Sequoyah Nuclear Plant

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SPECIAL TEST NO. 7

SIMULATED LOSS OF ALL ONSITE
AND OFFSITE AC POWER

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SIMULATED LOSS OF ALL ONSITE AND OFFSITE AC POWER

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SIMULATED LOSS OF ALL ONSITE AND OFFSITE AC POWER

Test Description

This test is intended to provide a significant demonstration of reactor operation in the natural circulation mode under the degraded condition of loss of all onsite and offsite AC power. For the purpose of plant and equipment safety, this total blackout condition will be simulated by the selective deenergizing of components and equipment.

SPECIAL OPERATOR INSTRUCTION

*An operator initiated safety injection should be performed only for one or more of the following conditions:

Reactor Coolant System Subcooling	≤ 10°
Sudden Unexplained Decrease in Pressurizer Level of or to an Indicated Level of	10% ≤ 10%
Sudden Unexplained Decrease in Any S/G Level to	≤ 76% Wide Range ≤ 0% Narrow Range
Unexplained Pressurizer Pressure Drop	≥ 200 PSI
Containment Pressure Hi - (1.54 psig)	Annunciator XA-55-6B Window 5 initiates

An operator initiated reactor trip should be performed for any of the following conditions:

Reactor Coolant System Subcooling	≤ 15°
Sudden Unexplained Decrease in Pressurizer Level of or to an Indicated Level of	5% ≤ 17%
1/3 Excores	≥ 10%
Any Loop Δ T	> 65°F
Tavg	> 578°F
Core Exit Temperature (Highest)	> 610°F
Any Uncontrolled Rod Movement	

*SI termination should be in accordance with plant EMERGENCY OPERATING PROCEDURES.

1.0 OBJECTIVES

The objectives of this test are:

1.1 To demonstrate that following a loss of all onsite and offsite power, including the emergency diesel generators, the decay heat can be removed by natural circulation using the auxiliary feedwater system in the manual mode.

1.2 It will be verified that hot standby conditions can be maintained by manual control of the auxiliary feedwater system.

1.3 It will also be verified that critical plant operations can be performed using emergency lighting, that the 125-volt vital battery has the ability to supply the 125-volt vital AC and that certain equipment areas do not exceed maximum design temperature.

1.4 To provide operator training, all operating shifts will perform this test.

NOTE: Data acquisition does not need to be repeated for multiple test performances.

2.0 PREREQUISITES

2.1 Reactor is critical and manually controlled at approximately 1% power with control bank D at 160 steps or as specified by test engineer. (Power level determined as indicated in Appendix C).

_____ / _____

2.2 All four Reactor Coolant Pumps in operation.

_____ / _____

2.3 RCS pressure at approximately 2235 psig and temperature at approximately 548°F, and pressurizer level at approximately 26-28%.

_____ / _____

2.4 Steam pressure approximately 1005 psig and being maintained by steam dump to the condenser.

_____ / _____

2.5 Steam generator level being maintained at approximately 33% on the narrow range indicators.

_____ / _____

2.6 One main feedwater pump in service and the other tripped.

_____ / _____

2.7 Auxiliary feedwater system lined up in standby in accordance with SOI 3.2

_____ / _____

2.8 Steam generator chemistry in a condition that the absolute minimum steam generator blowdown can be maintained during the duration of this test. (Zero blowdown is possible).

_____ / _____

2.9 Excess letdown is available for service if required during the test.

_____ / _____

2.0 PREREQUISITES (Continued)

2.10 125-V Vital Battery Board I energized from 125-V Vital Battery I (BKR 107 closed).

_____ /

2.11 125-V Vital Battery Board II energized from 125-V Vital Battery II (BKR 107 closed).

_____ /

2.12 125-V Vital Battery Board III energized from 125-V Vital Battery III (BKR 107 closed).

_____ /

2.13 125-V Vital Battery Board IV energized from 125-V Vital Battery IV (BKR 107 closed).

_____ /

2.14 Verify that battery-powered lights are located in areas where operation of equipment is required after normal lighting is de-energized. (Operations to supply lights and position them where desired).

_____ /

NOTE: These temporary lights should only be located in areas where operation of equipment would not normally take place in a blackout. Areas which must be operated during a blackout should be supplied with permanent battery-powered lights.

2.15 Charging is being maintained with a centrifugal pump and in automatic control.

_____ /

2.0 PREREQUISITES (Continued)

2.16 Connect Recorders to the following test points:

Recorder #1	Connect to:	Monitoring:
Channel #1	1-R-1, FP414B	RCS Flow - loop 1
Channel #2	1-R-1, FP424B	RCS Flow - loop 2
Channel #3	1-R-1, FP434B	RCS Flow - loop 3
Channel #4	1-R-1, FP444B	RCS Flow - loop 4
Channel #5	1-R-1, PP455B	Pressurizer Pressure
Channel #6	1-R-1, LP459B	Pressurizer level

Recorder #2	Connect to:	Monitoring:
Channel #1	1-R-23, LP501	Steam Gen #1 Level
Channel #2	1-R-3, FP512B	Steam Gen #1 Steam Flow
Channel #3	1-R-3, PP514B	Steam Gen #1 Pressure
Channel #4	1-R-23, LP502	Steam Gen #2 Level
Channel #5	1-R-3, FP522B	Steam Gen #2 Steam Flow
Channel #6	1-R-3, PP524B	Steam Gen #2 Pressure

Recorder #3	Connect to:	Monitoring:
Channel #1	1-R-23, LP503	Steam Gen #3 Level
Channel #2	1-R-4, FP532B	Steam Gen #3 Steam Flow
Channel #3	1-R-4, PP534B	Steam Gen #3 Pressure
Channel #4	1-R-23, LP504	Steam Gen #4 Level
Channel #5	1-R-4, FP542B	Steam Gen #4 Steam Flow
Channel #6	1-R-4, PP544B	Steam Gen #4 Pressure

Recorder #4	Connect to:	Monitoring:
Channel #1	F-3-163, TP 13, 1-L-11B	Aux Feed flow to S.G. #1
Channel #2	F-3-155, TP 13, 1-L-11A	Aux Feed flow to S.G. #2
Channel #3	F-3-147, TP 12, 1-L-11B	Aux Feed flow to S.G. #3
Channel #4	F-3-170, TP 12, 1-L-11A	Aux Feed flow to S.G. #4

2.17 Set the trend recorders and computer trend printer in the Main Control Room to monitor the parameters indicated in Appendix D.

_____/_____

2.18 Install ρ-computer recorder to monitor the following:

a. Flux
b. Average wide-range T_{cold}
c. Average wide-range T_{hot}
d. Average steam generator pressure
e. Reactivity

_____/_____

2.0 PREREQUISITES (Continued)

2.19 Evacuate construction personnel from all unit 1 and unit 2 work areas in the auxiliary and containment buildings.

_____ /

NOTE: This is a safety measure since these work areas will be without lighting for approximately 2 hours.

2.20 Record on the recorder charts the following information:

a. Unit number
b. Date
c. Procedure number
e. Chart speed
f. Time marker interval
g. Recorder ID number
h. Name of individual recording data

_____ /

2.21 Verify the input logic of safety injection on Hi Steam Line ΔP has been blocked in accordance with Appendix E.

_____ /

2.22 Verify the Hi steam flow coincident with Lo S/G pressure or Lo Tav input to safety injection has been modified in accordance with Appendix E.

_____ /

2.23 Verify the automatic actuation of safety injection has been blocked in accordance with Appendix E.

_____ /

2.24 Verify the following UHI isolation valves are gagged.

FCV - 87-21 _____ /

FCV - 87-22 _____ /

FCV - 87-23 _____ /

FCV - 87-24 _____ /

2.25 Verify the auxiliary boiler is supplying steam seals to the turbine.

_____ /

2.0 PREREQUISITES (Continued)

2.26 Intermediate and power range (low setpoint) high level reactor trip setpoints have been set to 7% in accordance with Appendix C and D of SU-8.5.2.

Power Range _____/_____

Intermediate Range _____/_____

3.0 PRECAUTIONS

3.1 Maintain reactor coolant pump seal and thermal barrier differential pressure requirements as given in SOI 68.2.

3.2 Do not exceed 5% nuclear power at any time while the test is in progress.

3.3 Abort the test if any of the following temperature limits are exceeded:

3.3.1 Core exit temperature of 610°F

3.3.2 ΔT as indicated by $T_h - T_c$ of 65°F

3.3.3 T_{avg} temperature of 578°F

3.4 When equilibrium is established after the initial transient, avoid any sudden changes in Auxiliary Feedwater flow or in the Steam Generator water level.

3.5 Ensure seal flow to each Reactor Coolant pump is maintained at or slightly above 6 gpm during the test.

3.6 After the Reactor Coolant pumps are tripped, the normal T_{avg} and ΔT indication will become unreliable. ΔT and T_{avg} should be calculated by taking the difference and the average of the hot and cold leg temperature indications respectively.

3.7 If the primary system pressure drops to a point where it is obvious that saturation pressure for the existing wide range hot leg or incore T/C temperatures will soon be reached, the pressurizer heaters will have to be energized or charging flow reestablished to increase system pressure.

3.8 NIS channels can be used to determine changes in core power level providing the RCS cold leg temperatures are maintained at approximately the same value that existed before tripping the reactor coolant pumps.

3.0 PRECAUTIONS (Continued)

3.9 The turbine auxiliary feedwater pump room has four temperature detectors designed to isolate the steam supply to the turbine if the temperature reaches 125°F. If ambient temperature reaches 115°F, start the AC-powered exhaust fan to help maintain temperature.

3.10 Should a reactor trip occur during the conduct of this test, at least one reactor coolant pump (#2) should be started prior to closing the reactor trip breaker.

3.11 Maintain D bank at ≥ 100 steps during the conduct of this test. Should this limit be reached, boron concentration will have to be increased.

4.0 Special Test Equipment

Instrument	Specification	Identification Number	Calibration Verification
Digital Voltmeters (DVM) (3)	Fluke Model 3120A or equivalent		
Strip Chart Recorder, (6-channel) (2)	Brush 260 or equivalent		
Room Thermometers (7)			
Reactivity Computer	Westinghouse		
Explosimeter	Mine Safety Model #3 0-100% explosive	442760	
Recorder (1)	HP 7100B or equivalent		

If test instruments are changed during this test, the instrument information must be recorded here and an entry made in the chronological log book explaining this change.

5.0 TEST INSTRUCTIONS

NOTE: For the purpose of operator training, the test instruction steps in Section 5.0 may be repeated. The steps should be performed sequentially and those steps indicated by a double asterisk (**) should not be repeated.

**5.1 Close the following dampers on El 669 in the Auxiliary Building.

1-31C-1105	_____ / _____
1-31C-1109	_____ / _____
1-31C-1150	_____ / _____
1-31C-1148	_____ / _____

NOTE: These dampers and the following coolers will be shutdown to allow monitoring the air temperatures in the area of the turbine driven auxiliary feedwater pump room under blackout conditions.

**5.2 Adjust the thermostats on the General Vent Coolers 1C and 2C on El 669 to their highest settings. (Note their present setpoint).

0-TIC-313-610	_____ As Found Dial Setting
2-TIC-313-611	_____ As Found Dial Setting

**5.2.1 Shutdown the main control room air conditioning and place a room thermometer on the operators' desk to monitor control room air temperature.

_____ / _____

5.3 Position AUO's in the following positions in the plant to be available to operate vital equipment.

a) Auxiliary Feedwater Level Control Valves LCV-3-172, 173, 174, and 175.

b) Turbine driven Auxiliary Feedwater pump.

c) Power relief control valves PCV-1-5, 1-23, 1-12, and 1-30.

_____ / _____

5.4 Clear the control and auxiliary building of all non-essential personnel and announce over the Public Address System that a blackout test will be beginning shortly.

_____ / _____

5.0 TEST INSTRUCTIONS (Continued)

5.5 Manually adjust PIC-68-340B and PIC-68-340D to zero % output (closes pressurizer spray valves) and leave the controllers in manual control.

_____ /

5.6 Ensure the pressurizer backup heaters 1A, 1B, and 1C will remain off by moving handswitches 1-HS-68-341A and 341D to the "stop" position and moving 1-HS-68-341H to "stop-pull to lock".

_____ /

5.7 Ensure Auxiliary Feedwater motor driven pumps 1A-A and 1B-B will not start on the simulated blackout by moving switches 1-HS-3-118A and 1-HS-3-128A on 1-M-4 to the "stop" position

_____ /

5.8 Move switch 1-HS-30-217 to "stop" to shut off the AC auxiliary feedwater turbine pump room exhaust fan. Verify switch 1-HS-30-214 is in "Auto". (Both located in Turbine driven Aux. Feed pump room).

_____ /

5.9 Just prior to initiating RCP trips, reduce charging flow to the minimum required to maintain seal injection flow. (FCV-62-89 should be fully closed).

_____ /

5.10 Isolate RCS letdown by closing the following valves from their respective handswitches on 1-M-6.

1-FCV-62-69 _____ /

1-FCV-62-70 _____ /

1-FCV-62-72 _____ /

1-FCV-62-73 _____ /

1-FCV-62-74 _____ /

**5.11 Record the data indicated on Data Sheet 5.1.

_____ /

5.0 TEST INSTRUCTIONS (Continued)

**5.11.1 Start the Computer Trend printer printing at 1-minute intervals.

_____ / _____

**5.12 Record the time, date and initial the charts on the data recorders in the Auxiliary Instrument Room.

_____ / _____

**5.13 Open 6.9KV ACB located on 6.9KV Common Board A that feeds the Auxiliary Building Lighting Bus A.

_____ / _____

**5.14 Open 6.9KV ACB located on 6.9 K Common Board B that feeds the Auxiliary Building Lighting Bus B.

_____ / _____

5.15 Start all four reactor coolant pump oil lift pumps from 1-HS-68-84A, 85A, 86A, and 87A on 1-M-5.

_____ / _____

NOTE: The following step should be conducted immediately before initiating the trips.

5.16 Isolate the control air supply to the air accumulator for the following turbine driven Auxiliary Feedwater pump level control valves.

1-LCV-3-172 _____ / _____

1-LCV-3-173 _____ / _____

1-LCV-3-174 _____ / _____

1-LCV-3-175 _____ / _____

5.17 As quickly as possible shutdown the following equipment. As many people as possible should be utilized to complete this step so that a close approximation to a blackout can be simulated.

NOTE: Zero Time = _____

Check _____

a) Trip pressurizer heater group 1D from 1-HS-68-341F on 1-M-4 _____

5.0 TEST INSTRUCTIONS (Continued)

b) Trip all four reactor coolant pumps from 1-HS-68-8A, 31A, 50A, 73A _____

c) Close main steam isolation valves from 1-HS-1-4, 11, 22, 29 on 1-M-4 _____

d) Trip the main feed pump presently in operation from either 1-HS-46-9A (Pump A) or 1-HS-46-36A (Pump B) _____

NOTE: The next steps will remove the 125V Vital Battery chargers from service which places the entire 125VDC Vital load on the 125V Vital batteries.

**e) Open the breaker on 125V Vital Battery Board I from the No. I 125V Vital Battery charger. (BKR 225) _____

**f) Open the breaker on 125V Vital Battery Board II from the No. II 125V Vital Battery charger. (BKR 225) _____

**g) Open the breaker on 125V Vital Battery Board III from the No. III 125V Vital Battery charger. (BKR 225) _____

**h) Open the breaker on 125V Vital Battery Board IV from the No. IV 125V Vital Battery charger. (BKR 225) _____

**i) Open 480-V standby Lighting Cabinet NO. 4 breaker, located on 480-V Shutdown Board 1A2-A, Breaker 9C. _____

**j) Open 480-V Standby Lighting Cabinet No. 1 breaker located on 480-V Shutdown Board 2A2-A, Breaker 9C. _____

**k) Open 480-V Standby Lighting Cabinet No. 2 breaker located on 480-V Shutdown Board 1B1-B, Breaker 8D. _____

**l) Open 480-V Standby Lighting Cabinet No. 3 breaker located on 480-V Shutdown Board 2B1-B, Breaker 8D. _____

NOTE: At this point the normal lighting in the Control Building and the Auxiliary Building has been deenergized and the emergency lighting is energized from the 125-VDC Vital Battery.

5.0 TEST INSTRUCTIONS (Continued)

**m) Open 480-vac input breaker on Vital Inverter 1-I. _____

**n) Open 480-vac input breaker on Vital Inverter 1-II. _____

**o) Open 480-vac input breaker on Vital Inverter 1-III. _____

**p) Open 480-vac input breaker on Vital Inverter 1-IV. _____

**q) Open 480-vac input breaker on Vital Inverter 2-I. _____

**r) Open 480-vac input breaker on Vital Inverter 2-II. _____

**s) Open 480-v input breaker on Vital Inverter 2-III. _____

**t) Open 480-v input breaker on Vital Inverter 2-IV. _____

**u) Turn vital battery room I exhaust fan off. _____

**v) Turn vital battery room II exhaust fan off. _____

**w) Turn vital battery room II exhuast fan off. _____

**x) Turn vital battery room IV exhaust fan off. _____

NOTE: At this point in time the 125-v Vital Battery is supplying all the 120-v Vital AC load as well as the Emergency Lighting.

y) Begin monitoring and recording the parameters indicated on Data Sheet 5.2, sheets 2 through 4, at the intervals indicated. _____

NOTE: Monitor reactor power closely and make any adjustments necessary to maintain approximately 1% power. T_c for each leg should be maintained at approximately the pretrip temperature.

5.0 TEST INSTRUCTIONS (Continued)

5.18 Verify the steam-driven Auxiliary Feedwater pump has started and flow established to each steam generator.

_____ /

NOTE: The Auxiliary Feedwater level control valves LCV-3-172, 173, 174, 175 will open shortly after the Aux Feed pump starts but will fail close in 4 or 5 minutes as the accumulators run out of air. Preparations must be made to operate these valves by hand when this happens.

5.19 Operators should be dispatched to take manual control of the Auxiliary Feedwater level control valves, and main steam power operated relief valves.

_____ /

5.20 Move the following handswitches to the "Close" position to simulate loss of control to the main steam power operated relief valves.

1-HS-1-6	_____ /
1-HS-1-13	_____ /
1-HS-1-24	_____
1-HS-1-31	_____ /

5.21 After the simulated blackout has taken place the operational guidelines in Appendix A of EOI-5 should be followed to verify natural circulation has been established.

_____ /

5.22 Record the time that full manual control of the Auxiliary Feedwater level control valves takes place.

	Time
1-LCV-3-172	_____
1-LCV-3-173	_____
1-LCV-3-174	_____
1-LCV-3-175	_____

_____ / _____

5.0 TEST INSTRUCTIONS (Continued)

5.23 Bring the steam generator levels back to normal operating level (approximately 33%) and manually adjust atmospheric dump and auxiliary feedwater flow to maintain the pretrip cold leg temperature. (Establish a steady feedwater flow. Do not stop and start flow to control the level.)

_____ /

5.24 When equilibrium conditions have been established for each steam generator, make notes on Data Sheet 5.2 of the time and continue recording data.

_____ /

5.25 Maintain steam generator level at approximately 33% and reactor power at 1% for a two-hour period from the time of the simulated blackout.

_____ /

NOTE: The pressurizer water level is not expected to rise above 70%, however, if it should, put excess letdown into service to reduce the RCS water volume. Maintain letdown until level reaches 50%. (Note letdown established on Data Sheet 5.2).

5.26 At the end of the 2-hour period, manually adjust the Main Steam PORV pressure controllers PIC-1-6A, -13A, -24A, and -31A to approximately the output corresponding to the percentage each valve is open as indicated by the valve position indicator on the valve.

_____ /

5.27 Adjust the setpoint dial on the pressure controllers to 1000 psig (83.3% on dial) and individually return the power-operated relief valves to 'auto' control by putting first the valve handswitch in 'auto' and then the corresponding controller.

CAUTION: Let each steam generator come to equilibrium before putting the next power relief valve in Auto.

1-HS-1-6 and PIC-1-6A _____ /

1-HS-1-13 and PIC-1-13A _____ /

1-HS-1-24 and PIC-1-24A _____ /

1-HS-1-31 and PIC-1-31A _____ /

5.0 TEST INSTRUCTIONS (Continued)

5.28 Individually return the control air supply to the Auxiliary Feedwater level control valves and adjust the flow controllers to obtain approximately the equilibrium flow indicated before the air was returned.

1-LCV-3-172 _____ /

1-LCV-3-173 _____ /

1-LCV-3-174 _____ /

1-LCV-3-175 _____ /

5.29 Return the Auxiliary Feedwater level controllers to 'auto' and verify automatic control is resumed.

_____ /

5.30 Return pressurizer spray controllers PIC-68-340B and PIC-68-340D to 'Auto'. (Spray will not be available until the reactor coolant pumps are restarted).

_____ /

5.31 If the RCS pressure is below 2210 psig, allow one of the handswitches for the pressurizer backup heaters to return to P-Auto. The heater should energize and increase RCS pressure. Control RCS pressure by energizing or deenergizing the backup heaters.

_____ /

5.32 Manually adjust the output of PIC-68-340A to 40% output and energize the pressurizer control heater group 1D. Return PIC-68-340A to 'Auto.'

_____ /

5.33 Insert Control bank D until the reactor is in the hot zero power test range.

_____ /

NOTE: The following steps return normal power to the vital instruments. The steps must be followed in sequence.

**5.34 Close 480vac input breaker on Vital Inverter 1-I.

_____ /

**5.35 Close 480vac input breaker on Vital Inverter [illegible]

_____ /

5.0 TEST INSTRUCTIONS (Continued)

**5.36 Close 480vac input breaker on Vital Inverter 1-III.

_____ / _____

**5.37 Close 480vac input breaker on Vital Inverter 1-IV.

_____ / _____

**5.38 Close 480vac input breaker on Vital Inverter 2-I.

_____ / _____

**5.39 Close 480-vac input breaker on Vital Inverter 2-II.

_____ / _____

**5.40 Close 48-vac input breaker on Vital Inverter 2-III.

_____ / _____

**5.41 Close 480-vac input breaker on Vital Inverter 2-IV.

_____ / _____

**5.42 Close 6.9-kV ACB located on 6.9-kV Common Board A that feeds the Auxiliary Building Lighting Bus A.

_____ / _____

**5.43 Close 6.9-kV ACB located on 6.9-kV Common Board B that feeds the Auxiliary Building Lighting Bus B.

_____ / _____

**5.44 Close 480-V Standby Lighting Cabinet No. 4 breaker, located on 480-V Shutdown Board 1A2-A, breaker 9C.

_____ / _____

**5.45 Close 480-V Standby Lighting Cabinet No. 1 breaker, located on 480-V Shutdown Board 2A2-A, Breaker 9C.

_____ / _____

**5.46 Close 480-V Standby Lighting Cabinet No. 2 breaker, located on 480-V Shutdown Board 1B1-B, Breaker 8D.

_____ / _____

**5.47 Close 480-V Standby Lighting Cabinet No. 3 breaker, located on 480-V Shutdown Board 2B1-B, Breaker 8D.

_____ / _____

5.0 TEST INSTRUCTIONS (Continued)

**5.48 Close the breaker on 125V Vital Battery Board I from the No. I 125V Vital Battery Charger. (BKR 225)

_____/_____

**5.49 Close the breaker on 125V Vital Battery Board II from the No. II 125V Vital Battery Charger. (BKR 225)

_____/_____

**5.50 Close the breaker on 125V Vital Battery Board III from the No. III 125V Vital Battery Charger. (BKR 225)

_____/_____

**5.51 Close the breaker on 125V Vital Battery Board IV from the No. IV 125V Vital Battery Charger. (BKR 225)

_____/_____

NOTE: At this time the 125 vdc Vital Battery, 120 vac Vital Instrument Power, and the Plant Emergency Lighting System are normal.

5.52 Individually move handswitches 1-HS-3-118A and 1-HS-3-128A to 'auto' position. When these switches are returned to Auto, the motor-driven Auxiliary Feedpumps will start so a close watch should be maintained to verify proper automatic level control.

_____/_____

**5.53 Turn off the data recorders and note the time on the charts.

_____/_____

CAUTION: Prior to starting RCP 1 and/or 2 ensure pressurizer spray valves are closed.

5.54 Restart reactor coolant pumps in accordance with SOI 68.2 starting with RCP 2, 1, 3 and then 4.

_____/_____

5.55 Return the pressurizer level to approximately 26% and return control to auto.

_____/_____

5.56 Re-establish normal letdown and charging in accordance with SOI 62.1B.

_____/_____

5.0 TEST INSTRUCTIONS (Continued)

5.57 Open MSIV warmup bypass valves. Control them to maintain stable heatup and pressure conditions in the main steam piping. Do not exceed main steam piping heatup rate of 200°F/hr.

_____ / _____

NOTE: Temperature can be monitored on computer log points T2300, T2301, T2302, and T2303.

5.58 When steam pressure across the MSIV's is less than 25 psi, with HS-1-4A, 11A, 22A, and 29A in close positions, reset main steam isolation valves by momentarily placing control switch MS-1-4A in the reset position.

_____ / _____

5.59 Open the following MSIV's:

FCV-1-4 _____ / _____

FCV-1-11 _____ / _____

FCV-1-22 _____ / _____

FCV-1-29 _____ / _____

**5.60 Return the following dampers on El 669 in the auxiliary building to their original positions:

1-31C-1105 _____ / _____

1-31C-1109 _____ / _____

1-31C-1150 _____ / _____

1-31C-1148 _____ / _____

**5.61 Return the thermostats on General Vent Coolers 1C and 2C to their original setpoints.

_____ / _____

**5.62 Return main control room air conditioning to normal.

_____ / _____

**5.63 Turn vital battery room I exhaust fan on.

_____ / _____

**5.64 Turn vital battery room II exhaust fan on.

_____ / _____

5.0 TEST INSTRUCTIONS (Continued)

**5.65 Turn vital battery room III exhaust fan on.

_____ / _____

**5.66 Turn vital battery room IV exhaust fan on.

_____ / _____

5.67 Remove the block of the input logic of safety injection on Hi steam line ΔP in accordance with Appendix E unless the next test to be performed requires the block to be installed. If this is the case, disregard this step, place N/A in signature line and initial.

_____ / _____

5.68 Remove modification to Hi steam flow coincident with Lo S/G pressure or Lo Tav safety injection input in accordance with Appendix E unless the next test to be performed requires this modification to be made. If this is the case, disregard this step, place N/A in the signature line and initial.

_____ / _____

5.69 Remove block of automatic actuation of safety injection in accordance with Appendix E unless the next test to be performed requires this lockout. If this is the case, disregard this step, place N/A in the signature line and initial.

_____ / _____

5.70 Remove the gag from the following UHI isolation valves unless the valves are required to be gagged in the next test. If this is the case, disregard this step, place N/A in the signature line, and initial.

FCV-87-21 _____ / _____

FCV-87-22 _____ / _____

FCV-87-23 _____ / _____

FCV-87-24 _____ / _____

5.71 Reset the intermediate and power range high level reactor trip setpoints as indicated by the test director in accordance with Appendix C and D of SU-8.5.2 unless the next test to be performed requires this adjustment. If this is the case, disregard this step, place N/A in the signature line, and initial.

Power Range _____ / _____

Intermediate Range _____ / _____

6.0 ACCEPTANCE CRITERIA

6.1 Core exit T/C temperature did not exceed 610°F.

_____ / _____

6.2 Delta-T for any loop did not exceed 65°F.

_____ / _____

6.3 Tavg for any loop did not exceed 578°F.

_____ / _____

6.4 Natural circulation can be established and maintained with the degraded condition of a simulated loss of offsite and onsite power.

_____ / _____

6.5 Emergency lighting in the plant is sufficient to operate critical equipment in the loss of all normal lighting.

_____ / _____

6.6 Hot standby conditions can be maintained for a 2-hour period with critical equipment operating off of vital battery power.

_____ / _____

6.7 Manual operation of auxiliary feedwater valves and main steam power reliefs can be coordinated by the unit operator to maintain stable plant conditions.

_____ / _____

6.8 Auxiliary feedwater turbine driven pump room temperature did not exceed 115°F.

_____ / _____

DATA SHEET 5.1

Initial Conditions

Date _____ Time _____ Unit _____

Pressurizer Pressure PR-68-340	_____	psig
Pressurizer Level LR-68-339 Red Pen	_____	%
#1 Hot leg temp TR-68-1	_____	°F
#1 Cold leg temp TR-68-18	_____	°F
#2 Hot leg temp TR-68-1	_____	°F
#2 Cold leg temp TR-68-18	_____	°F
#3 Hot leg temp TR-68-43	_____	°F
#3 Cold leg temp TR-68-60	_____	°F
#4 Hot leg temp TR-68-43	_____	°F
#4 Cold leg temp TR-68-60	_____	°F
S.G. #1 Level (narrow range) LI-3-42	_____	%
S.G. #2 Level (narrow range) LI-3-55	_____	%
S.G. #3 Level (narrow range) LI-3-97	_____	%
S.G. #4 Level (narrow range) LI-3-110	_____	%

Data By _____/_____

DATA SHEET 5.1

Date _____ Time _____ Unit _____

S.G. #1 Level (wide range)
LR-3-43 Pen 1 _____ %

S.G. #2 Level (wide range)
LR-3-43 Pen 2 _____ %

S.G. #3 Level (wide range)
LR-3-98 Pen 1 _____ %

S.G. #4 Level (wide range)
LR-3-98 Pen 2 _____ %

S.G. #1 Pressure
PI-1-2A _____ psig

S.G. #2 Pressure
PI-1-9A _____ psig

S.G. #3 Pressure
PI-1-20A _____ psig

S.G. #4 Pressure
PI-1-27A _____ psig

Attach computer printout of Incore Thermocouple Temperature Map. Refer to Appendix D for the procedure for printing out this map.

S.G. #1 Feedwater flow
FI-3-35A _____ lbs/hr

S.G. #2 Feedwater flow
FI-3-48A _____ lbs/hr

S.G. #3 Feedwater flow
FI-3-90A _____ lbs/hr

S.G. #4 Feedwater flow
FI-3-103A _____ lbs/hr

S.G. #1 Steam flow
FI-1-3A _____ lbs/hr

S.G. #2 Steam flow
FI-1-10A _____ lbs/hr

Data By: _____/_____

DATA SHEET 5.1

Date _____ Time _____ Unit _____

S.G. #3 Steam flow
FI-1-21A _____ lbs/hr

S.G. #4 Steam flow
FI-1-28A _____ lbs/hr

Loop #1 T-average
TI-68-2E _____ ^{o}F

Loop #2 T-average
TI-68-25E _____ ^{o}F

Loop #3 T-average
TI-68-44E _____ ^{o}F

Loop #4 T-average
TI-68-67E _____ ^{o}F

Loop #1 ΔT
TI-68-2D _____ %

Loop #2 ΔT
TI-68-25D _____ %

Loop #3 ΔT
TI-68-44D _____ %

Loop #4 ΔT
TI-68-67D _____ %

($0-52^{o}F = 0-100\%$)

NIS Channel N-41 _____ %

NIS Channel N-42 _____ %

NIS Channel N-43 _____ %

NIS Channel N-44 _____ %

Temperature reading in Turbine-driven Auxiliary Feedwater Pump Room _____ ^{o}F

Data By _____ / _____

DATA SHEET 5.1

Date _____ Time _____ Unit _____

Temp rature reading outside turbine-driven Auxiliary Feedwater Pump Room (Elevation 669) _____ ^{o}F

Main control room temperature _____ ^{o}F

Remarks:

Data By: _____/_____

Reviewed By: _____/_____

DATA SHEET 5.2

Attach the computer printout from the following parameters. Refer to Appendix D for the computer log points and setup procedure.

Pressurizer pressure
Pressurizer Level
RCS Loop 1 Hot Leg Temp
RCS Loop 2 Hot Leg Temp
RCS Loop 3 Hot Leg Temp
RCS Loop 4 Hot Leg Temp
RCS Loop 1 Cold Leg Temp
RCS Loop 2 Cold Leg Temp
RCS Loop 3 Cold Leg Temp
RCS Loop 4 Cold Leg Temp
Steam Generator 1 Pressure
Steam Generator 1 Narrow Range Level
Steam Generator 2 Pressure
Steam Generator 2 Narrow Range Level
Steam Generator 3 Pressure
Steam Generator 3 Narrow Range Level
Steam Generator 4 Pressure
Steam Generator 4 Narrow Range Level
Power Range Channel 1
Power Range Channel 2
Power Range Channel 3
Power Range Channel 4
Incore Thermocouples #1 through #5 (upper head)

NOTE: The preceding parameters should be printed every 1 minute until equilibrium conditions are reached. At this time the interval can be changed as required.

The data points on page 3 of this data sheet will have to be recorded by hand at the indicated intervals using a DVM.

Print out core T/C maps as required.

DATA SHEET 5.2

Record the following temperatures at the indicated intervals.

Time After Trip	Auxiliary* F.P. Room	Ele.669 Outside F.P. Room	Main Control Room
15 mins.			
30 mins.			
45 mins.			
60 mins.			
75 mins.			
90 mins.			
105 mins.			
120 mins.			

*If ambient temperature reaches 115°F, start the AC-powered exhaust fan.

Data By: _____ / _____

DATA SHEET 5.2

125-V Vital Battery and 120 vac Vital Instrument Power

(Battery Output Voltage)

	125v Vital Batt BD I	125v Vital Batt BD II	125v Vital Batt BD III	125v Vital Batt BD IV	120vac Vital Inst Pwr Bd 1-I	120vac Vital Inst Pwr Bd 1-II	120vac Vital Inst Pwr Bd 1-III	120vac Vital Inst Pwr Bd 1-IV
Initial Conditions								
Immediately Following B.O(T)								
T + 10 min.								
T + 20 min.								
T + 30 min.								
T + 40 min.								
T + 50 min.								
T + 60 min.								
T + 70 min.								
T + 80 min.								
T + 90 min.								
T + 100 min.								
T + 110 min.								
T + 120 min.								

Data by: _____ /_____

DATA SHEET 5.2

125-V Vital Battery Room Temperatures & H_2 Level

Initial Conditions	125-V Vital Battery Room I		125-V Vital Battery Room II		125-V Vital Battery Room III		125-V Vital Battery Room IV	
	Temp	H_2* % of Scale	Temp	H_2* % of Scale	Temp	H_2* % of Scale	Temp	H_2* % of Scale
T + 10 min								
T + 20 min								
T + 30 min								
T + 40 min								
T + 50 min								
T + 60 min								
T + 70 min								
T + 80 min								
T + 90 min								
T + 100 min								
T + 110 min								
T + 120 min								

CAUTION: If H_2 approaches 50% of scale 8 (2% H_2) turn exhaust fans on.

Remarks:

Data by _____ / _____

Reviewed by _____ / _____

APPENDIX A

References

1. FSAR

2. Technical Specifications

3. Plant Operating Instructions

   SOI 3.2
   SOI 68.2
   EOI 5
   SOI 62.1B

APPENDIX B

Test Deficiencies # _____

Test Deficiency

Recommended Resolution

Final Resolution

Originator _____ / _____
Signature Date

PORC Review of Final Resolution _____
Date

Approval of Final Resolution _____ / _____
Plant Superintendent Date

APPENDIX C

Procedure for Determining Core Power Level

APPENDIX C

Outline

I. Core Power Determination

A. Primary Side Calorimetric (Forced Circulation Only)

1. Reference (~ 550°F) Calorimetric (Before NC test)

a) Output used to adjust M/D Power Monitor Program's power conversion constant.

B. M/D Power Monitor Program

1. Power Conversion Constant Adjustment.

a) The output of the REF primary calorimetric will give a percent power output; this output must be input to the M/D Power-Monitor Program so that the program output will be in percent power and equal to the primary calorimetric output.

2. Power Monitoring

a) The M/D Power Monitor Program will calculate the integral power as seen by one pass of 5 or 6 detectors. After the output has been calibrated to be equal to the REF primary calorimetric it will be rerun up to once every 2 minutes or as necessary to continuously monitor core power.

APPENDIX C

CORE POWER DETERMINATION

PART A: Primary side calorimetric - Data Sheet C.1 (Forced Circulation)

C.1 Use two DVMs and measure the voltage at the test points specified for each loop as rapid as possible.

C.2 Calculate the ΔT; multiply that ΔT by the specific heat and the Westinghouse best estimate flow rate of the core average temperature (Table C-1). (Special Test No. 9 uses wide range ΔT so a correction factor is required to compensate for pump heating, refer to Appendix D of ST-9A).

C.3 Sum the loop heat rates and convert to a percent reactor power. The output is used in Part B.

APPENDIX C

Core Power Determination

PART B: M/D Power Monitor Program

1. Set up the movable detector system for a 1 pass partial core flux map as per TI-53. Select flux thimbles as per the table below for the flux map.

Drive	10-Path Position	Core Location
A	10	L-5
B	10	L-11
C	10	E-5
D	10	E-11
E	6	J-8
F	8	P-9

These positions may be altered by the test engineer, based upon low-power physics testing results and previous special testing experience.

2. Determine the detector normalization constants and enter them into the P-250 as follows:

   a) Enter a value of 1.0 into the P-250 for the addresses shown in the table below.

   b) With all 5-path selector switches set to normal, run a flux trace.

   c) With all 5-path selector switches set to Emergency, run a second flux trace.

   d) Determine the detector normalization constants from Data Sheet C.2.

APPENDIX C

Core Power Determination

PART B: (Continued)

e) Enter these detector normalization constants into the P-250 as shown in the table below.

Drive	P-250 Address
A	K0908
B	K0909
C	K0910
D	K0911
E	K0912
F	K0913

3. Verify that the P-250 parameters listed in the following table have the proper value and that the P-250 time and date are current. Update as required.

Address	Value	Function
K0901	1	Set the Power Normalization Factor
K5525	1	Selects the Modified "Flux Map Print" programs
K0900	0	Initiated Pass Number
K0864	Variable(1)	Calibration Constant for M/D Power Monitor

(1) Variable: The value entered is a ratio of the Primary Calorimetric Indicated Power (Item B on Data Sheet C.1) to the M/D calculated power (U0906) times the current value entered in (K0864). If no value has been entered into (K0864) enter 0.25.

$$\text{New (K0864)} = \text{Current (K0864)} \times \frac{\text{Item \#8 Data Sheet C.1}}{\text{(U0906)}}$$

APPENDIX C

PART B: (Continued)

4. For power determination, obtain a partial core flux map as per TI-53. The M/D's need not be withdrawn between passes, and passes may be repeated as often as a power determination is required.

NOTE: The calculated power (U0906) is printed after each pass and may be trended by the P-250 if desired. The individual detector normalized integrals are also printed.

TABLE C-1

Temp ^{o}F	C_p (1) BTU/lbm ^{o}F	$\dot{m}^{o}$ lbm/hr
556	1.260	3.6448×10^7
554	1.255	3.6553×10^7
552	1.250	3.6659×10^7
550	1.245	3.6765×10^7
548	1.240	3.6862×10^7
546	1.236	3.6959×10^7
544	1.231	3.7057×10^7
542	1.226	3.7155×10^7
540	1.221	3.7254×10^7
538	1.217	3.7348×10^7
536	1.213	3.7443×10^7
534	1.209	3.7538×10^7
532	1.206	3.7633×10^7
530	1.202	3.7729×10^7

(1) These values are from the 1967 ASME Steam Tables. Values are for a pressure of 2250 psia.

APPENDIX C

Data Sheet C.1

Date _____ Time _____ Unit _____ Power _____ Tavg _____ °F

Item #	Calculation Procedure	Units	Loop 1 R2/TP-411J	Loop 2 R6/TP-421J	Loop 3 R10/RP-431J	Loop 4 R13/RP-441J
1	Loop ΔT - Inservice (at test point)	Volts				
2	Loop ΔT = (#1) x (1)	°F				
3	Loop ΔH = (#2) x Cp (from Table C.1)	BTU/lbm				
4	Loop RCS Flow (from Table C.1)	10^6 lbm/hr				
5	Loop Reactor Power = (#3) x (#4)	10^6 BTU/hr				
6	Total Reactor Power = (#5) Loop 1 + Loop 2 + Loop 3 + Loop 4	10^6 BTU/hr				
7	Reactor Power = (#6) x 0.29307	MWT				
8	% Reactor Power = (#7) x 0.02932	%				

(1) Conversion factor for ΔT obtained from scaling document.

Remarks:

Date By: _____

Checked By: _____

APPENDIX C

A_N = _____ B_N = _____ C_N = _____ D_N = _____ E_N = _____ F_N = _____

A_E = _____ B_E = _____ C_E = _____ D_E = _____ E_E = _____ F_E = _____

$N_A = 1.00$

$$N_B = \frac{A_N}{B_N} = \frac{N_A A_E}{B_N} = \text{_____}$$

$$N_C = \frac{A_N}{C_N} = \frac{N_B B_E}{C_N} = \text{_____}$$

$$N_D = \frac{A_N}{D_N} = \frac{N_C C_E}{D_N} = \text{_____}$$

$$N_E = \frac{A_N}{E_N} = \frac{N_D D_E}{E_N} = \text{_____}$$

$$N_F = \frac{A_N}{F_N} = \frac{N_E E_E}{F_N} = \text{_____}$$

Definitions:

A_N, B_N, C_N, D_N, E_N, F_N = Normalized integral from summary map for each detector in a normal path in the first pass

A_E, B_E, C_E, D_E, E_E, F_E = Normalized integral from summary map for each detector in an emergency path in the second pass

N_A, N_B, N_C, N_D, N_E, N_F = Detector normalization factor for each detector

Remarks:

Data By: _____ Date _____

APPENDIX C

Part C: Using Thermocouples

The incore thermocouples can be used as an indication of both core flow distribution and power shifts during natural circulation.

Prior to running a thermocouple map or trending the eight quadrant tilts (four center line and four diagonal tilts) the following should be verified:

K0701-K0765 = 1, For the flow mixing factors

K5501 = 0, Indicates the measured core ΔT is unreliable

K0791 = 0.075, Core bypass flow fraction

K5010 = 8, Tells thermocouple program how many readings of thermocouples are required for averaging before calculation is done. This in turn sets the running frequency of the Thermcouple Averaging Program at 1, 2, ... X 8 seconds or 64 seconds for us.

The thermcouple programs breaks the core down into eight quadrants--four centerline and four diagonal quadrants (see Figure C-1). Quadrants 1-4 can be directly correlated with the excore detectors but quadrants 5-8 cannot.

The quadrant tilts are indicative of power shifts and should be trended at approximately a 2-minute frequency. The following addressable values are the quadrant tilts:

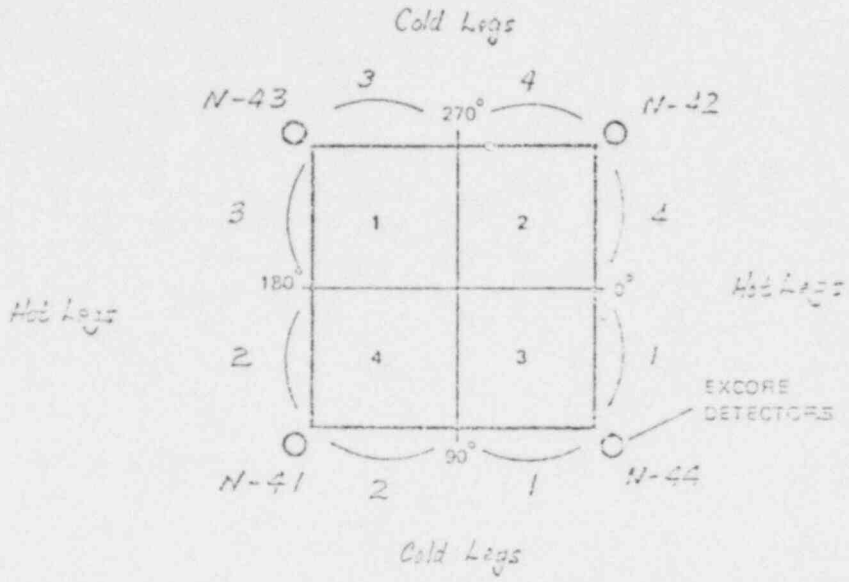
Quadrant	Addressable Value
1	U1159
2	U1160
3	U1161
4	U1162
5	U1151
6	U1152
7	U1153
8	U1154

A Short Form Map should be run periodically or upon request from the test engineer as an indication of core flow distribution. It should be put on the Utility Typewriter if possible. The P-250 Operator's Console Reference Manual provides instructions for obtaining thermocouple maps.

The trend output and Short Form Maps should be attached to this procedure at the end of the test.

APPENDIX C

CENTER-LINE QUARTER-CORE SYMMETRY



DIAGONAL QUARTER-CORE SYMMETRY

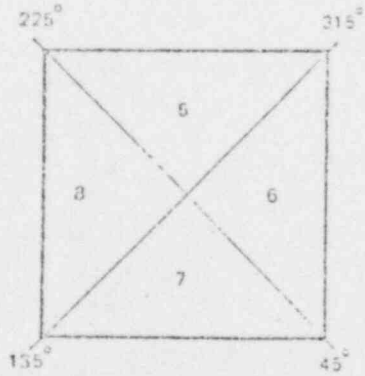


Figure C-1

APPENDIX D

Procedure For Use Of Computer System For Data Collection

The following parameters will be monitored during this test using the plant computer system.

Parameter	Computer Point
Pressurizer Pressure	P0480A
Pressurizer Level	L0480A
RCS Loop 1 Hot Leg Temperature	T0419A
RCS Loop 1 Cold Leg Temperature	T0406A
RCS Loop 2 Hot Leg Temperature	T0439A
RCS Loop 2 Cold Leg Temperature	T0426A
RCS Loop 3 Hot Leg Temperature	T0459A
RCS Loop 3 Cold Leg Temperature	T0446A
RCS Loop 4 Hot Leg Temperature	T0479A
RCS Loop 4 Cold Leg Temperature	T0466A
Steam Generator 1 Pressure	P0400A
Steam Generator 1 Narrow Range Level 1	L0400A
Steam Generator 2 Pressure	P0420A
Steam Generator 2 Narrow Range Level 1	L0420A
Steam Generator 3 Pressure	P0440A
Steam Generator 3 Narrow Range Level 1	L0440A
Steam Generator 4 Pressure	P0460A
Steam Generator 4 Narrow Range Level 1	L0460A
Power Range Channel 1 (Quadrant 4)	N0049A
Power Range Channel 2 (Quadrant 2)	N0050A
Power Range Channel 3 (Quadrant 1)	N0051A
Power Range Channel 4 (Quadrant 3)	N0052A
Incore Thermocouples	T0001A through T0065A

NOTE: One power range channel will be connected to the reactivity computer and will be unavailable for trend.

APPENDIX D

The computer trend typewriter will be used to monitor the following computer points. (Additional points may be added as required by the test director).

BLOCK 1

Column	Point	Column	Point	Column	Point
1	P0480A	7	T0459A	13	P0420A
2	L0480A	8	T0446A	14	L0423A
3	T0419A	9	T0479A	15	P0440A
4	T0406A	10	T0466A	16	L0443A
5	T0439A	11	P0400A	17	P0460A
6	T0426A	12	L0403A	18	L0463A

BLOCK 2

Column	Point	Column	Point
1	N0049A	7	T0017A
2	N0050A	8	T0043A
3	N0051A	9	T0059A
4	N0052A	10-18	As Required
5	T0002A		
6	T0013A		

To initially clear each data block perform the following step for each block to be used.

1. Push DIGITAL TREND button
2. Select block number (1 to 6) on keyboard
3. Push VALUE 1 button
4. Select 0 on keyboard
5. Push VALUE 2 button
6. Push STOP button

Repeat the above 6 steps for each data block to be used.

NOTE: A Block Trend Error message will occur if the data block is initially clear.

APPENDIX D

To set up the data blocks, perform the following series of steps for each point to be monitored.

1. Push the DIGITAL TREND button
2. Select the point address (i.e. PO480A) on the alphanumeric keyboard
3. Push ADDRESS button
4. Select block number (1 to 6) on keyboard.
5. Push VALUE 1 button
6. Select column number (1 to 18) on keyboard
7. Push VALUE 2 button
8. Push START button

Once the blocks are set up they can be initiated by performing the following steps for each block.

1. Push DIGITAL TREND button.
2. Select block number (1 to 6) on keyboard
3. Push VALUE 1 button
4. Select internal number 0 = 30 sec., 1 = 1 minute, 2 = 2 minute, et The 30-second interval is recommended for the duration of the test transient
5. Push VALUE 3 button
6. Push START button

If it is necessary to change the trend interval of a block or trend, perform the following.

1. Push DIGITAL TREND button
2. Select block number (1 to 6) on keyboard
3. Push VALUE 1 button
4. Select new interval number (0 = 30 sec., 1 = 1 min., 2 = 2 min., etc) on keyboard
5. Push VALUE 3 button
6. Push START button

To stop trending or block perform the following:

1. Push DIGITAL TREND button
2. Select block number (1 to 6) on keyboard
3. Push VALUE 1 button
4. Select C on keyboard
5. Push VALUE 3 button
6. Push STOP button

In addition to the data recorded on the trend typewriter, the following points will be monitored on analog trend recorded.

TO056A (Core exit temp).
Others as needed (Recommend pressurizer pressure, steam generator level (WR) and steam generator pressure).

APPENDIX D

After selecting the per to be used to record a value, ensure that it is cleared by performing the following steps.

1. Push ANALOG TREND function button
2. Select per number (1 to 1 .) on keyboard
3. Push VALUE 1 button
4. Push STOP 'utton

To start an analog trend perform the following steps.

1. Push ANALOG TREND function button
2. Select the computer point address (i.e. T0043A) on the alphanumeric keyboard
3. Push ADDRESS button
4. Select per number (1 to 12) on keyboard
5. Push VALUE 1 button
6. Select per position on keyboard. This is the minimum value of the parameter to be monitored
7. Select range on the keyboard
8. Push VALUE 3 button
9. Push START button

Repeat these steps until all of the desired analog points are being recorded.

Prior to initiation of the transient, and at 15-minute intervals thereafter, incore thermocouple maps will be recorded at the programmers console in the computer room. To initiate an incore thermocouple map at that location, perform the following steps.

1. Push IN-CORE T/C MAP function button
2. Select 25 on keyboard for short-form current map
3. Push VALUE 1 button
4. Select output device code number 20 for programmers console on keyboard.
5. Push VALUE 2 button
6. Select 1 on keyboard for a short-form map
7. Push VALUE 3 button
8. Push START bu ton

APPENDIX E

Safeguard Blocking Procedure

The first step blocks automatic initiation of a safety injection. The safety injection alarm, manual S.I handswitch, and the reactor trip portion of the protection logic will remain in operation. If conditions exist that would normally initiate a safety injection; (1) the safety injection alarm will initiate telling the operator that the condition exists and what the problem is. (2) a reactor trip will take place automatically. (3) a safety injection can be initiated manually from the switch in the control room if conditions warrant.

1. Install temporary jumpers and temporary alteration control tags to logic cards A216, test point 1, to the logic ground on the logic test panels in R-47 and R-50.

   NOTE: These jumpers will be specially made for this purpose and installed by an instrument mechanic.

   R-47 Panel Performed by: _____ / _____

   Verified by: _____ / _____

   R-50 Panel Performed by: _____ / _____

   Verified by: _____ / _____

Procedure for blocking automatic actuation of a safety injection on high steamline Delta-P. This block will prevent a reactor trip from occuring during the natural circulation tests from high ΔP caused by degraded test conditions. (This block will also defeat all ΔP SI alarms).

2. Verify status lights 1-XX-55-6B/1, 2, 3, 4, 25, 26, 27, 28, 50, 51, 73, 74 are all clear prior to starting blocking procedure.

3. Move test trip switch PS-515A in 1-R-7 to the trip position and verify the amber light above the switch comes on.

   Performed by: _____ / _____

   Verified by: _____ / _____

CAUTION: In the next step, and all following steps in which a voltage is being applied to the indicated terminals, ensure the applied voltage is of the same polarity as the terminals. This check should be done for every step that a voltage source is applied. Failure to apply the correct polarity will ground the rack power supply. (This problem can be avoided if only the hot wire from the voltage source in the rack is applied to the first terminal indicated in each step [the lower numbered terminal]. The

APPENDIX E

ground will already be made up through the trip switch). The wire on the rack side of the terminal block must be lifted and taped for the terminal point where the jumper wire is connected The TACF tag will be attached to the bistable switch and the TACF must note the jumper and the lifted wire.

NOTE: Orange "Out of Service" stickers should be placed on all status/alarm windows as the 120V source is connected.

4. Lift and tape the wire on the rack side of terminal L-9 in the rear of 1-R-7. Apply a 120-VAC source to terminals L-9 and L-10 in the rear of 1-R-7 and verify 1-XX-55-6B/25 is clear.

Performed by: _____ /_____

Verified by: _____ /_____

5. Move test trip switch PS-515B in 1-R-7 to the trip position and verify the amber light above the switch comes on.

Performed by: _____ /_____

Verified by: _____ /_____

6. Lift and tape the wire on the rack side of terminal L-7 in the rear of 1-R-7. Apply a 120-VAC source to terminals L-7 and L-8 in the rear of 1-R-7 and verify 1-XX-55-6B/27 is clear.

Performed by: _____ /_____

Verified by: _____ /_____

7. Move test trip switch PS-516C in 1-R-12 to the trip position and verify the amber light above the switch comes on.

Performed by: _____ /_____

Verified by: _____ /_____

8. Lift and tape the wire on the rack side of terminal L-5 in the rear of 1-R-7. Apply 120-VAC source to terminals L-5 and L-6 in the rear of 1-R-12 and verify 1-XX-55-6B/73 is clear.

Performed by: _____ /_____

Verified by: _____ /_____

APPENDIX E

9. Move test trip switch PS-516D in 1-R-12 to the trip position and verify the amber light above the switch comes on.

Performed by: _____ /_____

Verified by: _____ /_____

10. Lift and tape the wire on the rack side of terminal L-7 in the rear of 1-R-12. Apply 120-VAC source to terminals L-7 and L-8 in the rear of 1-R-12 and verify 1-XX-55-6B/76.

Performed by: _____ /_____

Verified by: _____ /_____

11. Move test trip switch PS-525B in 1-R-8 to trip position and verify the amber light above the switch comes on.

Performed by: _____ /_____

Verified by: _____ /_____

12. Lift and tape the wire on the rack side of terminal L-7 in the rear of 1-R-8. Apply 120-VAC source to terminals L-7 and L-8 and verify 1-XX-55-6B/28 is clear.

Performed by: _____ /_____

Verified by: _____ /_____

13. Move test trip switch PS-525A in 1-R-8 to the trip position and verify the amber light above the switch comes on.

Performed by: _____ /_____

Verified by: _____ /_____

14. Lift and tape the wire on the rack side of terminal L-9 in the rear of 1-R-8. Apply 120-VAC source to terminals L-9 and L-10 and verify that XX-55-6B/26 is clear.

Performed by: _____ /_____

Verified by: _____ /_____

15. Move test trip switch PS-526D in 1-R-11 to the trip position and verify the amber light above the switch comes on.

Performed by: _____ /_____

Verified by: _____ /_____

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16. Lift and tape the wire on the rack side of terminal L-7 in the rear of 1-R-11. Apply 120-VAC source to terminals L-7 and L-8 in the rear of 1-R-11 and verify that XX-55-6B/51 is clear.

Performed by: _____ /_____

Verified by: _____ /_____

17. Move test trip switch PS-526C in 1-R-11 to the trip position and verify the amber light above the switch comes on.

Performed by: _____ /_____

Verified by: _____ /_____

18. Lift and tape the wire on the rack side of terminal L-5 in the rear or 1-R-11. Apply a 120-VAC source to terminals L-5 and L-6 and verify 1-XX-55-6B/50 is clear.

Performed by: _____ /_____

Verified by: _____ /_____

Temporary Modification to High Steam Flow Coincident with Low S.G. Pressure or Low-Low T_{avg} Safety Injection

19. Verify annunciators XA-55-6A/30 and XA-55-6A/31 are clear or can be cleared.

Performed by: _____ /_____

Verified by: _____ /_____

NOTE: If the alarms will not clear, do not proceed with this modification as a reactor trip may result. The input bistables should be checked and the source of the problem corrected.

20. Move test trip switch TS412D in R-2 to the trip position and verify the amber light above the switch comes on.

Performed by: _____ /_____

Verified by: _____ /_____

21. Lift and tape the wire on the rack side of terminal M-3 in the rear of 1-R-2. Apply a 120-VAC source to terminals M-3 and M-4 and verify XA-55-6A/30 will clear.

Performed by: _____ /_____

Verified by: _____ /_____

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22. Move test trip switch TS-422D in R-6 to the trip position and verify the amber light above the switch comes on.

Performed by: _____ /_____

Verified by: _____ /_____

23. Lift and tape the wire on the rack side of terminal M-3 in the rear of 1-R-6. Apply a 120-VAC source to terminals M-3 and M-4 and verify XA-55-6A/30 will clear.

Performed by: _____ /_____

Verified by: _____ /_____

24. Move test trip switch TS432D in R-10 to the trip position and verify the amber light above the switch comes on.

Performed by: _____ /_____

Verified by: _____ /_____

25. Lift and tape the wire on the rack side of terminal M-3 in the rear of 1-R-10. Apply a 120-VAC source to terminals M-3 and M-4 and verify XA-55-6A/30 will clear.

Performed by: _____ /_____

Verified by: _____ /_____

26. Move test trip switch TS-442D in R-13 to the trip position and verify the amber light above the switch comes on.

Performed by: _____ /_____

Verified by: _____ /_____

27. Lift and tape the wire on the rack side of terminal M-3 in the rear of 1-R-13. Apply a 120-VAC source to terminals M-3 and M-4 and verify XA-55-6A/30 will clear.

Performed by: _____ /_____

Verified by: _____ /_____

NOTE: The T_{avg} inputs to the high steam flow S.I and steam dump interlock are now blocked. The next steps will trip the steam flow inputs to the high steam flow Safety Injection signal so that an S.I. signal will be initiated on low steam generator pressure alone (600 psig). (This would result in a reactor trip, an S. I. alarm, but no S. I. initiation.)

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28. Move test trip switch FS512B in R-3 to the trip position and verify the amber light and annunciator XA-55-6B/2 come on.

Performed by: _____ /_____

Verified by: _____ /_____

29. Move test trip switch FS522B in R-3 to the trip position and verify the amber light and annunciator XA-55-6B/ come on.

Performed by: _____ /_____

Verified by: _____ /_____

NOTE: These two trips will supply the 2 out of 4 logic required to get a Safety Injection Signal.

30. Apply Temporary Alteration Control Tags forms to all the above test trip switches to ensure that they remain in the trip position. Damage to the bistable could occur if the switch is moved back to the normal position. Record the temporary alteration numbers below:

RACK	TEST SWITCH	TEMP ALT. NO.
R-7	PS515A	_____ /_____
R-7	PS515B	_____ /_____
R-12	PS516C	_____ /_____
R-12	PS516D	_____ /_____
R-8	PS525B	_____ /_____
R-8	PS525A	_____ /_____
R-11	PS526D	_____ /_____
R-11	RS526C	_____ /_____
R-2	TS412D	_____ /_____
R-6	TS422D	_____ /_____
R-10	TS432D	_____ /_____
R-13	TS442D	_____ /_____
R-3	FS512B	_____ /_____
R-3	FS522B	_____ /_____

To return the steamline Delta-P S.I. to normal condition, the following steps should be followed.

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NOTE: The orange "Out of Service" stickers should be removed from the alarm/status window as each bistable is put back in service.

31. Remove the 120-VAC source from L-5 and L-6 in 1-R-11. Reterminate wire on L-5.

Performed by: _____ /_____

Verified by: _____ /_____

32. Move test trip switch PS-526C in 1-R-11 to the normal position and verify the amber light above the switch and 1-XX-55-6B/50 are clear.

Performed by: _____ /_____

Verified by: _____ /_____

33. Remove the 120-VAC source from L-7 and L-8 in 1-R-11. Reterminate wire on L-7.

Performed by: _____ /_____

Verified by: _____ /_____

34. Move test trip switch PS-526D in 1-R-11 to the normal position and verify the amber light above the switch and 1-XX-55-6B/51 are clear.

Performed by: _____ /_____

Verified by: _____ /_____

35. Remove the 120-VAC source from L-9 and L-10 in 1-R-8. Reterminate wire on L-9.

Performed by: _____ /_____

Verified by: _____ /_____

36. Move test trip switch PS-525A in 1-R-8 to the normal position and verify the amber light and 1-XX-55-6B/26 are clear.

Performed by: _____ /_____

Verified by: _____ /_____

37. Remove the 120-VAC source from L-7 and L-8 in 1-R-8. Reterminate wire on L-7.

Performed by: _____ /_____

Verified by: _____ /_____

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38. Move test trip switch PS-525B in 1-R-8 to the normal position and verify the amber light above the switch and 1-XX-5-6B/28 are clear.

Performed by: _____ /_____

Verified by: _____ /_____

39. Remove the 120-VAC source from terminals L-7 and L-8 in 1-R-12. Retermi-nate wire on L-7.

Performed by: _____ /_____

Verified by: _____ /_____

40. Move test trip switch PS-516D in 1-R-12 to the normal position and verify the amber light above the switch and 1-XX-55-6B/76 are clear.

Performed by: _____ /_____

Verified by: _____ /_____

41. Remove the 120-VAC source from terminals L-5 and L-6 in 1-R-12. Retermi-nate wire on L-5.

Performed by: _____ /_____

Verified by: _____ /_____

42. Move test trip switch PS-516C in 1-R-12 to the normal position and verify the amber light above the switch and 1-XX-55-6B/73 are clear.

Performed by: _____ /_____

Verified by: _____ /_____

43. Remove the 120-VAC source from terminals L-7 and L-8 in 1-R-7. Retermi-nate wire on L-7.

Performed by: _____ /_____

Verified by: _____ /_____

44. Move test trip switch PS-515B in 1-R-7 to the normal position and verify the amber light and 1-XX-55-6B/27 are clear.

Performed by: _____ /_____

Verified by: _____ /_____

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45. Remove the 120-VAC source from terminals L-9 and L-10 in 1-R-7. Reterminate wire on L-9.

Performed by: _____ /_____

Verified by: _____ /_____

46. Move test trip switch PS-515A to the normal position and verify the amber light above the switch and 1-XX-55-6B/25 are clear.

Performed by: _____ /_____

Verified by: _____ /_____

NOTE: At this point the steamline Delta-P safety injection is in a normal operating mode.

To return the high steam flow coincident with low steam generator pressure or low-low T_{avg} to normal, perform the following steps.

47. Move test trip switch FS522B in R-3 to the normal position and verify the amber light goes out and XA-55-6B/9 will clear.

Performed by: _____ /_____

Verified by: _____ /_____

48. Move test trip switch FS512B in R-3 to the normal position and verify the amber light goes out and XA-55-6B/2 will clear.

Performed by: _____ /_____

Verified by: _____ /_____

49. Remove the 120-VAC source from terminals M-3 and M-4 in R-13. Reterminate wire on M-3.

Performed by: _____ /_____

Verified by: _____ /_____

50. Move test trip switch TS442D in R-13 to the normal position and verify the amber light goes out and XA-55-6A/30 will clear.

Performed by: _____ /_____

Verified by: _____ /_____

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51. Remove the 120-VAC source from terminals M-3 and M-4 in R-10. Reterminate wire on M-3.

Performed by: _____ _____/_____

Verified by: _____ _____/_____

52. Move test trip switch TS4[illegible]D in R-10 to the normal position and verify the amber light goes out and XA-55-6A/30 will clear.

Performed by: _____/_____

Verified by: _____/_____

53. Remove the 120-VAC source from terminals M-3 and M-4 in R-6. Reterminate wire on M-3.

Performed by: _____/_____

Verified by: _____/_____

54. Move test trip switch TS442D in R-6 to the normal position and verify the amber light goes out and XA-55-6A/30 will clear.

Performed by: _____/_____

Verified by: _____/_____

55. Remove the 120-VAC source from terminals M-3 and M-4 in R-2. Reterminate wire on M-3.

Performed by: _____/_____

Verified by: _____/_____

56. Move test trip switch TS412D in R-2 to the trip position and verify the amber light comes on and XA-55-6A/30 will clear.

Performed by: _____/_____

Verified by: _____/_____

APPENDIX E

57. Remove the Temporary Alteration Tags on the following test trip switches:

RACK	TEST SWITCH	TEMP ALT. NO.
R-7	PS515A	_____/_____
R-7	PS515B	_____/_____
R-12	PS516C	_____/_____
R-12	PS516D	_____/_____
R-8	PS525B	_____/_____
R-8	PS525A	_____/_____
R-11	PS526D	_____/_____
R-11	RS526C	_____/_____
R-2	TS412D	_____/_____
R-6	TS422D	_____/_____
R-10	TS432D	_____/_____
R-13	TS442D	_____/_____
R-3	FS512B	_____/_____
R-3	FS522B	_____/_____

58. Remove the jumpers and the Temporary Alteration Tags from logic cards A216, test point 1, to the logic ground on the logic test panels in R-47 and R-50.

R-47 Panel Performed by: _____/_____

Verified by: _____/_____

R-50 Panel Performed by: _____/_____

Verified by: _____/_____

NOTE: All reactor safeguard systems modified for the special startup tests are back in a normal configuration at this time.

APPENDIX F

Technical Specifications Exceptions

The table below identifies those technical specification items which are temporarily bypassed or require special test exceptions to the limiting conditions for operation during the performance of this and all other special tests.

TECHNICAL SPECIFICATION	1 Natural Circulation	2 Loss of Offsite Power	3 Natural Circ. w/o Przr Htrs.	4 Natural Circ. Isolate SG	5 Natural Circ. Reduced Pressure	6 Charging and Letdown Cooldown	7 Blackout	8 Stagnant Start	9A Forced Flow Cooldown	9B Boron Mixing Cooldown
Containment HI Pressure SI (3.3.2.1)	X	X	X	X	X	X	X	X	X	X
Safety Limits (2.1.1)	X	X	X	X	X	X	X	X		X
OPΔT (3.3.1) Inoperable because of low flow	X	X	X	X	X		X	X	X	X
OTΔT (3.3.1) Inoperable because of low flow	X	X	X	X	X		X	X	X	X
Minimum temperature (3.1.1.4)				X				X	X	X
Moderator temperature coefficient (3.1.1.3)				X				X	X	X
Steamline ΔP SI (3.3.2.1) bypassed	X	X	X	X	X	X	X	X	X	X
High Steamflow coincidental w/low steamline pressure or low-low T_{avg} SI										
Reset flow to 0% and T_{avg} blocked	X	X	X	X	X	X	X	X	X	X
Reset low steamline pressure				X					X	X
Low pressurizer pressure SI (3.3.2.1)	X	X	X	X	X	X	X	X	X	X
SG level low AFW start reset (3.3.2.1)		X					X			
Pressurizer (3.4.4)			X		X		X			
UHI (3.5.1.2)	X	X	X	X	X	X	X	X	X	X
AFW (3.7.1.2)		X					X			
Diesel Gens. (3.8.1.1)		X					X			
A.C. Electrical Boards (3.8.2.1)		X					X			
Batteries (3.8.2.3)		X					X			
RCS Flowrate (3.2.3)	X	X	X	X	X		X	X		X
Control Rod Insertion Limits (3.1.3.6)	X	X	X	X	X		X	X		
Reactor Coolant Loops Normal Operation (3.4.1.2)	X	X	X	X	X		X	X		X

TABLE 1

Loop Flow and Core ΔT for
Various Power Levels and
Isolation Configurations

(Computer Estimates)

	No. of Loops Operating (Nat. Circ.)			
Power Level	4	3	2	1
.5%	W_L = 3.7 ΔT = 10.3	W_L = 3.6 ΔT = 12.5	W_L = 4.1 ΔT = 16.4	W_L = 5.2 ΔT = 26
.75%	W_L = 3.7 ΔT = 13.5	W_L = 4.1 ΔT = 16.3	W_L = 4.7 ΔT = 21.4	W_L = 5.9 ΔT = 34
1%	W_L = 4.1 ΔT = 16.3	W_L = 4.5 ΔT = 19.8	W_L = 5.2 ΔT = 26	W_L = 6.5 ΔT = 41
1.5%	W_L = 4.7 ΔT = 21.4	W_L = 5.2 ΔT = 26	W_L = 5.9 ΔT = 34	W_L = 7.5 ΔT = 54
2%	W_L = 5.2 ΔT = 26	W_L = 5.7 ΔT = 31.4	W_L = 6.5 ΔT = 41	W_L = 8.2 ΔT = 65.4
2.5%	W_L = 5.6 ΔT = 30.1	W_L = 6.2 ΔT = 36.5	W_L = 7.1 ΔT = 47.1	W_L = 8.9 ΔT = 75.9
3%	W_L = 5.9 ΔT = 34	W_L = 6.5 ΔT = 41.2	W_L = 7.5 ΔT = 54	W_L = 9.7 ΔT = 85.7

NOTE: W_L is % of 97,000 gpm flow through operable loop.

ΔT = Loop ΔT in °F.