFW Hdr Cross-tie. ______
6. Locally CLOSE MV-09-14, 2B To 2A AFW Hdr Cross-tie. ______
7. PERFORM Independent Verification of the following:

COMPONENT	POSITION	IV INITIAL	
MV-09-9, Pump 2A Disch To SG 2A Valve	CLOSED	______	
MV-09-10, Pump 2B Disch To SG 2B Valve	CLOSED	______	
1-SE-09-3, 2B Pump Disch To 2B S/G Vlv Key 84	CLOSED	______	/R2
MV-09-13, 2A To 2B AFW Hdr Cross-tie	CLOSED	______	
MV-09-14, 2B To 2A AFW Hdr Cross-tie	CLOSED	______	

Reviewed by: ______________________
ANPS

END OF APPENDIX C

Lesson File:	/cae/if/ifdata/lesson/nrc2/xl07.xld
Lesson Description:	Y2000, NRC OPERATING EXAM, Scenario #2
Lesson IC used:	
Created on:	12/03/99 11:46:58

Step #: 1
Step Description : Modification to IC
Delay Time : 0:00:00
Mode : Regular
InitialState : Triggered

	INSTRUCTION		TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TAF4D02P - F4_2_20412	BREAKER POSITION P	REM	3		
2	TFC3D079 - C3_EAG403 Detector Loss of Count,		MALF	TRUE		
3	TFFVV1BO - FA_HCV_09_1B	FWA ISOL VLV 1B FA	MALF	TRUE		
4	TFFVV1AO - FA_HCV_09_1A	FWA ISOL VLV 1A FA	MALF	TRUE		
5	TFFVV1BO - FA_HCV_09_1B a206_a1_s63_1	FWA ISOL VLV 1B FA	MALF	FALSE		
6	TFFVV1AO - FA_HCV_09_1A a206_a1_s59_1	FWA ISOL VLV 1A FA	MALF	FALSE		

Step #: 2
Step Description : 8801 DRIFT -- SBCS Valve Drifts Open
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION		TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TVSVSD - SB_PCV_8801 VALVE LEAKAGE	A	MALF	1.000	0:05:00	
2	A202_A1_DS64_1 - PCV-8801 OPEN (R, RTGB-202)		OVER	TRUE		0:00:15

Step #: 3
Step Description : 8801 ISOLATE -- NPO/NWE Locally Isolate and Remove air from 8801
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	A202_A1_DS64_1 - PCV-8801 OPEN (R, RTGB-202)	OVER	FALSE		0:03:00
2	TASVA359 - SB_V8359 BYPASS LINE #1 TO CNDSR	REM	0.0	0:03:00	

Step #: 4
Step Description : SPRAYS OPEN -- Spray Controller Fails, Opening BOTH Sprays
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	A203_A1_A18_11 - HIC-1100 DISPLAYED PROCES	OVER	77.160		

Step #: 5
Step Description : LETDOWN FAILURES -- FLOW LCV-2110P fails OPEN, V2515 Fails AS-IS
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFBVV15A - BL_V2515 FAIL AS IS	MALF	TRUE		
2	TFBVV0PO - BL_LCV2110P FAIL OPENED	MALF	TRUE		0:00:02
3	TFBVV15A - BL_V2515 FAIL AS IS a205_a1_s33_1	MALF	FALSE		

Step #: 6
Step Description : CONDENSER PT -- Vacuum PT-10-6 Sensing Line Breaks Off
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION		TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFF2M04H - FC_P_10_6	PT10-6 FAIL HIGH	MALF	TRUE		
2	TAFCMAF2 - FC_LV2	AIR INLEAK #2	REM	0.240	0:10:00	

Step #: 7
Step Description : HOG ON -- Place first Hogging Ejector Inservice'
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION			TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TAFBV200 - FC_V16200	VLV	PORT AREA	REM	0.300		
2	TAFBV575 - FC_V12575	VLV	PORT AREA	REM	1.000	0:00:20	
3	TAFBV200 - FC_V16200	VLV	PORT AREA	REM	0.100		0:00:30

Step #: 8
Step Description : MORE HOGS -- Place Second Hogging Ejector Inservice
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION			TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TAFBV203 - FC_V16203	VLV	PORT AREA	REM	0.300		
2	TAFBV576 - FC_V12576	VLV	PORT AREA	REM	1.000	0:00:20	0:00:02
3	TAFBV203 - FC_V16203	VLV	PORT AREA	REM	0.100		0:00:30

Step #: 9
Step Description : OPEN SAFETIES -- Opens (2) SG Safeties on Trip (Auto)
Step Condition : A1_A1_A1SI5_2
Delay Time : 0:00:08
Mode : Regular
InitialState : Triggered

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFSVR01O - SB_V8201 FAIL OPEN	MALF	TRUE		
2	TFSVR02O - SB_V8202 FAIL OPEN	MALF	TRUE		

Step #: 10
Step Description : AIR OFF -- Loss of Inst Air Header Post-Trip (Auto)
Step Condition : A1_A1_A1SI5_2
Delay Time : 0:00:00
Mode : Regular
InitialState : Triggered

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TAKFVL4 - KF_LV4 LEAK VLV BEFORE AIR DRYER	REM	1.000	0:10:00	

Step #: 11
Step Description : CHARLIE TRIP -- 2C AFW Pump Trips 10 Mins After Start
Step Condition : A1_A1_A1SI5_2
Delay Time : 0:13:00
Mode : Regular
InitialState : Triggered

	INSTRUCTION		TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFF4TRIP - FK_AFAS	MECH FAIL OR MANU	MALF	TRUE		

Step #: 12
Step Description : AFW XTIE -- NPO OPENs AFW Cross-Tie Valves
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION		TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFFYV080O - FK_MV_09_13	FAIL OPEN	MALF	TRUE		
2	TFFYV090O - FK_MV_09_14	FAIL OPEN	MALF	TRUE		

Step #: 13
Step Description : CHARLIE RESET -- NPO Resets 2C AFW PP Trip Mech
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION		TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFF4TRIP - FK_AFAS	MECH FAIL OR MANU	MALF	FALSE		
2	TCF4MOSR - FK_LOA	MECH. OVERSPEED RES	REM	TRUE		0:00:15

Step #: 14
Step Description : SWAP P/Q -- SNPO swaps P/Q Valves
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION		TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TABLV344 - BL_V2344	LCV-2110Q DOWNSTREAM I	REM	1.000		
2	TABLV343 - BL_V2343	LCV-2110Q UPSTREAM ISO	REM	1.000		
3	TABLV342 - BL_V2342	LCV-2110P DOWNSTREAM I	REM	0.0		
4	TABLV341 - BL_V2341	LCV-2110P UPSTREAM ISO	REM	0.0		

S2 Fixes

- [x] CHANGE ORDER OF SCENARIO COMPONENTS
- [ ] CHECK AFW PP & SLUS ON MAP TO BE AUTOMATIC.
- [ ] CHECK ADD AUTO ACTUATE OF IA RUPTURE AND CHANGE TIME DELAY TO +10 MINS
- [ ] ADD NEW CRITICALS ON RCP STOPS.

Facility: St. Lucie   Scenario No.: Backup 3   Op-Test No.: 1

Objectives: To evaluate the students ability to implement the ONOPs and take manual control of systems due to various instrument and component failures; perform a normal plant power increase; and to execute the EOPs for a Loss of Offsite Power with loss of both Emergency Diesel Generators (Station Blackout)

Initial Conditions: Unit 2 is at 30% power BOC

Turnover: The plant is operating at 30% power, BOC. The unit is returning from Plant Trip four days ago after reaching 100% power. Plant up-power has just been secured at 300 MW to prepare for placing MSRs inservice. 2A Emergency Diesel Generator has just been taken out of service to replace a defective relay, expected back in four hours. Reactor Reg #2 is out of service, I&C is troubleshooting. Instructions to the shift is to increase power to 100%.

Preexisting Malfunctions: 2B EDG trips 15 minutes after LOOP

Event No.	Malf. No.	Event Type*	Event Description
1	0	R-RO N-BOP	Power increase from 30% to 100% (start at 300 Mw) Initiate placing MSR's in service
2	1	I-RO	TE-1111Y (Rx Reg Thot input) fails high
3	2	C-BOP	LCV-9006 (2B 15% bypass valve) drifts open
4	3	I-BOP	FR-8011 (2A steam generator steam flow transmitter) drifts high, requires placing FIC-9011 in Manual to avoid plant trip.
5	4	C-RO	PCV-1100E (Pressurizer spray valve) fails open
6	5	M-RO M-BOP	Loss of offsite power, Manually Open ADVs, Start AFW flow to SGs
7	6	C	2B EDG trips 15 minutes after LOOP (Station Blackout)
8		N	SBO Cross-tie 4.16 KV power with Unit 1

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Op-Test No.: 1 Scenario No.: Backup 3 Event No.: 1

Event Description: Power increase from 30% to 100% power.

Time	Position	Applicant's Actions or Behavior
	BOP	Refers to appropriate procedures for increase of turbine and reactor power: NOP-2-0030123, "Reactor Operating Guidelines during Steady State and Load Changes", "2-GOP-201"Reactor Plant Start-up Mode 2 to Mode 1"
		Operates DEH to increase turbine load
		Places MSRs in service per 2-GOP-201 -> 2-GOP-502
	RO	Operates CVCS to increase RCS temperature
		Operates Control Rods to maintain ASI within limits
		Remains cognizant of RCS parameters during power increase
	SRO	Performs shift brief prior to power increase
		Directs RO to increase RCS temperature by CVCS addition
		Directs BOP to increase turbine power by DEH
		Notifies System of impending power increase
		Directs BOP to place MSRs in service per 2-GOP-201-> 2-GOP-502
		Remains cognizant of RO and BOP actions

Op-Test No.: 1	Scenario No.: Backup 3	Event No.: 2	Page 3 of 10
Event Description:	TE-1111X (Rx Reg Thot input) fails low		

Time	Position	Applicant's Actions or Behavior
	RO	Recognize that TE-1111X failed high
		Takes manual control of letdown and reduces output of level control valve (LCV will go to minimum output on failure)
		Manually controls pressurizer level
		Stops dilution (optional)
	BOP	Refers to ONOP 2-0120035, Pressuirzer Pressure and Level (minimal guidance due to both RRS out of service)
		Stops turbine increase (optional)
		Assists RO in monitoring RCS parameters
	SRO	Directs RO to take manual control of CVCS to maintain pressurizer level
		Directs RO and BOP to stop power ascension (optional)
		Refers to ONOP 2-0120035, Pressuirzer Pressure and Level (minimal guidance due to both RRS out of service)
		Notifies I&C Supervisor to report TE-1111X failed high
		Notifies Plant Management

Op-Test No.: 1	Scenario No.: Backup 3	Event No.: 3	Page 4 of 10
Event Description:	LCV-9006 (2B 15% bypass valve) drifts open		

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes 2B steam generator level increasing
		Recognizes LCV-9006 drifting open (60%)
		Takes manual control of FIC-9021(2B main feed reg valve)
		Maintains 2B steam generator within normal band (60-70% NR)
		Stops turbine increase (optional, if not already done)
	RO	Recognizes 2B steam generator level increasing
		Refers to ONOP 2-0700030, "Main Feedwater"
		Monitors plant parameters during transient
		Stops dilution (optional, if not already done)
	SRO	Recognizes 2B steam generator level increasing
		Directs BOP to take manual control of FIC-9021
		Refers to ONOP 2-0700030, "Main Feedwater"
		Directs BOP to maintain 2B steam generator level within normal band (60-70% NR)
		Directs RO and BOP to
		Notifies I&C or RMS of feedwater valve failures
		Notifies Plant Management

Op-Test No.: 1	Scenario No.: Backup 3	Event No.: 4	
Event Description:	FR-8011 (2A steam generator steam flow transmitter) drifts high		

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes 2A steam generator level increasing
		Recognizes FR-8011 drifting high
		Takes manual control of FIC-9011 (2A main feed reg valve controller)
		Restores 2A steam generator level to normal value (60-70% NR)
	RO	Refers to ONOP 2-0700030, "Main Feedwater"
		Monitors plant parameters during transient
	SRO	Recognizes 2A steam generator level increasing
		Directs BOP to take manual control of FIC-9011
		Refers to ONOP 2-0700030, "Main Feedwater"
		Notifies I&C or RMS of FR-8011 failure
		Notifies Plant Management

Op-Test No.: 1	Scenario No.: Backup 3	Event No.: 5	
Event Description:	PCV-1100E (Pressurizer spray valve) fails open		

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes PCV-1100E fails open
	<u>Critical Task</u>	Place spray selector control switch on RTGB 203 to PCV-1100F to terminate RCS de-pressurization prior to automatic trip.
		Notify SRO that RCS pressure is less than Tech Spec minimum value
		Monitors and restores RCS pressure to normal value (2250 psia)
		Stops dilution (optional, if not already done)
	BOP	Refers to ONOP 2-0120035, "Pressurizer Pressure and Level"
		Monitors plant parameters during transient
		Stops turbine increase (optional, if not already done)
	SRO	Recognizes PCV-1100E fails open
		Directs RO to take manual control of HIC-1100 <u>or</u> place spray selector control switch on RTGB 203 to PCV-1100F to terminate RCS depressurization
		Consults Tech Spec 3.2.5 (RCS pressure limit / DNB)
		Directs RO to restore RCS pressure to normal value (2250 psia)
		Notifies I&C or RMS of PCV-1100E failure
		Notifies Plant Management

Op-Test No.: 1	Scenario No.: Backup 3	Event No.: 6	Page 7 of 10
Event Description:	Loss of offsite power		

Time	Position	Applicant's Actions or Behavior
	RO	Recognize loss of offsite power
		Perform systematic board walkdown
		Perform Standard Post Trip actions (2-EOP-1)
		Report all safety function status to SRO
		Manually Initiate Auxiliary Feedwater flow to SGs (150 gpm / SG)
		Operate Atmospheric steam dumps to maintain stable RCS temperature
		Monitor plant parameters
	BOP	Recognize loss of offsite power
		Perform systematic board walkdown
		Perform Standard Post Trip actions (2-EOP-1)
		Report all safety function status to SRO
		Perform safety function status checks for 2-EOP-9 (if STA is unavailable)
		Contact NPO for restoration of instrument air
		Assist RO as directed by SRO in stabilization of plant

Op-Test No.: 1	Scenario No.: Backup 3	Event No.: 6	Page 8 of 10
Event Description:	Loss of Offsite Power		

Time	Position	Applicant's Actions or Behavior
	SRO	Recognize loss of offsite power
		Direct RO and BOP to manually trip the reactor and turbine
		Direct RO and BOP to perform systematic board walkdown
		Direct the performance of 2-EOP-1
		Direct entry into 2-EOP-9, "Loss of Offsite Power"
		Direct RO to stabilize RCS pressure and temperature
		Direct BOP to perform safety function status checks for 2-EOP-9 (if STA is unavailable)
		Contact HP for secondary radiation surveys
		Direct BOP in restoration of instrument air

Op-Test No.: 1	Scenario No.: Backup 3	Event No.: 7 / 8	Page 9 of 10
Event Description:	2B EDG trips 15 minutes after LOOP (Station Blackout)		

Time	Position	Applicant's Actions or Behavior
	BOP	Recognize 2B EDG trips
		Contact SNPO to investigate 2B EDG failure
		Report to SRO that Maintenance of Vital Auxiliary safety function not being met
		Perform safety function status checks for 2-EOP-10 (if STA is unavailable)
		Perform Table 7 of 2-EOP-99, "Vital Power Breaker Configuration/Station Blackout"
	Critical Task	Crosstie Unit 2 to Unit 1 per Appendix V of 2-EOP-99, "SBO Crosstie From Unit 1 to Unit 2"
	RO	Recognize 2B EDG trips
		Realign Auxiliary Feedwater (2C pump feeding both steam generators)
		Realign Atmospheric Steam Dumps (All dumps in Manual/Manual)
		Monitor plant parameters and maintain RCS pressure and temperature stable
		Isolate leakage and cooldown paths as directed by SRO

Op-Test No.: 1	Scenario No.: Backup 3	Event No.: 7 / 8	Page 10 of 10
Event Description:	2B EDG trips 15 minutes after LOOP (Station Blackout)		

Time	Position	Applicant's Actions or Behavior
	SRO	Recognize 2B EDG trips
		Recognize Maintenance of Vital Auxiliaries safety function not met
		Direct entry into 2-EOP-10, "Station Blackout"
		Direct RO to maintain plant stable
		Direct efforts to recover an AC power source
		Direct BOP to perform Table 7 of 2-EOP-99
		Direct RO in the isolation of leakage and cooldown paths
	Critical Task	Direct BOP to crosstie 4.16 KV power to Unit 1 through the SBO breaker per Appendix V of 2-EOP-99

Shift Turnover

- The plant is operating at 30% power, BOC.
- The unit is returning from a 30 day refueling outage and has been on a chemistry hold.
- Chemistry has given the approval to continue the power ascension to 100%.
- 2A Emergency Diesel Generator has just been taken out of service to replace a defective relay, expected back in four hours.
- Reactor Reg #2 is out of service, I&C is troubleshooting.
- Instructions to the shift is to increase power to 100%

6.0 INSTRUCTIONS (continued) INITIAL

6.116 When Turbine load is approximately 250 MW, Then VERIFY that secondary chemistry values are less than the minor inleakage limits of ONOP 2-0610030, Secondary Chemistry - Off Normal. ______ CHEM

6.117 Prior to Reactor Power reaching 30% as indicated on the highest reading instrument, PERFORM the following:

1. STOP the power ascension. ______

2. PERFORM 2-OSP-69.01, Nuclear / Delta T Power Calibration. ______

> **NOTE**
> The power ascension may continue while the MSRs are being placed in service.

6.118 When Turbine load is approximately 300 MW, Then PERFORM Appendix BB of 2-GOP-502, Placing MSRs In Service. ______

6.119 If Turbine startup is being performed in Single Valve, Then TRANSFER to Sequential Valve as follows:

1. If keyboard location 4412 has been stable for 1 minute, Then PROCEED to step 3. ______

2. If location 4412 is NOT stable, Then PERFORM the following:

   A. MONITOR keyboard location 4265 (Digital Speed). ______

   B. If this value is greater than or equal to 1802 or changing from 1801 to 1802, Then PROCEED as follows:

      1. INSERT key into the Maintenance Test key switch. ______

6.0 INSTRUCTIONS (continued) INITIAL

6.119 (continued)

2. (continued)

B. (continued)

> **NOTE**
> The following step will transfer the DEH System to Turbine Manual.

2. PLACE the Maintenance Test key switch in TEST. ______

3. VERIFY the value of key board location 3104 is 2.00. ______

4. DEPRESS Change. ______

5. ENTER 10.00. ______

6. VERIFY key board location 3104 is now 10.00. ______

7. TURN Maintenance Test key switch to OFF. ______

8. VERIFY that the Oper Auto pushbutton is flashing. ______

> **NOTE**
> The following step will transfer the DEH System to automatic control.

9. DEPRESS the Oper Auto. ______

10. VERIFY keyboard location 4412 is stable for at least one minute.

11. If stable, Then PROCEED with the transfer.

12. If the value is NOT stable, Then DO NOT attempt to transfer to Sequential Valve and CONTACT the I&C Department. ______

6.0 INSTRUCTIONS (continued) — INITIAL

6.119 (continued)

3. PLACE the Impulse Pressure Feedback loop in service by performing **BOTH** of the following:

A. DEPRESS the Imp In/Imp Out. ______

B. VERIFY the Imp In light is LIT. ______

4. DEPRESS the Single Valve/Seq Valve pushbutton. ______

5. VERIFY the Seq Valve light is flashing. ______

> **NOTE**
> When Seq Valve light comes on solid, the transfer to Sequential Valve is complete. The transfer should take approximately 10 minutes.

6. VERIFY transfer to Sequential Valve COMPLETE. ______

7. If the value of location 3104 was changed, Then PERFORM the following:

A. INSERT the key into the Maintenance Test key switch. ______

> **NOTE**
> The following step will transfer the DEH System to Turbine Manual.

B. PLACE the Maintenance Test key switch to TEST. ______

C. ENTER location 3104 into the key board. ______

D. DEPRESS Change. ______

E. ENTER 2.00. ______

F. VERIFY key board location 3104 is now indicating 2.00. ______

6.0 INSTRUCTIONS (continued) INITIAL

6.119 (continued)

7. (continued)

G. PLACE Maintenance Test key switch to OFF. _______

H. VERIFY the Oper Auto pushbutton is flashing. _______

NOTE
The following step will transfer the DEH System to automatic control.

I. DEPRESS Oper Auto. _______

J. REMOVE Maintenance Test Key. _______

8. REMOVE the Impulse Pressure Feedback Loop from service as follows:

A. DEPRESS Imp In/Imp Out. _______

B. VERIFY Imp Out light is LIT. _______

6.120 When Reactor Power is at approximately 45% as indicated on the highest reading instrument, Then PERFORM the following:

1. STOP the power ascension. _______

2. At the discretion of the NPS/ANPS, PLACE LEFM in service in accordance with 2-NOP-09.06. _______

§1 **3.** PERFORM a Nuclear / Delta T power calibration in accordance with 2-OSP-69.01, Nuclear and Delta T Power Calibration if NOT performed while placing LEFM in service. _______

4. If the Condensate Polisher is in service, Then ENSURE enough Powdex vessels are in service to support the increase in condensate flow. _______

6.0 INSTRUCTIONS (continued) INITIAL

6.120 (continued)

5. START the second Condensate Pump in accordance with OP 2-0700020, Condensate and Feedwater System - Normal Operation. ______

6. ENSURE the second Main Feed Pump is ready to start in accordance with OP 2-0700020, Condensate and Feedwater System - Normal Operation. ______

7. WARMUP the Heater Drain Pumps in accordance with OP 2-0700020, Condensate and Feedwater System - Normal Operation. ______

8. VERIFY proper operation of heater Drain and Vent system.

A. VERIFY proper heater levels. ______

B. VERIFY proper operation of normal and alt drain valves. ______

CAUTION

The second Main Feed Pump should NOT be started until the second Condensate Pump is running and total feedwater flow is approximately 10,000 GPM.

9. START the second Main Feed Pump in accordance with OP 2-0700020. ______

10. When total feedwater flow is between 15,000 GPM and 20,000 GPM, Then:

A. PLACE the second Main Feed Pump control switch in AUTO RECIRC. ______

B. VERIFY the Recirc Valve CLOSES. ______

6.0 INSTRUCTIONS (continued) INITIAL

> **CAUTION**
> The power ascension should be stopped if Main Feed Pump suction pressure decreases to less than 400 psig.

6.121 VERIFY the Moderator Temperature Coefficient is within limits as specified in TS 3.1.1.4.b. ______ RE

¶6 **6.122** When Reactor Power is at approximately 50% as indicated on the highest reading instrument, Then PERFORM the following:

1. ENSURE both Turbine Cooling Water Pumps are in operation. ______

2. If 2-OSP-69.01, Nuclear / Delta T Power Calibration, was performed at 45% Reactor Power with LEFM in service,

   OR

   Margin improvements have been captured in a reload PCM, Then VERIFY a specific stop at 50% power is NOT required to perform 2-OSP-69.01, Nuclear / Delta T Power Calibration, in accordance with **ONE** of the following:

   - The current reload PCM

     Source:____________________ Date____/____/____ ______ RE/STA

   - 2-OSP-69.01, Nuclear / Delta T Power Calibration was performed at 45% Reactor Power with LEFM in service. ______

6.0 INSTRUCTIONS (continued) INITIAL

6.122 (continued)

3. If 2-OSP-69.01 is NOT required to be performed, Then the following Substeps are NOT required. ______

A. STOP the power ascension. ______

B. PERFORM 2-OSP-69.01, Nuclear / Delta T Power Calibration. ______

6.123 When Reactor power is approximately 60%, as indicated by the higher of Calorimetric or NI Power, Then PERFORM the following:

1. VERIFY proper heater levels. ______

2. VERIFY proper operation of normal and alt drain valves. ______

6.124 When Turbine load is approximately 660 MW, Then PLACE the Heater Drain Pumps in service in accordance with OP 2-0700020, Condensate and Feedwater System - Normal Operation. ______

6.125 When Reactor power is approximately 80%, as indicated on the highest reading instrument, Then PERFORM the following:

1. STOP the power ascension. ______

§1 **2.** PERFORM a Nuclear/Delta T Power calibration in accordance with 2-OSP-69.01, Nuclear and Delta T Power Calibration. ______

3. VERIFY proper operation of Heater Drain and Vent system.

A. VERIFY proper heater levels. ______

B. VERIFY proper operation of normal and alt drain valves. ______

6.0 INSTRUCTIONS (continued) INITIAL

6.126 When Turbine load is approximately 765 MW, (85% Calorimetric Power) as indicated on WR-871, Gross Megawatts, Then PERFORM the following prior to proceeding:

1. If all four Circulating Water Pumps are in operation, Then VERIFY the Main Condenser is less than or equal to 4.5 inches of Hg. absolute by the average of the two condensers as indicated on PI-10-7A, A Condenser Back Press (WR), and PI-10-6, B Condenser Back Pressure. _______

2. If only three Circulating Water Pumps are in operation, Then VERIFY the Main Condenser is less than or equal to 4.5 inches of Hg. absolute by the higher of the two condensers as indicated on PI-10-7A, A Condenser Back Press (WR), or PI-10-6, B Condenser Back Pressure. _______

3. ENSURE at least one Heater Drain Pump is in operation in accordance with OP 2-0700020, Condensate and Feedwater System - Normal Operation. _______

4. ENSURE the MSRs are in service in accordance with Appendix BB of 2-GOP-502, Placing MSRs in Service. _______

5. If desired, Then PLACE CTCS in service in accordance with 2-OI-21-01. _______

6.127 When Turbine load is approximately 810 MW, Then ENSURE both Heater Drain Pumps are in operation. _______

6.128 When Reactor power is approximately 98%, as indicated on the highest reading instrument, Then PERFORM the following:

1. STOP the power ascension. _______

§1 2. PERFORM a Nuclear/Delta T Power calibration in accordance with 2-OSP-69.01, Nuclear and Delta T Power Calibration. _______

6.0 INSTRUCTIONS (continued) INITIAL

6.128 (continued)

3. VERIFY proper operation of Heater Drain and Vent system.

A. VERIFY proper heater levels. ______

B. VERIFY proper operation of normal and alt drain valves. ______

6.129 INCREASE power to 100% steady state. ______

6.130 If I&C performed the Linear Power Range Safety and Control Channel Monthly Calibration, 2-1220052, while Reactor Power was reduced to less than 90%, Then REPERFORM 2-1220052 following Reactor Power return to 100% and stable. ______

6.131 **GO TO NOP-2-0030123, Reactor Operating Guidelines During Steady State and Scheduled Load Changes for further guidance.** ______

END OF SECTION 6.0

7.0 INFREQUENT OPERATION <u>INITIAL</u>

7.1 Transfer DEH System from Turbine Manual to Operator Auto

1. VERIFY the Oper Auto is flashing. _______

2. ENSURE the Valve Position Limit is set to 131%. _______

<u>CAUTION</u>
If the Turbine is in Sequential Valve when the Oper Auto pushbutton is depressed, the potential exists for the Turbine to automatically transfer to Single Valve.

3. DEPRESS Oper Auto. _______

4. <u>If</u> the Turbine begins to transfer to Single Valve, <u>Then</u> DEPRESS Imp In.

5. MAINTAIN steady state conditions during the transfer to Single Valve. _______

6. <u>If</u> desired, <u>Then</u> RETURN the DEH System to Sequential Valve, as follows:

A. VERIFY keyboard location 4412 is stable for 1 minute. _______

B. <u>If</u> location 4412 is NOT stable, <u>Then</u> PERFORM the following:

1. <u>If</u> keyboard location 4265 is greater than or equal to 1802 or changing from 1801 to 1802, <u>Then</u> INSERT key into the Maintenance Test switch. _______

INITIAL

7.0 INFREQUENT OPERATION (continued)

7.1 Transfer DEH System from Turbine Manual to Operator Auto (continued)

6. (continued)

B. (continued)

> **NOTE**
> The following step will transfer the DEH System to Turbine Manual.

2. PLACE the Maint Test key switch to TEST. ______
3. VERIFY key board location 3104 is 2.00. ______
4. DEPRESS Change. ______
5. ENTER a value of 10.00. ______
6. VERIFY key board location 3104 is set to 10.00. ______
7. PLACE Maint Test key switch in OFF. ______
8. VERIFY Oper Auto pushbutton is flashing. ______

> **NOTE**
> The following step will transfer the DEH System to automatic control.

9. DEPRESS Oper Auto. ______
10. VERIFY Turbine Program Display keyboard location 4412 is stable for 1 minute. ______
    a. If stable, Then PROCEED with the transfer. ______
    b. If location 4412 is NOT stable, Then DO NOT continue. CONTACT the I&C Department. ______

7.0 INFREQUENT OPERATION (continued) INITIAL

7.1 Transfer DEH System from Turbine Manual to Operator Auto (continued)

6. (continued)

B. (continued)

11. ENSURE the Impulse Pressure Feedback loop is in service as follows:

a. VERIFY Imp In light is LIT. _______

b. VERIFY Imp Out light is NOT LIT.

12. DEPRESS the Single Valve/Seq Valve pushbutton. _______

13. VERIFY the Seq valve Light is flashing. _______

> **NOTE**
> When the Seq Valve light comes on solid, the transfer to Sequential Valve is complete. The transfer should take approximately 10 minutes.

14. VERIFY transfer to Sequential valve is COMPLETE. _______

15. If the value of key board location 3104 was changed, Then RETURN to a value of 2.00 as follows:

a. INSERT key into Maint Test key switch. _______

> **NOTE**
> The following step will transfer the DEH System to Turbine Manual.

b. PLACE the Maint Test key switch to TEST. _______

7.0 INFREQUENT OPERATION (continued) INITIAL

7.1 Transfer DEH System from Turbine Manual to Operator Auto (continued)

6. (continued)

B. (continued)

15. (continued)

c. ENTER location 3104 into the key board. ______

d. DEPRESS Change. ______

e. ENTER a value of 2.00. ______

f. VERIFY the value of key board location 3104 is now 2.00. ______

g. PLACE Maint Test key switch to OFF. ______

h. VERIFY Oper Auto light is flashing. ______

> **NOTE**
> The following step will transfer the DEH System to automatic control.

i. DEPRESS Oper Auto. ______

j. REMOVE the Maintenance Test Key. ______

16. REMOVE the Impulse Pressure Feedback Loop from service as follows:

a. DEPRESS Imp In/Imp Out. ______

b. VERIFY Imp Out Light LIT. ______

7.0 INFREQUENT OPERATION (continued) INITIAL

7.1 Transfer DEH System from Turbine Manual to Operator Auto (continued)

6. (continued)

B. (continued)

17. RESTORE the valve position limit to the desired value. ______

Reviewed By:________________________ Date ____/____/____
SRO

END OF SECTION 7.1

7.0 INFREQUENT OPERATION (continued) INITIAL

7.2 Reestablish Reheat Steam Flow To The MSRs After Inadvertent Closure Of The TCVs:

1. ENSURE Reactor power level is less than or equal to 95%. ______

2. DEPRESS the Reset pushbutton on the Reheat Control Valve Panel. ______

3. VERIFY locally the MSR TCVs are positioned as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
TCV-08-1	MS to 2A MSR	CLOSED	
TCV-08-7	MS to 2A MSR	CLOSED	
TCV-08-3	MS to 2B MSR	CLOSED	
TCV-08-9	MS to 2B MSR	CLOSED	
TCV-08-4	MS to 2C MSR	CLOSED	
TCV-08-10	MS to 2C MSR	CLOSED	
TCV-08-2	MS to 2D MSR	CLOSED	
TCV-08-8	MS to 2D MSR	CLOSED	

4. ENSURE the manual isolation valves for the MSR TCVs are positioned as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
V08381	TCV-08-7 Isol	OPEN	
V08370	TCV-08-7 Isol	OPEN	
V08378	TCV-08-8 Dwnstm Isol	OPEN	
V08382	TCV-08-8 Upstm Isol	OPEN	
V08383	TCV-08-9 Isol	OPEN	
V08372	TCV-08-9 Isol	OPEN	
V08375	TCV-08-10 Isol	OPEN	
V08384	TCV-08-10 Isol	OPEN	

7.0 INFREQUENT OPERATION (continued)

7.2 Reestablish Reheat Steam Flow To The MSRs After Inadvertent Closure Of The TCVs: (continued)

NOTE

A large steam demand may occur while opening the MSR Block Valves. The MSR Block Valves that will be opened should be opened one at a time, allowing time for the RCS to stabilize.

5. ENSURE the MSR Block Valves are positioned as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
MV-08-4	2A Block TCV	OPEN	
MV-08-6	2D Block TCV	OPEN	
MV-08-8	2B Block TCV	OPEN	
MV-08-10	2C Block TCV	OPEN	

6. POSITION the MSR Warmup Valves as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
MV-08-5	Warmup 2A MSR	OPEN	
MV-08-7	Warmup 2D MSR	OPEN	
MV-08-9	Warmup 2B MSR	OPEN	
MV-08-11	Warmup 2C MSR	OPEN	

7.0 INFREQUENT OPERATION (continued) INITIAL

7.2 Reestablish Reheat Steam Flow To The MSRs After Inadvertent Closure Of The TCVs: (continued)

7. After a period of approximately 2 hours, Then PERFORM the following:

NOTE
If the wrong pushbutton is depressed, the controller can be reset by depressing the Reset pushbutton.

A. If automatic startup is desired, Then DEPRESS the Ramp pushbutton. _______

NOTE
Ramp starts a 2 hour timed opening of TCV-08-7, 8, 9 and 10 (small TCVs). This is followed by a 30 minute time delay and then a 10 minute timed opening of TCV-08-1, 2, 3 and 4 (large TCVs). Total time is 2 hours and 40 minutes until TCV-08-1, 2, 3 and 4 indicate open.

B. If manual startup is desired, Then PERFORM the following:

CAUTION
If the manual valve positioner is NOT on zero before pushing the Manual Valve Position pushbutton, the TCVs will OPEN to a position relative to the manual valve positioner setpoint and possibly damage the MSRs from the resultant thermal stresses.

1. ENSURE the manual valve positioner is on zero. _______

2. DEPRESS the Manual Valve Position pushbutton. _______

NOTE
Manual opening of the MSR TCVs should take approximately 2 hours.

3. Slowly OPEN the TCVs by rotating the manual valve positioner. _______

7.0 INFREQUENT OPERATION (continued)

7.2 Reestablish Reheat Steam Flow To The MSRs After Inadvertent Closure Of The TCVs: (continued)

8. After the MSR TCVs are OPEN, Then PERFORM the following:

A. POSITION the small TCV isolation valves as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
V08381	TCV-08-7 Isol	CLOSED	
V08370	TCV-08-7 Isol	CLOSED	
V08378	TCV-08-8 Dwnstm Isol	CLOSED	
V08382	TCV-08-8 Upstrm Isol	CLOSED	
V08383	TCV-08-9 Isol	CLOSED	
V08372	TCV-08-9 Isol	CLOSED	
V08375	TCV-08-10 Isol	CLOSED	
V08384	TCV-08-10 Isol	CLOSED	

B. ALIGN the MSR Warm Up Valves as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
MV-08-5	Warmup 2A MSR	CLOSED	
MV-08-7	Warmup 2D MSR	CLOSED	
MV-08-9	Warmup 2B MSR	CLOSED	
MV-08-11	Warmup 2C MSR	CLOSED	

Reviewed by______________________________ Date____/____/____
SRO

END OF SECTION 7.2

5.0 OPERATOR ACTIONS:

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 1. Verify 2-EOP-01, "Standard Post Trip Actions" has been performed.	1. Perform 2-EOP-01, "Standard Post Trip Actions."

CAUTION

All available indications should be used in diagnosing the event since the accident will cause extensive loss of control room instrumentation. Instrument readings must be verified when one or more confirmatory indications are available.

NOTE

All steps preceded with an asterisk (*) are to be performed continuously.

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] 2. To confirm the diagnosis of a station blackout: A. Verify the Safety Function Status Check acceptance criteria are satisfied. B. Perform Safety Function Status Check per Appendix A every 15 minutes until exit conditions are met.	2. If Safety Function Status Check acceptance criteria are NOT satisfied, Then rediagnose the event and exit to either appropriate Emergency Operating Procedure or 2-EOP-15, "Functional Recovery."
[*] 3. Contact Health Physics to conduct secondary area radiation surveys.	

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS / **CONTINGENCY ACTIONS**

CAUTION

If all feedwater has been stopped, when feed flow to the steam generators is reinitiated, flow should be limited to less than or equal to 150 gpm for five minutes or until a level increase is observed.

[*] 4. Ensure at least one steam generator has the following:

A. Level being restored or maintained in the normal band (60% to 70% narrow range) using the 2C AFW Pump.

AND

B. Pressure control by one of the following (listed in preferred order):

1. Atmospheric Dump Valves (ADVs) (manual control).
2. Main Steam Safety Valves.

Contingency Actions:

4. If 2C AFW flow capacity is lost, Then perform the following as necessary:

A. If 2C AFW Pump is tripped on overspeed a restart can be performed per Off-Normal Operating Procedure 2-ONP-09.02, "Auxiliary Feedwater."

B. Locally operate 2C AFW Pump per Appendix G, "Local Operation of the 2C Auxiliary Feedwater Pump."

[ ] 5. OPEN all breakers on the deenergized 6.9 KV, 4.16 KV, and 480V buses per Table 7, "Vital Power Breaker Configuration/Station Blackout."

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 6. Locally THROTTLE ICW Pump Discharge Valves on previously operating pumps approximately 10 TURNS OPEN: 2A ICW Disch. - SB21163 2B ICW Disch. - SB21209 2C ICW Disch. - SB21206	
☒ 7. If diesel generators have failed to start, Then attempt a manual start from RTGB.	7. If manual start is unsuccessful, Then dispatch an operator to perform a local start per Appendix C, "Diesel Generator Local Start" and continue with this procedure.
☒ 8. If 4.16KV Bus 2A3 or 2B3 fails to energize from its associated operating diesel generator, Then: A. Insert sync plug for the deenergized bus and turn to position DG-2A (DG-2B). B. Manually CLOSE breaker 2-20211 (2-20401), "2A (2B) Diesel Generator Output Breaker." C. Remove sync plug.	8. If the breaker fails to close from the RTGB, Then locally CLOSE breaker 2-20211 (2-20401), "2A (2B) Diesel Generator Output Breaker": A. Place LOCAL/ISOLATE switch(es) in ISOLATE position. B. Locally CLOSE breaker. C. Return LOCAL/ISOLATE switch(es) to NORMAL. D. Verify breaker remains CLOSED.

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] 9. If Unit 2 EDG or offsite power is available, Then restore normal power per Appendix E, "Power Restoration Station Blackout."	9. If Unit 2 EDG or offsite power is NOT available, Then: A. If Unit 1 has at least one energized 4.16 KV Emergency Bus, Then crosstie AB 4.16 KV buses from Unit 1 to Unit 2 per Appendix V, "SBO Crosstie From Unit 1 to Unit 2." B. If SBO crosstie from Unit 1 is NOT available, Then consider crosstie from Unit 1 per Appendix F, "Alternate Method of Crosstying Unit 1 Diesel or Startup Transformer to Unit 2."
☐ 10. To minimize RCS leakage and cooldown, perform the following: A. Manually CLOSE the Main Steam Isolation Valves (MSIVs). 1. HCV-08-1A - S/G 2A AND 2. HCV-08-1B - S/G 2B	10. If MSIVs do NOT close, Then perform the following as necessary: A. Manually initiate MSIS. B. Locally CLOSE MSIVs per Appendix I, "MSIV Local Closure."

(Continued on Next Page)

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
10. (continued)	10.

B. Manually CLOSE S/G Blowdown Valves and Sample Valves.

1. FCV-23-3 and FCV-23-4 - S/G 2A

AND

2. FCV-23-5 and FCV-23-6 - S/G 2B

AND

3. FCV-23-7 and FCV-23-9, "Blowdown Sample" (one switch).

C. Manually CLOSE RCS and Pressurizer Sample Isolation Valves.

V5200 V5203
V5201 V5204
V5202 V5205

D. Manually CLOSE V2515, V2516 and V2522, "Letdown Isolation Valves."

E. Manually CLOSE V2505 and V2524, "RCP Bleed-Off Isolation Valves."

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS | **CONTINGENCY ACTIONS**

NOTE
It takes about 15 minutes for natural circulation flow to fully develop.

[*] 11. Verify natural circulation flow in at least one loop by all of the following:

A. Loop ΔT (T-hot minus T-cold) is less than full power ΔT (50°F).

B. T-cold constant or decreasing.

C. T-hot constant or decreasing.

D. No abnormal differences (greater than 20°F) between T-hot and Representative Core Exit Thermocouple (CET) temperature.

E. Representative CET temperature indicates at least 20°F subcooling.

CONTINGENCY ACTIONS:

11. If natural circulation flow is NOT observed, Then ensure proper control of S/G feeding and steaming.

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

[*] 12. If power has been restored to at least one 4.16 KV Emergency Bus and 2C and 2D Instrument Air Compressors are NOT available, Then restore instrument air by performing the following:

A. Ensure 2AB 480V Load Center is aligned to an energized bus, if only one vital AC electrical train is available. (Refer to Operating Procedure 2-NOP-52.02, "Alignment of 2AB Buses and Components"). /R10A

B. Dispatch an operator to align and start emergency cooling water to the instrument air compressors per Appendix H, "Operation of the 2A and 2B Instrument Air Compressors." (Requires 2AB MCC to be energized.)

C. When Appendix H, "Operation of the 2A and 2B Instrument Air Compressors" is completed, Then locally start one instrument air compressor as follows: (Requires 2A6 or 2B6 MCC to be energized.)

1. Place local handswitch in AUTO.

(Continued on Next Page)

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
12. (continued) C. (continued) 2. Reset 2A or 2B Instrument Air Compressor control switch (HVCB). 3. Verify instrument air pressure being restored.	
☐ 13. Maintain RCS subcooling 20°F to 50°F (Representative CET Temperature, per Figure 1, "RCS Pressure Temperature") using auxiliary feedwater and steaming with ADVs.	13. If subcooling is NOT between 20°F and 50°F, Then: A. If subcooling less than 20°F, Then reduce RCS temperature and verify Representative CET temperature is less than 22°F superheated. B. If subcooling is greater than 50°F, Then stop any cooldown in progress.
☐ 14. Ensure available condensate inventory is adequate to maintain Hot Standby conditions. (Refer to Figure 3, "Time Until Shutdown Cooling Required vs. Condensate Availability" and Figure 4, "Condensate Required For Cooldown").	14. If condensate inventory is NOT adequate, Then request alternate sources from the Technical Support Center.

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] 15. If power has NOT been restored to at least one electrical train, Then perform the following: A. Calculate shutdown margin based on T-cold minus 50°F and boron concentration at time of trip. Repeat calculation every 50°F as the plant cools down and depressurizes. B. As the plant cools down and depressurizes, block the automatic actuation of SIAS and MSIS. C. Contact NPO to locally monitor the 2C AFW Pump operation. D. Contact Security to block open exterior doors to control room and electrical switchgear rooms. E. Deenergize DC equipment per Table 9, "125V DC Equipment Which May Be Deenergized to Extend Battery Life." F. Do NOT perform the remaining steps of this procedure. **Continue performing Instruction Steps 1 through 15.**	**15. If power has been restored to at least one electrical train, Then go to Step 16.**

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	**CONTINGENCY ACTIONS**

☐ 16. Ensure that vital 125V DC power is being supplied by at least one battery charger per Operating Procedure 2-0960020, "125V DC Class 1E Power System - Normal Operation."

☐ 17. Borate the RCS as necessary to maintain greater than 5000 pcm shutdown margin. (Manual valve operation may be necessary.)

CAUTION

If AC power is being supplied from a Unit 1 Diesel, then EDG loading restrictions may preclude starting an ICW or CCW pump until adequate margin exists. Do NOT restart an ICW or CCW pump if power is from the only operating EDG on Unit 1.

☐ 18. If AC power is from any source other than the only operating EDG on Unit 1, Then:

A. Ensure at least one ICW pump is operating and restore operating ICW Pump Discharge Valve(s) to NORMAL position.

B. Ensure ICW System is vented per Operating Procedure 2-0640020, "Intake Cooling Water System Operation."

(Continued on Next Page)

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

18. (continued)

    C. Ensure CCW is restored to operation per Operating Procedure 2-0310020, "Component Cooling Water - Normal."

☐ 19. If power has been restored from offsite, Then instrument air may be restored using the 2C or 2D Instrument Air Compressor as follows:

    A. Ensure Turbine Cooling Water (TCW) has been restored to instrument air compressors.

    B. Locally, place 2C and 2D Instrument Air Compressor control switches to OFF position.

    C. Depress Reset push button on both 2C and 2D Instrument Air Compressors.

    D. Place desired instrument air compressor control switch to RUN position.

    E. Verify instrument air compressor starts and loads.

    F. Place control switch for standby instrument air compressor to AUTO position.

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	**CONTINGENCY ACTIONS**

NOTE

The non-essential sections of MCC 2A6 and 2B6 must be energized, and instrument air available to restore letdown using 'Q' valves. To restore letdown using 'P' valves, MCC 2A2 must also be energized.

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] 20. If plant conditions permit, Then restore letdown per Off-Normal Operating Procedure 2-0210030, "Charging and Letdown."	
[*] 21. Ensure RCS inventory is being restored or maintained per the following criteria: A. Operate charging pumps (and letdown if available) as required to maintain pressurizer level 10% to 70%. AND B. RCS subcooling at least 20°F (Representative CET, page 213, QSPDS). AND C. Reactor vessel level indicates core covered (sensors 7 and 8 covered, page 212, QSPDS) or representative CET temperature NOT superheated.	21. If adequate RCS inventory control is NOT established, Then ensure all available charging pumps are operating.

/R10

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE

If Unit 2 is being supplied by a Unit 1 EDG, then restriction on the load capacity of the EDG may limit operation Pressurizer Heaters. Refer to Table 11, "Emergency Diesel Generator Loading (SBO)."

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 22. Restore and maintain pressurizer pressure within the pressure/temperature limits of Figure 1, "RCS Pressure Temperature" curve: A. CLOSE the breakers for pressurizer heater buses on 4160V Buses 2A3 and 2B3 when available. B. Manually reset the Backup Heater Banks B1 and B4 only. C. Manual operation of auxiliary sprays.	22. If RCS subcooling is NOT being maintained, Then perform the following as appropriate: A. If RCS subcooling is less than 20°F, Then: 1. Establish 20°F subcooling by reducing RCS temperature. OR 2. Operate pressurizer heaters to establish 20°F subcooling. B. If RCS subcooling is greater than 200°F or cooldown rate is greater than 100°F/hr, Then perform the following steps as appropriate: 1. Stop any cooldown in progress.

(Continued on Next Page)

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
22.	22. (continued) B. (continued) 2. Depressurize the plant by using auxiliary spray to restore and maintain pressurizer pressure within the limits of Figure 1, "RCS Pressure Temperature" curve. OR 3. Depressurize the plant by using manual control of letdown to restore and maintain pressurizer pressure within the limits of Figure 1, "RCS Pressure Temperature" curve. 4. If overpressurization due to charging flow, Then depressurize RCS by stopping charging pumps, one at a time, to restore and maintain pressurizer pressure within the limits of Figure 1, "RCS Pressure Temperature" curve.

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE

If Unit 2 is being supplied by a Unit 1 EDG, then restriction on the load capacity of the EDG may limit operation to only 1 containment cooling fan. Refer to Table 11, "Emergency Diesel Generator Loading (SBO)."

☐ 23. If AC power is from any source other than the only operating EDG on Unit 1, Then place two containment fan coolers in service as follows:

A. If 'A' Electrical Train is available, Then start the 2A and 2B Containment Coolers. (MCC 2A9 must be energized.)

OR

B. If 'B' Electrical Train is available, Then start the 2C and 2D Containment Coolers. (MCC 2B9 must be energized.)

[*] 24. If power is being supplied from Unit 1, Then restore normal power configuration per Appendix E, "Power Restoration Station Blackout", when offsite power or a Unit 2 EDG becomes available.

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] 25. When the station blackout exit conditions are satisfied, Then: A. Verify Safety Function Status Check acceptance criteria of 2-EOP-09, "Loss of Offsite Power (LOOP)" can be met, and exit to 2-EOP-09. OR B. Exit to appropriate procedure as directed by the Technical Support Center.	

This procedure should leave the plant in a condition where all safety functions are being maintained and the RCS is in a MODE 3 condition. Further recovery actions may be recommended by the Technical Support Center.

END OF TEXT

APPENDIX V
SBO CROSSTIE FROM UNIT 1 TO UNIT 2
(Page 1 of 12)

INITIAL

1. Establish communications with Unit 1 via Gai-Tronics or plant radio (if available). ______

2. To bring AC power from Unit 1 to Unit 2 via the SBO crosstie bus:

> NOTE
> Selection should be based on equipment availability necessary to stabilize the RCS, i.e., if the 2A Charging Pump is out of service, the 2B3 4.16 KV Bus should be considered, or the electrical train LEAST likely to be restored by either offsite power or EDG. Due to 10 CFR 50 Appendix R considerations, the 'A' side is preferable.

A. Select the 4.16 KV vital bus to be energized on Unit 2.
Circle selected bus: 2A3 2B3 ______

B. Place the following pump switches in the PULL TO LOCK position: ______

2A ICW Pump

2B ICW Pump

2C ICW Pump

2A CCW Pump

2B CCW Pump

2C CCW Pump

C. Perform the following steps:

1. Ensure Table 7, "Vital Power Breaker Configuration/ Station Blackout" of 2-EOP-99 has been completed. ______

2. Verify the EDG output breaker on the selected 4.16 KV bus is OPEN 2-20211 (2-20401). ______

APPENDIX V

SBO CROSSTIE FROM UNIT 1 TO UNIT 2

(Page 2 of 12)

INITIAL

2. (continued)

C. (continued)

> CAUTION
> The following step will render a Unit 1 EDG inoperable. Refer to Unit 1 Technical Specifications 3.8.1.1 and 3.8.1.2.

3. If Unit 1 will supply power from a 4.16 KV Transformer (Auxiliary or Startup), Then disable the Unit 1 EDG associated with the Unit 1 4.16 KV Emergency Bus that will be crosstied to Unit 2 as follows:

   a. Disable the 1A Emergency Diesel Generator as follows:

      1. Place the 1A Diesel Generator Start Control Norm/Isolate switch in ISOLATE. ________

      2. OPEN the Control Power knife switch. ________

   OR

   b. Disable the 1B Emergency Diesel Generator as follows:

      1. Place the 1B Diesel Generator Start Control Norm/Isolate switch in ISOLATE. ________

      2. OPEN the Control Power knife switch. ________

APPENDIX V

SBO CROSSTIE FROM UNIT 1 TO UNIT 2

(Page 3 of 12)

2. (continued) INITIAL

> NOTE
>
> If SBO crosstie from Unit 1 is unavailable or is NOT successful in subsequent steps, consider crosstie from Unit 1 per 2-EOP-99, Appendix F, "Alternate Method of Crosstying Unit 1 Diesel or Startup Transformer to Unit 2."

D. When the Unit 1 Control Room is ready to crosstie AB 4.16 KV Buses, Then CLOSE in the Unit 2 SBO Breaker (2-20501). ______

E. Request the Unit 1 Control Room to CLOSE the Unit 1 SBO Breaker (1-20501) ______

F. Place the RTGB control switches on the selected 4.16 KV vital bus for the HPSI, LPSI, CS and AFW pumps in the OFF position. ______

> NOTE
>
> If 2C AFW Pump is NOT available, Then feedwater must be restored using a motor driven AFW pump as soon as a vital 4.16 KV bus is restored.

G. Align the selected 2A3 or (2B3) 4.16 KV vital bus to the 2AB 4.16 KV Bus by closing 2-20208 and 2-20505 or (2-20409) and (2-20504). Verify proper bus voltage on the selected vital bus. ______

APPENDIX V
SBO CROSSTIE FROM UNIT 1 TO UNIT 2
(Page 4 of 12)

2. (continued) INITIAL

> NOTE
> Up to this point, this appendix has one 4.16 KV Emergency Bus energized from Unit 1 via both units' AB 4.16 KV Buses. It may be energized by the only operating EDG on plant site, thus limiting the load capability available for use on Unit 2. Close coordination between the units is required to prevent exceeding the operating EDG maximum loading. Refer to Table 11, "Emergency Diesel Generator Loading (SBO)," load list of 2-EOP-99 as necessary.

H. If the power source from Unit 1 is from the only operating EDG on plant site, Then GO TO Step 3.

I. If the power source from Unit 1 is one of two operating EDGs, Then GO TO Step 4.

J. If the power source from Unit 1 is a 4.16 KV Transformer (Auxiliary or Startup), Then GO TO Step 5.

3. If the Unit 1 EDG energizing the Unit 2 vital 4.16 KV bus is the only operating EDG on plant site, Then restore loads as follows:

> CAUTION
> Notify the Unit 1 Control Room to monitor the operating diesel. If the loading causes bus load instabilities, Then Unit 2 480V L.C. feeder breakers and 4.16 KV loads may be tripped to protect the diesel. Maximum loading on the SBO (2AB 4.16 KV) bus is 550 continuous amps, as indicated on AM 942 on RTGB 101.

A. Turn the RCP oil lift pump switches to the OFF position. ______

APPENDIX V

SBO CROSSTIE FROM UNIT 1 TO UNIT 2

(Page 5 of 12)

3. (continued) INITIAL

> NOTE
>
> KW indication is the preferred method of EDG loading. Ampere values are provided in the event that KW indication is NOT available.

B. Have Unit 1 verify the crosstied EDG is carrying less than or equal to 2500 KW (350 amps) load. ______

C. Energize the 2A2 or (2B2) 480V L.C. powered by the selected 4.16 KV vital bus by closing or ensuring CLOSED the following: ______

2A2 - 2-20213,"Station Service Transformer Feeder 2A2" and 2-40219, "480V 2A2 L.C. Feeder."

OR

2B2 - (2-20402, "Station Service Transformer Feeder 2B5" and 2-40503, "480V 2B2 L.C. Feeder.")

D. Ensure all containment fan coolers are stopped. ______

E. Start the 2A or 2B Charging Pump and initiate seal injection if available. ______

> CAUTION
>
> Additional charging pumps operation may exceed diesel/bus loading capacity.

F. If the 2C Charging Pump is required for operation, Then: ______

1. CLOSE Bkr. 2-40220, "Feed to 480V Vital Load Center 2AB" and CLOSE Bkr. 2-40702, "Supply from 480V Vital L.C. 2A2."

OR

APPENDIX V
SBO CROSSTIE FROM UNIT 1 TO UNIT 2
(Page 6 of 12)

3. (continued) INITIAL

F. (continued)

1. (continued)

(CLOSE Bkr. 2-40504, "Feed to 480V Vital L.C. 2AB" and CLOSE Bkr. 2-40706, "Supply from 480V Vital L.C. 2B2.")

2. Start the 2C Charging Pump, if it did NOT auto start. ______

G. Energize the 2A5 or (2B5) 480V L.C. powered by the selected 4.16 KV vital bus by ensuring CLOSED: ______

2A5 - 2-20210, "480V L.C. Station Service Transformer 2A5" and 2-40361, "Feeder from Station Service Transformer 2A5."

OR

2B5 - (2-20402, "480V L.C. Station Service Transformer 2B5" and 2-40653, "Feeder from Station Service Transformer 2B5.")

H. Exit this Appendix.

APPENDIX V

SBO CROSSTIE FROM UNIT 1 TO UNIT 2

(Page 7 of 12)

INITIAL

NOTE

The following actions will energize the 2A2 and 2A5, or 2B2 and 2B5 480V L.C.s and subordinate MCCs. Loads will sequence on bus per LOOP load sequence within 35 seconds following the closure of the 480V L.C. feeder breaker. Refer to Table 11, "Emergency Diesel Generator Loading (SBO)", load list of 2-EOP-99 as necessary.

4. If two Unit 1 EDGs are running and one EDG is being used to supply Unit 2, Then restore loads as follows:

CAUTION

Notify the Unit 1 Control Room to monitor the operating diesel. If the loading causes bus load instabilities, Then Unit 2 480V L.C. feeder breakers and 4.16 KV loads may be tripped to protect the diesel. Maximum loading on the SBO (2AB 4.16 KV) bus is 550 continuous amps, as indicated on AM 942 on RTGB 101.

A. Turn the RCP oil lift pump switches to the OFF position. _______

NOTE

KW indication is the preferred method of EDG loading. Ampere values are provided in the event that KW indication is NOT available.

B. Have Unit 1 verify the crosstied EDG is carrying less than or equal to 2500 KW (350 amps) load. _______

C. Energize the 2A2 or (2B2) 480V L.C. powered by the selected 4.16 KV vital bus by closing or ensuring CLOSED: _______

2A2 - 2-20213, "Station Service Transformer Feeder 2A2" and 2-40219, "480V 2A2 L.C. Feeder."

OR

2B2 - (2-40402, "Station Service Transformer Feeder 2B5" and 2-40503, "480V 2B2 L.C. Feeder.")

APPENDIX V
SBO CROSSTIE FROM UNIT 1 TO UNIT 2
(Page 8 of 12)

4. (continued) INITIAL

D. Energize the 2A5 or (2B5) 480V L.C. powered by the selected 4.16 KV vital bus by closing or ensuring CLOSED: ________

2A5 - 2-20210, "480V L.C. Station Service Transformer 2A5" and 2-40361, "Feeder from Station Service Transformer 2A5."

OR

2B5 - (2-20402, "480V L.C. Station Service Transformer 2B5" and 2-40653, "Feeder from Station Service Transformer 2B5.")

E. Ensure all containment fan coolers are stopped. ________

F. Start the 2A or 2B Charging Pump and initiate seal injection if available. ________

G. If the 2C Charging Pump is required for operation, Then: ________

1. CLOSE Bkr. 2-40220, "Feed to 480V Vital Load Center 2AB" and CLOSE Bkr. 2-40702, "Supply from 480V Vital L.C. 2A2."

OR

(CLOSE Bkr. 2-40504, "Feed to 480V Vital L.C. 2AB" and CLOSE Bkr. 2-40706, "Supply from 480V Vital L.C. 2B2.")

2. Start the 2C Charging Pump, if it did NOT auto start. ________

H. Start an available ICW pump. ________

I. Start an available CCW pump. ________

APPENDIX V
SBO CROSSTIE FROM UNIT 1 TO UNIT 2
(Page 9 of 12)

4. (continued) INITIAL

CAUTION
Additional equipment operation may exceed diesel/bus loading capacity.

J. Start HPSI, LPSI, CS, and AFW pumps as necessary. ________

K. Exit this Appendix.

APPENDIX V

SBO CROSSTIE FROM UNIT 1 TO UNIT 2

(Page 10 of 12)

> NOTE
>
> The following actions will energize the 2A2 and 2A5, or 2B2 and 2B5 480V L.C.s and subordinate MCCs. Loads will sequence on bus per LOOP load sequence within 35 seconds following the closure of the 480V L.C. feeder breaker. Refer to Table 11, "Emergency Diesel Generator Loading (SBO)," load list of 2-EOP-99 as necessary.

5. If a Unit 1 4.16 KV Transformer (Auxiliary or Startup) is being used to supply power to Unit 2, Then restore loads as follows:

> CAUTION
>
> Maximum loading on the SBO (2AB 4.16 KV) Bus is 550 continuous amps, as indicated on AM 942 on RTGB 101.

INITIAL

A. Turn the RCP oil lift pump switches to the off position. ________

B. Energize the 2A2 or (2B2) 480V L.C. powered by the selected 4.16 KV vital bus by closing or ensuring CLOSED: ________

2A2 - 2-20213, "Station Service Transformer Feeder 2A2" and 2-40219, "480V 2A2 L.C. Feeder."

OR

2B2 - (2-40402, "Station Service Transformer Feeder 2B5" and 2-40503, "480V 2B2 L.C. Feeder.")

Lesson File:	/cae/if/ifdata/lesson/nrc2/xl03.xld
Lesson Description:	Y2000, NRC OPERATING EXAM, Scenario #3
Lesson IC used:	
Created on:	11/26/99 18:02:42

Step #: 1
Step Description : Modification to IC
Delay Time : 0:00:00
Mode : Regular
InitialState : Triggered

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TAQ5072P - Q5_2_20211 2A3-11 BKR POSITION	REM	3		
2	TAQ5AIS1 - Q5_2A_EG SS-ISOL-1 ELECT GOVER	REM	0		
3	TAQ5AIS2 - Q5_2A_VR SS-ISOL-2 VOLT REGULA	REM	0		
4	TAQ5AIS3 - Q5_2A_EG SS-ISOL-3 HYD GOVERN	REM	0		
5	TFQ5AA52 - Q5_LOA 2A OVERSPEED TRIP	MALF	TRUE		
6	TFLCPWR2 - LC_PP_221 POWER FAILURE (RRS2)	MALF	TRUE		

Step #: 2
Step Description : RRS FAIL -- Failure of TE-1111Y
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION		TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFH1S10D - H1_T1111X	FAIL HIGH MALFUNCTION	MALF	TRUE		

Step #: 3
Step Description : 15% OPEN -- B-Side 15% Feed Reg Fails Open
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	A202_A1_A23_26 - LIC-9006 OUTPUT	OVER	0.600		

Step #: 4
Step Description : STM FLOW -- 2A SG Steam Flow Xmtr Fails HIGH
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION			TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TVF1M03D - SB_F_081A	FT-8011	DRIFT INC	MALF	0.030		

Step #: 5
Step Description : SPRAY VALVE -- Pzr Spray PCV-1100E Fails OPEN
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFHV0701 - HV_PCV1100E FAIL OPENED	MALF	TRUE		
2	TFHV0701 - HV_PCV1100E FAIL OPENED a203_a1_s15_3	MALF	FALSE		

Step #: 6
Step Description : LOOP -- Initiates Manual Input for LOOP
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFP8D1ET - P8_52_1E FAIL TRIP	MALF	TRUE		
2	TFP8D1MT - P8_52_1M FAIL TRIP	MALF	TRUE		
3	TFP8L09F - P8_IDA FAULT ON MIDWAY LINE #1	MALF	TRUE		
4	TFP8L10F - P8_IDA FAULT ON MIDWAY LINE #2	MALF	TRUE		
5	TFP8L11F - P8_IDA FAULT ON MIDWAY LINE #3	MALF	TRUE		
6	TAKFPU1 - KF_IDA PRESSURE OF IAS OF UNIT 1	REM	60.000	0:11:00	

Step #:	7
Step Description :	SBO NOW -- (Auto) Trips Running EDG 15 mins Post-Trip
Step Condition :	A1_A1_A1SI5_2
Delay Time :	0:15:00
Mode :	Regular
InitialState :	Triggered

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TFQ5BBTR - Q5_2_20401 2B3-1 BKR FAIL TRIP	MALF	TRUE		

Step #: 8
Step Description : 1-WHISKEY -- Unit 1 App 'W', Prep to Feed Power to Unit 2
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION		TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TAE2DF9L - E2_1_20409	BREAKER LOCAL CONTRO	REM	3		
2	TAE2DG2L - E2_1_20504	BREAKER LOCAL CONTRO	REM	3		
3	TAE2DF8L - E2_1_20209	BREAKER LOCAL CONTRO	REM	3		
4	TAQ5U1AS - Q5_1_20211	D/G 1A BKR CONTROL S	REM	1		
5	TAE2DF7L - E2_1_20208	BREAKER LOCAL CONTRO	REM	1		
6	TAE2DG1L - E2_1_20505	BREAKER LOCAL CONTRO	REM	1		

Step #: 9
Step Description : CLOSE U1 -- Close Unit 1 SBO X-Tie 1-20501
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TAE2501L - E2_51_20501 XTIE BREAKER LOCAL T	REM	1		

Step #: 10
Step Description : LOOPER SWAP -- Swap RRS Input Loops
Delay Time : 0:00:00
Mode : Regular
InitialState : Pending

	INSTRUCTION	TYPE	DEMANDED VALUE	RAMP TIME	DELAY TIME
1	TCLCS1L1 - LC_LOA RRS1 LOOP 1 SELECTED	REM	FALSE		
2	TCLCS2L1 - LC_LOA RRS1 LOOP 2 SELECTED	REM	TRUE		0:00:02

APPENDIX BB
PLACING MSRs IN SERVICE
(Page 1 of 4)

INITIAL

1. DEPRESS the Reset pushbutton on the Reheater Control System. ______

2. VERIFY locally the MSR TCVs are positioned as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
TCV-08-1	MS to 2A MSR	CLOSED	
TCV-08-7	MS to 2A MSR	CLOSED	
TCV-08-3	MS to 2B MSR	CLOSED	
TCV-08-9	MS to 2B MSR	CLOSED	
TCV-08-4	MS to 2C MSR	CLOSED	
TCV-08-10	MS to 2C MSR	CLOSED	
TCV-08-2	MS to 2D MSR	CLOSED	
TCV-08-8	MS to 2D MSR	CLOSED	

NOTE

A large steam demand may occur while opening the MSR Block Valves. The MSR Block Valves should be opened one at a time, allowing time for the RCS to stabilize.

3. POSITION the MSR Block Valves as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
MV-08-4	2A Block TCV	OPEN	
MV-08-6	2D Block TCV	OPEN	
MV-08-8	2B Block TCV	OPEN	
MV-08-10	2C Block TCV	OPEN	

APPENDIX BB

PLACING MSRs IN SERVICE

(Page 2 of 4)

INITIAL

> **NOTE**
> Quench water to the MSRs will be supplied approximately 2 minutes after the MSR Block Valves are open due to an associated time delay.

4. When the MSR Block Valves are open, Then THROTTLE OPEN the following components to adjust MSR subcooling flow to app 5 to 7 gpm on applicable indicator:

COMPONENT	DESCRIPTION	INDICATOR	INITIAL
V09322	SE-09-1A 2A, MSR Subcooling Dwnstrm Isol	FI-09-4A = 5 to 7 gpm	
V09319	SE-09-1B 2B MSR, Subcooling Dwnstrm Isol	FI-09-4B = 5 to 7 gpm	
V09328	SE-09-1C 2C MSR, Subcooling Dwnstrm Isol	FI-09-4C = 5 to 7 gpm	
V09325	SE-09-1D 2D MSR, Subcooling Dwnstrm Isol	FI-09-4D = 5 to 7 gpm	

> **NOTE**
> - When the MSR TCVs have started the warm up period by either automatic or manual control, the Turbine startup should continue.
> - If the wrong pushbutton is depressed, the controller can be reset by depressing the Reset pushbutton.
> - Ramp starts a 2 hour timed opening of TCV-08-7, 8, 9 and 10 (small TCVs). This is followed by a 30 minute time delay and then a 10 minute timed opening of TCV-08-1, 2, 3 and 4 (large TCVs). Total time is 2 hours and 40 minutes until TCV-08-1, 2, 3 and 4 indicate open.

5. If automatic startup is desired, Then DEPRESS the Ramp pushbutton. ______

APPENDIX BB
PLACING MSRs IN SERVICE
(Page 3 of 4)

INITIAL

CAUTION

If the manual valve positioner is NOT on zero before pushing the Manual Valve Position pushbutton, the TCVs will OPEN to a position relative to the manual valve positioner setpoint and possibly damage the MSRs from the resultant thermal stresses.

6. If manual startup is desired, Then PERFORM the following:

A. ENSURE the manual valve positioner is on zero. ______

B. DEPRESS the Manual Valve Position pushbutton. ______

C. Slowly OPEN the TCVs by rotating the manual valve positioner. Manual opening of the MSR TCVs should take approximately 2 hours. ______

7. After the MSR TCVs are OPEN, Then PERFORM the following:

A. POSITION the small TCV isolation valves as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
V08381	TCV-08-7 Isol	CLOSED	
V08370	TCV-08-7 Isol	CLOSED	
V08378	TCV-08-8 Dwnstm Isol	CLOSED	
V08382	TCV-08-8 Upstrm Isol	CLOSED	
V08383	TCV-08-9 Isol	CLOSED	
V08372	TCV-08-9 Isol	CLOSED	
V08375	TCV-08-10 Isol	CLOSED	
V08384	TCV-08-10 Isol	CLOSED	

APPENDIX BB
PLACING MSRs IN SERVICE
(Page 4 of 4)

7. (continued)

B. ALIGN the MSR vents to the 5A and 5B Feedwater Heaters as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
V11446	2A MSR to Extr Stm Isol	OPEN	
V11451	2B MSR To Extr Stm Isol	OPEN	
V11117	2C MSR To Extr Stm Isol	OPEN	
V11122	2D MSR To Extr Stm Isol	OPEN	

C. ALIGN the MSR vents to the Condenser as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
V11508	2B Cndsr Vent From 2A MSR Isol	CLOSED	
V11507	2B Cndsr Vent From 2B MSR Isol	CLOSED	
V11520	2B Cndsr Vent From 2C MSR Isol	CLOSED	
V11227	2A Cndsr From 2D MSR Tube Bundle Vent Isol	CLOSED	

D. ALIGN the MSR Warm Up Valves as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
MV-08-5	Warmup 2A MSR	CLOSED	
MV-08-7	Warmup 2D MSR	CLOSED	
MV-08-9	Warmup 2B MSR	CLOSED	
MV-08-11	Warmup 2C MSR	CLOSED	

Reviewed by: ______________________________ Date: ____/____/____
SRO

END OF APPENDIX BB

NOTE:

SEE SCENARIO #1 AND #2 FOR ADDITIONAL PROCEDURES

FPL	ST. LUCIE UNIT 2 EMERGENCY OPERATING PROCEDURE SAFETY RELATED	Procedure No. **2-EOP-09** Current Rev. No. **9** Effective Date: **10/04/99**

Title:

LOSS OF OFFSITE POWER

Responsible Department: **OPERATIONS**

Revision Summary

Revision 9 - Added ampere values for EDG loading when kW indication is not available. (Dennis Bonsall, 09/16/99)

Revision 8A - Changed OP 2-0120023 to 2-NOP-01.02. (Ron Pennenga, 07/13/99)

Revision	FRG Review Date	Approved By	Approval Date
0	09/19/89	G. J. Boissy Plant General Manager	09/19/89
Revision	FRG Review Date	Approved By	Approval Date
9	09/16/99	R. G. West Plant General Manager	09/16/99
		N/A Designated Approver	

S 2 OPS
DATE
DOCT PROCEDURE
DOCN 2-EOP-09
SYS
COMP COMPLETED
ITM 9

1.0 TITLE:

LOSS OF OFFSITE POWER

2.0 PURPOSE:

1. This procedure provides operator actions which must be accomplished in the event of a Loss of Offsite Power (LOOP) including actions required to mitigate the loss of forced circulation. The actions in this procedure are necessary to ensure that the plant is placed in a stable, safe condition. The goal of this procedure is to safely establish the plant in a MODE 3 condition while minimizing any radiological releases to the environment and maintaining adequate core cooling.

3.0 ENTRY CONDITIONS:

1. The 2-EOP-01, "Standard Post Trip Actions" have been performed.

OR

All of the following conditions exist:

A. Event initiated from MODE 3.

B. SIAS has NOT been blocked.

AND

2. A. Plant conditions indicate that a Loss of Offsite Power has occurred. At least one vital (AC) 4.16 KV bus is energized. Any of the following may be present:

   1. Diesel generator(s) automatically start

   2. Loss of normal control room lighting.

   3. Both 6.9 KV buses are de-energized.

   OR

   B. A station blackout event has occurred, and at least one vital (AC) 4.16 KV bus has been restored.

4.0 EXIT CONDITIONS:

1. The diagnosis of a Loss of Offsite Power is NOT confirmed.

OR

2. Any of the Loss of Offsite Power Safety Function Status Check acceptance criteria are NOT met.

OR

3. The Loss of Offsite Power procedure has accomplished its purpose by satisfying ALL of the following:

   A. At least one vital 4.16 KV bus is energized from a Unit 2 start up transformer.

   B. All safety function status check acceptance criteria are satisfied.

   C. RCS conditions are being controlled and maintained in MODE 3.

   D. An approved procedure is available for implementation.

5.0 <u>OPERATOR ACTIONS</u>:

INSTRUCTIONS	**CONTINGENCY ACTIONS**
☐ 1. Verify 2-EOP-01, "Standard Post Trip Actions" has been performed.	1. Perform 2-EOP-01, "Standard Post Trip Actions."

<u>NOTE</u>

- All steps preceded with an asterisk (*) are to be performed continuously.
- All available indications should be used in diagnosing the event since the loss of offsite power (LOOP) may cause irregularities in a particular instrument reading. Instrument readings must be verified when one or more confirmatory indications are available.

INSTRUCTIONS	**CONTINGENCY ACTIONS**
[*] 2. To confirm the diagnosis of a Loss of Offsite Power (LOOP): A. Verify the Safety Function Status Check acceptance criteria are satisfied. B. Perform Safety Function Status Check per Appendix A every 15 minutes until exit conditions are met.	2. <u>If</u> Safety Function Status Check acceptance criteria are NOT satisfied, <u>Then</u> rediagnose the event and exit to either appropriate Emergency Operating Procedure or 2-EOP-15, "Functional Recovery."
[*] 3. Contact Health Physics to conduct secondary area radiation surveys.	

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
NOTE The LOCA, SGTR, ESDE, and TLOF procedures are written to accommodate a concurrent loss of offsite power.	
☒ 4. If diagnosis indicates a LOCA, SGTR, ESD, or TLOF has occurred in addition to LOOP, Then exit to appropriate Emergency Operating Procedure.	
☐ 5. Verify Diesel Generators 2A and 2B have started and energized their associated vital 4.16 KV buses.	5. If 2A and 2B Diesel Generators have NOT started and loaded, Then perform the following as necessary: A. If one diesel generator fails to start or load, Then attempt a manual start or CLOSE output breaker to energize the associated 4.16 KV bus. B. If manual start is unsuccessful, Then refer to Appendix C, "Diesel Generator Local Start" and continue on with this procedure. C. If no vital 4.16 KV buses are energized, Then exit this procedure and go to 2-EOP-10, "Station Blackout."

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 6. Ensure at least one vital DC bus is energized from either the battery charger or station batteries.	**6. If neither vital DC bus is energized, Then GO TO 2-EOP-15, "Functional Recovery."**
☐ 7. If non-vital 4.16 KV Bus 2A2 or 2B2 is NOT energized, Then OPEN startup transformer supply breakers and 4.16 KV tie breakers per Table 6, "Vital Power Breaker Configuration/Loss of Offsite Power."	

CAUTION

Do NOT exceed 70% pressurizer level. Actions to maintain pressurizer level take precedence over maintaining seal injection.

☐ 8. Initiate seal injection to the RCPs if available:

A. Ensure charging flow available.

B. OPEN V2185, "Injection Actuation Valve."

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS | **CONTINGENCY ACTIONS**

CAUTION
If all feedwater has been stopped, when feed flow to the steam generators is reinitiated, flow should be limited to less than or equal to 150 gpm for five minutes or until a level increase is observed.

[*] 9. Ensure at least one steam generator has the following:

A. Level being restored or maintained in the normal band (60% to 70% narrow range) using AFW pumps.

AND

B. Pressure control by one of the following (listed in preferred order):

1. Atmospheric Dump Valves (ADVs).

2. Main Steam Safety Valves.

[*] 10. Operate charging pumps as required to maintain pressurizer level 10% to 70%.

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 11. Restore instrument air using the 2A or 2B Instrument Air Compressor by performing the following: A. Ensure 2AB 480V Load Center is aligned to an energized bus. B. Dispatch an operator to align and start emergency cooling water to the instrument air compressors per Appendix H, "Operation of the 2A and 2B Instrument Air Compressors." C. When Appendix H, "Operation of the 2A and 2B Instrument Air Compressors" is completed, Then locally start one instrument air compressor as follows: 1. Place local handswitch in AUTO. 2. Reset 2A or 2B Instrument Air Compressor control switch (HVCB). 3. Verify instrument air pressure being restored.	

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 12. When instrument air has been restored, Then ensure CCW flow to the RCPs has been reestablished.	
☒ 13. Ensure RCS pressure is being maintained within the limits of Figure 1, "RCS Pressure Temperature" curve.	13. If RCS subcooling is NOT being maintained, Then perform the following as appropriate: A. If RCS subcooling is less than 20°F: 1. Establish 20°F subcooling by reducing RCS temperature. OR 2. Operate pressurizer heaters to establish 20°F subcooling. B. If RCS subcooling is greater than 200°F or cooldown rate is greater than 100°F/hr, Then perform the following steps as appropriate: 1. Stop any cooldown in progress.

(Continued on Next Page)

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
	13. (continued) B. (continued) 2. Depressurize the plant by using main or auxiliary spray to restore and maintain pressurizer pressure within the limits of Figure 1, "RCS Pressure Temperature" curve. OR 3. Depressurize the plant by using manual control of letdown to restore and maintain pressurizer pressure within the limits of Figure 1, "RCS Pressure Temperature" curve. 4. If overpressurization due to charging flow, Then depressurize RCS by stopping charging pumps, one at a time, to restore and maintain pressurizer pressure within the limits of Figure 1, "RCS Pressure Temperature" curve.

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE

It takes about 15 minutes for natural circulation flow to fully develop.

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] 14. Verify natural circulation flow in at least one loop by all of the following:	14. If natural circulation flow is NOT observed, Then ensure proper control of S/G feeding and steaming, and RCS inventory and pressure.
A. Loop ΔT (T-hot minus T-cold) is less than full power ΔT (50°F).	
B. T-cold constant or decreasing.	
C. T-hot constant or decreasing.	
D. No abnormal differences (greater than 20°F) between T-hot and Representative Core Exit Thermocouple (CET) temperature.	
E. Representative CET temperature indicates at least 20°F subcooling.	
[*] 15. 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.	

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 16. Isolate S/G blowdown as follows: A. CLOSE FCV-23-3 and FCV-23-4, " 'A' Steam Generator Blowdown." B. CLOSE FCV-23-5 and FCV-23-6, " 'B' Steam Generator Blowdown."	
☐ 17. If Unit 1 has experienced a Station Blackout, Then supply Unit 1 with AC power per Appendix W, "Supplying Unit 1 With AC Power Using SBO Crosstie."	
[*] 18. When offsite power is available to the switchyard, Then restore power to the Electrical Distribution System and station loads as follows: A. Contact Division Load Dispatcher to restore power to the switchyard. B. Restore power to plant electrical buses per Appendix D, "Power Restoration Loss of Offsite Power."	

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS | **CONTINGENCY ACTIONS**

CAUTION

Sufficient power (KW) should be available prior to energizing these loads. Diesel Generator loading should be reevaluated as loads are reenergized. (Maximum continuous load, if KW indication is available, is 3685 KW if KW indication is NOT available, 510 amps; maximum 2000 hour rated load, if KW indication is available, is 3935 KW if KW indication is NOT available, 550 amps.)

/R9

☐ 19. When adequate margin exists on the diesel generator, Then the following loads may be started as required. Refer to Table 8, "Emergency Diesel Generator Loading (LOOP)" for running (KW) loads.

A. Manually CLOSE the breakers for pressurizer heater buses on 4.16 KV Buses 2A3 and 2B3.

B. Manually reset the Backup Heater Breakers B1 and B4 only.

C. Start the spent fuel pool cooling pump. Maintain less than 150°F spent fuel pool temperature.

D. Reset non-essential loads breaker on the following MCCs:

2A5 2A6 2A8
2B5 2B6 2B8

5.0 <u>OPERATOR ACTIONS</u>: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 20. Energize startup channel nuclear instrumentation as reactor power decreases.	20. <u>If</u> startup nuclear instrumentation is NOT available, <u>Then</u> use Excore Neutron Monitoring System.
☐ 21. Locally OPEN MV-10-1A and MV-10-1B, "Condenser Vacuum Breakers."	
☐ 22. CLOSE HCV-08-1A and HCV-08-1B, "Main Steam Isolation Valves."	
☐ 23. Ensure the following turbine oil pumps are operating: A. Emergency bearing oil pump. B. Air side seal oil backup pump. (Annunciator D-40, "Seal Oil DC Backup Pump Running.")	

NOTE

The non-essential sections of MCC 2A6 and 2B6 must be energized, and instrument air available to restore letdown using 'Q' valves. To restore letdown using 'P' valves, MCC 2A2 must <u>also</u> be energized.

[*] 24. <u>When</u> plant conditions permit, <u>Then</u> restore letdown per Off-Normal Operating Procedure 2-0210030, "Charging and Letdown."

5.0 <u>OPERATOR ACTIONS</u>: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] 25. <u>When</u> offsite power is restored, <u>Then</u> evaluate the need and desirability of restarting RCPs with Technical Support Center concurrence (if operational). Consider the following: A. Adequacy of RCS and core heat removal using natural circulation. B. Existing RCS pressure and temperatures. C. The need for main pressurizer spray capability. D. The duration of CCW interruption to pumps. 1. RCPs were NOT operated greater than 10 minutes without CCW. 2. CCW was NOT lost greater than 30 minutes. E. RCP seal breakdown pressures and temperatures. F. Desirability to operate RCPs if Controlled Bleedoff was isolated.	

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] 26. If RCP restart is desired, Then determine if all the following RCP restart criteria are met: A. All RCP starting requirements are satisfied per 2-NOP-01.02, "Reactor Coolant Pump Operation." (Letdown System operation is NOT required.) B. No high temperature alarms exist on the selected RCPs. C. Representative CET temperature indicates at least 20°F subcooling. D. Unisolated S/G level is greater than or equal to 15% (wide range) with feedwater available for removing heat. E. Pressurizer level is greater than or equal to 45% and NOT decreasing.	**26. If RCP restart criteria is NOT met, Then GO TO step 28.**

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS	**CONTINGENCY ACTIONS**

CAUTION

Pressurizer level and pressure may decrease upon starting RCPs. The level decrease may be large enough to drain the pressurizer. RCP operation with a drained pressurizer may continue provided all available charging pumps are operating and all other RCP restart criteria are met.

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] 27. If RCP restart is desired and restart criteria are met, Then do the following: A. Ensure all available charging pumps are operating. B. Start one RCP in each loop. C. Verify adequate NPSH (refer to Fig. 1, "RCS Pressure Temperature") and stable RCP amperage. D. Restore pressurizer level to program level.	**27. If RCPs can NOT be restarted, Then GO TO step 28.**
[ ] 28. Evaluate the need for cooldown based on plant status, auxiliary systems availability and condensate inventory (Figure 3, "Time Until Shutdown Cooling Required vs. Condensate Availability" and Figure 4, "Condensate Required For Cooldown").	

5.0 OPERATOR ACTIONS: (continued)

INSTRUCTIONS | **CONTINGENCY ACTIONS**

☐ 29. If conditions require a plant cooldown, Then cooldown to SDC entry conditions using one of the following procedures:

A. Off-Normal Operating Procedure 2-0120039, "Natural Circulation Cooldown."

B. Operating Procedure 2-0030127, "Reactor Plant Cooldown - Hot Standby to Cold Shutdown."

[*] 30. If exit conditions are met, Then maintain the plant in a stabilized condition and exit to an applicable procedure.

This procedure should leave the plant in a condition where all safety functions are being maintained and the RCS is in a MODE 3 condition. Further recovery actions may be recommended by the Technical Support Center, if operational.

END OF TEXT

APPENDIX A
SAFETY FUNCTION STATUS CHECK SHEET
(Page 1 of 9)

DATE__________

> CAUTION
> Notify NPS/ANPS immediately if any safety function acceptance criterion is NOT met.

1. REACTIVITY CONTROL

	SAFETY FUNCTION	ACCEPTANCE CRITERIA	CHECK √
			TIME
A.	Reactor Power	Less than 5 X 10^{-4}% and stable or decreasing.	
			AND
	CEA Position	Maximum of 1 CEA NOT fully inserted.	

⇓

(Continued on Next Page)

APPENDIX A

SAFETY FUNCTION STATUS CHECK SHEET

(Page 2 of 9)

1. REACTIVITY CONTROL

	SAFETY FUNCTION	ACCEPTANCE CRITERIA	CHECK √
B.	Reactor Power	Less than 5 X 10^{-4}% and stable or decreasing.	☐☐☐☐☐☐
			AND
	Emergency Boration	Borating to greater than 5000 pcm shutdown margin.	☐☐☐☐☐☐
C.	Reactor Power	Less than 5 X 10^{-4}% and stable or decreasing.	☐☐☐☐☐☐
			AND
	Startup Rate	Negative or zero.	☐☐☐☐☐☐

END OF SAFETY FUNCTION 1

APPENDIX A

SAFETY FUNCTION STATUS CHECK SHEET

(Page 3 of 9)

2. MAINTENANCE OF VITAL AUXILIARIES

SAFETY FUNCTION	ACCEPTANCE CRITERIA	CHECK √
A. Vital DC Buses (2A or 2B)	At least one energized.	☐☐☐☐☐☐
		AND
Vital 4.16 KV Bus (2A3 or 2B3)	At least one energized.	☐☐☐☐☐☐

END OF SAFETY FUNCTION 2

APPENDIX A

SAFETY FUNCTION STATUS CHECK SHEET

(Page 4 of 9)

3. RCS INVENTORY CONTROL

	SAFETY FUNCTION	ACCEPTANCE CRITERIA	CHECK √
A.	Pressurizer Level	Being maintained or restored 10% to 70%.	☐☐☐☐☐☐
			AND
	RCS Subcooled	Greater than or equal to 20°F (During Natural Circulation use Representative CET, page 213, or during Forced Circulation use T-hot, page 211, QSPDS.)	☐☐☐☐☐☐
			AND
	Reactor Vessel Level (page 212, QSPDS)	Core covered (Sensors 7 and 8 covered.)	☐☐☐☐☐☐
			OR
	Representative CET temperature	NOT superheated	☐☐☐☐☐☐

END OF SAFETY FUNCTION 3

APPENDIX A
SAFETY FUNCTION STATUS CHECK SHEET
(Page 5 of 9)

4. RCS PRESSURE CONTROL

SAFETY FUNCTION	ACCEPTANCE CRITERIA	CHECK √
A. Pressurizer Heaters and Sprays	Maintaining or restoring pressure within limits of Figure 1, "RCS Pressure Temperature" curve.	☐☐☐☐☐☐

END OF SAFETY FUNCTION 4

APPENDIX A
SAFETY FUNCTION STATUS CHECK SHEET
(Page 6 of 9)

5. CORE HEAT REMOVAL

SAFETY FUNCTION	ACCEPTANCE CRITERIA	CHECK √
A. RCS Subcooled	Greater than or equal to 20°F (During Natural Circulation use Representative CET, page 213, or during Forced Circulation use T-hot, page 211, QSPDS.)	☐☐☐☐☐☐
		AND
Loop ΔT	Less than full power ΔT (50°F) (if all RCPs are off).	☐☐☐☐☐☐
		OR
	Less than 10°F (if any RCPs are running).	☐☐☐☐☐☐

END OF SAFETY FUNCTION 5

APPENDIX A
SAFETY FUNCTION STATUS CHECK SHEET
(Page 7 of 9)

6. RCS HEAT REMOVAL

	SAFETY FUNCTION	ACCEPTANCE CRITERIA	CHECK √
A.	Steam Generator Level	At least one S/G in the normal band (60% to 70% narrow range) with feedwater available, or being restored by total feedwater flow greater than or equal to 150 gpm.	

END OF SAFETY FUNCTION 6

APPENDIX A
SAFETY FUNCTION STATUS CHECK SHEET
(Page 8 of 9)

7. CONTAINMENT ISOLATION

	SAFETY FUNCTION	ACCEPTANCE CRITERIA	CHECK √
A.	Containment Pressure	Less than 2 psig.	☐☐☐☐☐☐
			AND
	Containment Radiation Monitors	No alarms or increasing trends.	☐☐☐☐☐☐
			AND
	Condenser Air Ejector, Blowdown and Main Steamline Radiation Monitors	No alarms or increasing trends.	☐☐☐☐☐☐
			OR
		Local surveys being performed indicate no secondary plant radiation.	☐☐☐☐☐☐

END OF SAFETY FUNCTION 7

APPENDIX A
SAFETY FUNCTION STATUS CHECK SHEET
(Page 9 of 9)

8. CONTAINMENT TEMPERATURE, PRESSURE, AND COMBUSTIBLE GAS CONTROL

SAFETY FUNCTION	ACCEPTANCE CRITERIA	CHECK √
A. Containment Pressure	Less than 2 psig.	☐☐☐☐☐☐
		AND
Containment Temperature	Less than 120°F <u>or</u> all available containment coolers operating.	☐☐☐☐☐☐

END OF SAFETY FUNCTION 8

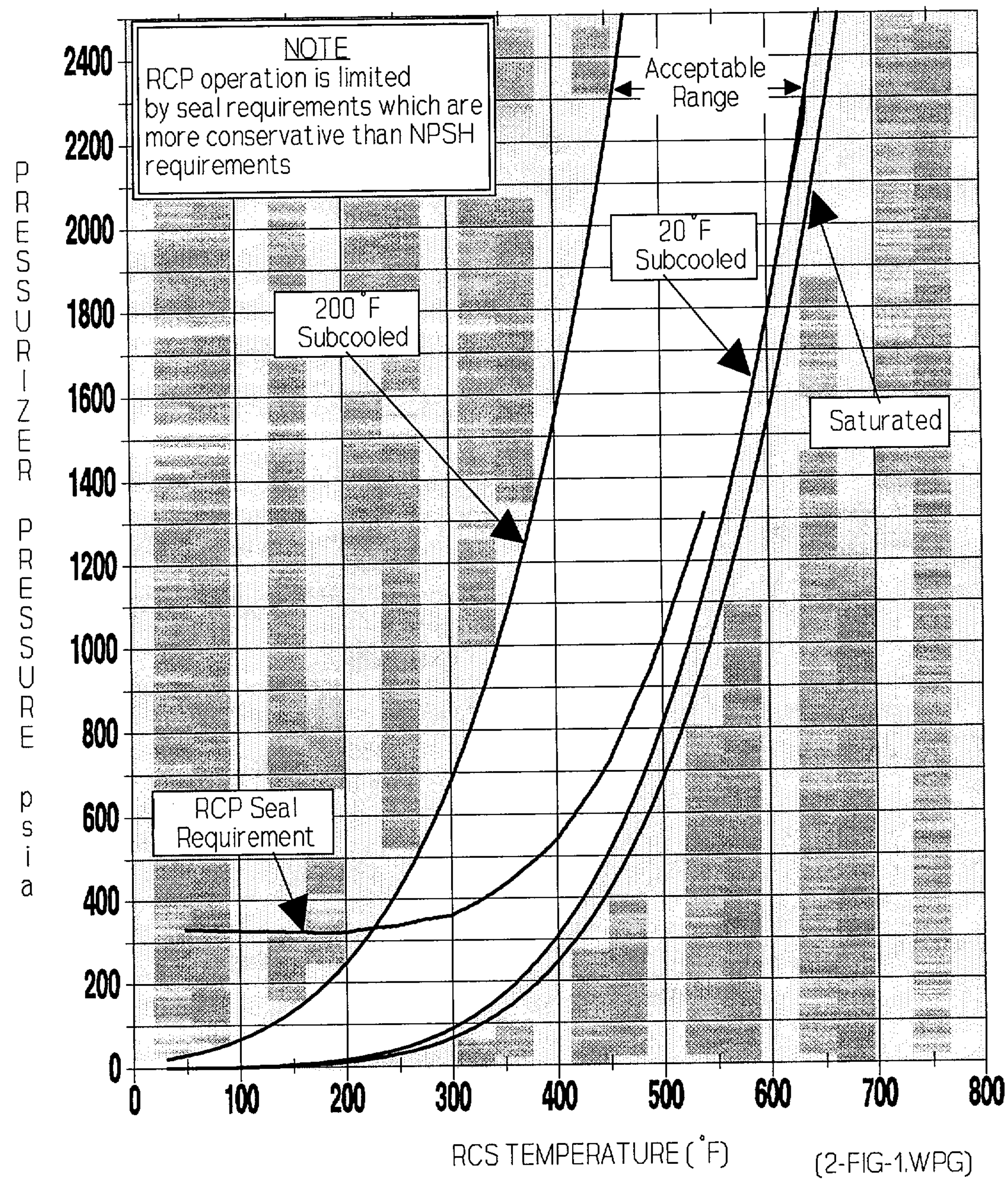
	INITIALS
RO / SRO / STA	☐☐☐☐☐☐

END OF APPENDIX A

FIGURE 1
RCS PRESSURE TEMPERATURE

CAUTION

When below the RCP Seal Requirement Curve, RCP instrumentation should be monitored for indication of pump cavitation. For minimum seal requirements, RCP operation below 250 psia should be avoided.



(2-FIG-1.WPG)