

INFORMATION ONLY

Form 34731 (10-81)
(Formerly SPD-1002-1)

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: OP/1/A/6100/05
Change(s) 0 to
13 Incorporated

(2) STATION: McGuire Nuclear

(3) PROCEDURE TITLE: Unit Fast Recovery

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Reviewed/Approved By: _____ Date: _____

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Date/Initial

Verified with Control Copy _____/_____

DUKE POWER COMPANY
McGUIRE NUCLEAR STATION
UNIT FAST RECOVERY

1.0 Purpose

The purpose of this procedure is to define the cause and/or actions resulting in a Reactor Trip and/or Shutdown. This procedure defines the corrective action taken to remedy the Reactor Trip and/or Shutdown and outlines the steps necessary to return the unit to power. This procedure may be used provided:

- 1) The Reactor Startup is to begin within sixteen hours after the Reactor Trip and/or shutdown occurred.
- 2) Cooldown has not been initiated per controlling procedure for Unit Shutdown (OP/1/A/6100/02).

Sections included in this procedure are:

- 3.0 Cause of Reactor Trip and/or Shutdown AND Corrective Actions Taken.
- 4.0 Fast Recovery Procedure.

2.0 Limitations and Precautions

- 2.1 Do not exceed a stable startup rate of 1 DPM.
- 2.2 Overlap between source and intermediate and between intermediate and power range shall not be less than one decade.
- 2.3 If reactor startup is not initiated in sixteen (16) hours, OP/1/A/6100/01 (Controlling Procedure for Unit Startup) shall be used for unit startup.
- 2.4 Whenever there is a thermal power change exceeding 15% of the rated thermal power within a one hour period, Primary Chemistry must be notified to take an isotopic analysis for iodine following the power change, and Health Physics must be notified to sample and analyze the unit vent per T.S. 4.11.2.1.2.

3.0 Cause of Trip/Shutdown and Corrective Action Taken

3.1 Initial Conditions

3.1.1 AP/1/A/5500/01 (Reactor Trip) and/or applicable steps in OP/1/A/6100/02 (Controlling Procedure for Unit Shutdown) have been completed.

3.2 Procedure

3.2.1 Date _____ Time _____ of reactor trip and/or shutdown.

3.2.2 The cause of the reactor trip and/or shutdown was an operational error, equipment failure, etc. Explain in detail:

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3.2.3 The corrective action taken was repair equipment, procedure change etc. Explain in detail:

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_____/_____
3.2.4 The Performance Group has performed an engineering evaluation of the unit trip and recommends a unit startup. This evaluation is not applicable if the trip was caused by an obvious personnel error. (Must be signed prior to Mode 2 by the Performance Group)

4.0 Fast Recovery Procedure

4.1 Initial Conditions

_____/_____ 4.1.1 The reactor is to be restarted within sixteen (16) hours after the trip and/or shutdown.

____/____ 4.1.2 Cooldown has not been initiated per Controlling Procedure for Unit Shutdown (OP/1/A/6100/02).

____/____ 4.1.3 The main turbine-generator is coasting down or on the turning gear.

____/____ 4.1.4 The Steam Dump Control is set at 1092 psig and transferred to pressure control.

____/____ 4.1.5 The following documents have been reviewed to clear any items which effect entering Modes 2 or 1:

Red Tag Log _____

White Tag Log _____

R&R of Station Equipment Checksheets _____

Tech Spec Action Item Log _____

4.2 Procedure Date _____ Time _____ Initial _____

4.2.1 If reactor is critical (Mode 2) proceed to Step 4.2.16. If reactor is not critical perform statup surveillance testing as follows:

4.2.1.1 If MG sets are NOT in service then proceed to Step 4.2.1.4.

____/____ 4.2.1.2 Insert all control rods per OP/1/A/6150/08 (Rod Control).

____/____ 4.2.1.3 Shutdown both MG sets per OP/1/A/6150/08 (Rod Control).

____/____ 4.2.1.4 Perform PT/1/A/4600/56 (Manual Reactor Trip Functional Test) unless it has been completed within the previous seven days.

____/____ 4.2.1.5 Ensure IAE has completed channel functional tests on

the following if not performed within the previous seven days:

- 1) Intermediate Range, Neutron Flux
- 2) Source Range, Neutron Flux
- 3) Reactor Trip Breaker

_____/_____
4.2.1.6 One rod position indicator is operable per Tech. Spec. 3.1.3.3.

NOTE Ensure Performance engineering evaluation is complete, if applicable.

CAUTION Do not exceed rod withdrawal limit per the Data Book Curve.

_____/_____
4.2.2 Determine the desired estimated critical rod height and corresponding boron concentration per OP/0/A/6100/06 (Reactivity Balance Calculation).

NOTE NC System boron concentration shall not be reduced below the value required to maintain 1.6% Delta k/k shutdown margin at xenon free hot standby conditions unless the shutdown banks are fully withdrawn. The shutdown banks should be withdrawn during any boron concentration change.

_____/_____
4.2.3 Adjust NC System boron concentration as required in previous step per OP/1/A/6150/09 (Boron Concentration Control) or OP/1/A/6200/02 (BTRS).

_____/_____
4.2.4 After Step 4.2.1 is completed withdraw the Shutdown Banks per OP/1/A/6150/08 (Rod Control). Ensure one rod position indicator is operable with reactor trip breakers closed for any rod not fully inserted per Tech Spec 3.1.3.3.

NOTE Notify Radwaste Chemistry prior to transferring water to the waste recycle system.

- ____/____ 4.2.5 Set the highest reading source range and intermediate range channels to record on the Nuclear Instrumentation Recorder.
- ____/____ 4.2.6 Defeat the "Source Range High Flux Level at Shutdown" alarm by the manual block switch on each of the source range drawers.
- ____/____ 4.2.7 Verify the "Source Range High Shutdown Flux Alarm Blocked" annunciator is illuminated.
- ____/____ 4.2.8 Verify a shutdown margin greater than or equal to 1.6% Delta k/k per OP/0/A/6100/06 (Reactivity Balance Calculation) by verifying that the predicted critical control rod position is above Tech Spec limit within 4 hours prior to achieving criticality. Document this condition on Enclosure 13.2 Part B of PT/1/A/4600/08 (Precriticality Surveillance Requirements for Unit Startup) if startup is from Mode 3.
- ____/____ 4.2.9 Within 15 minutes prior to criticality, verify the NC System lowest operating Loop Tave is greater than or equal to 551°F and that the shutdown banks are fully withdrawn. Document both these conditions on Enclosure 13.2 Part C of PT/1/A/4600/08 (Precriticality Surveillance Requirements for Unit Startup) if startup is from Mode 3.
- ____/____ 4.2.10 Announce over the paging system that a reactor startup has commenced.
- ____/____ 4.2.11 Set NR-45 Recorder Chart speed to hi.

NOTE If criticality is attained below the control rods' low insertion limit, reinsert all control banks and refer to OP/0/A/6100/06 (Reactivity Balance Calculation). If criticality is attained above the control rods' low insertion limit, but below the estimated critical position (ECP) lower band, notify Reactor personnel (within 24 hours) and continue normal operation. If criticality is not attained prior to exceeding the upper band

of the ECP, stop withdrawing rods and recheck ECP calculations. If calculations are not in error, criticality must be approached per OP/0/A/6150/13 (1/M Approach to Critical).

____/____ 4.2.12 Withdraw the Control Rod Banks per OP/1/A/6150/08 (Rod Control) to attain criticality.

4.2.12.1 Maintain rods within the rod withdrawal limits per the Data Book Curve.

____/____ 4.2.13 Perform the following steps while increasing reactor power to 1×10^{-8} amps.

____/____ 4.2.13.1 Select both IR channels to record on NR-45 when power is greater than 1×10^{-10} amps and "P-6 IR Permissive" lamp is illuminated.

____/____ 4.2.13.2 Block the S.R. high level trip and high voltage by placing both SR select switches to "Block".

____/____ 4.2.13.3 Verify the "SR Train A (B) Trip Blkd. Hi Voltage Off" permissive lamps illuminated.

____/____ 4.2.14 With reactor power leveled out at 1×10^{-8} amps record the following data:

Rod Position Bank _____ Steps _____ Tave _____ °F

Boron Concentration _____ ppm

Time _____

NOTE Record following if OAC is operating. Xenon worth _____ pcm.
Samarium difference from equilibrium _____ pcm.

____/____ 4.2.15 Select one PZ channel to record on NR-45 Recorder and return NR-45 Recorder to slow speed.

4.2.16 Ensure IAE has completed the following prior to entering Mode 1:

_____/_____
4.2.16.1 Channel functional tests on the following if not completed within the previous seven days:

- 1) Turbine Trip, Low Fluid Oil Pressure
- 2) Turbine Trip, Stop Valve Closure

_____/_____
4.2.17 Establish or verify that a H₂ blanket has been established on the NCDT per OP/0/A/6500/01 (Liquid Waste System).

_____/_____
4.2.18 Increase reactor power to 1%. If necessary, continue heatup to no-load Tave.

_____/_____
4.2.19 If auxiliary feedwater has been used to maintain steam generator level, warm up and start the Main Feedwater System per OP/1/A/6250/01 (Condensate and Feedwater System).

NOTE If CA Pumps received an auto start signal and Train "A" and Train "B" Modulating Valve resets were placed in "Reset" when securing CA, then return both Train "A" and Train "B" resets to "Normal".

_____/_____
4.2.20 Secure the Auxiliary Feedwater pumps and align for standby readiness per OP/1/A/6250/02 (Auxiliary Feedwater) if being used to maintain S/G levels.

_____/_____
4.2.21 Match steam generator level and programmed level then place feedwater bypass control valves in automatic when desired.

_____/_____
4.2.22 Align and startup MSR's per OP/1/B/6250/11 (MSR Operation) concurrent with starting up the Turbine Generator.

NOTE Refer to Data Book, Section 1.3 (Fuel Maneuvering Limits) for rate at which power levels can be changed.

_____/_____
4.2.23 Increase reactor power to about 3% and bring the main turbine to 1800 RPM per OP/1/A/6300/01 (Turbine Generator Operation). Do not allow Tave to decrease below 551°F.

_____/_____
4.2.24 Increase reactor power to about 6% for a cold turbine start or 12% for a hot turbine start.

_____/_____
4.2.25 Parallel the unit to the system per OP/1/A/6300/01 (Turbine Generator Operation).

_____/_____
4.2.26 When the steam dump valves close, transfer the steam dump controller selector switch to Tave control. Place Steam Dump M/A station in "AUTO".

_____/_____
4.2.27 When reactor power reaches 10%, verify "P-10 Nuclear at Power" light illuminated, "P-13 Turbine Not At Power" light off, and "P-7 Lo Power Rx Trip Block" light off.

_____/_____
4.2.28 Block the intermediate range high level trip and rod stop by depressing both "Intermediate Range Block" pushbuttons. Verify both "I/R Trip Blocked" lights illuminated.

_____/_____
4.2.29 Block the power range Lo Setpoint trip by depressing both "Power Range Block" pushbuttons. Verify both "P/R Lo Setpoint Trip Blocked" lights illuminated.

_____/_____
4.2.30 At approximately 183 MWe, transfer automatic feedwater control from the bypass control valve to the main feedwater control valve for each steam generator as follows:

NOTE Transfer should be made over a period of five minutes to reduce flow oscillations.

_____/_____
4.2.30.1 Open or verify open the following valves:

1CF-31 (A S/G CF Cntrl Inlet Isol.)
1CF-33 (A S/G CF Cntrl Outlet Isol.)

1CF-22 (B S/G CF Cntrl Inlet Isol.)
1CF-24 (B S/G CF Cntrl Outlet Isol.)

1CF-19 (C S/G CF Cntrl Inlet Isol.)
1CF-21 (C S/G CF Cntrl Outlet Isol.)

1CF-16 (D S/G CF Cntrl Inlet Isol.)
1CF-18 (D S/G CF Cntrl Outlet Isol.)

_____/_____
4.2.30.2 The following is the recommended way to transfer from the bypass to the main CF control valves: With the Main Feedwater Control Valve in manual, throttle open the main feedwater control vlv until the CF Bypass Control valve slowly closes. When the CF Bypass Control valve closes, place Man/Auto station on the bypass control to manual. Place the Main Feedwater Control vlv. in Auto and verify proper operation.

_____/_____
4.2.31 When "C-5 Lo Turb. Impulse Press Rod Blk" light is out, adjust Tave to within $\pm 1^{\circ}\text{F}$ of Tref and transfer rod control to automatic when desired.

NOTE With rod control in auto maintain the rods within the insertion and withdrawal limits by boration and dilution.

_____/_____
4.2.32 Place the Turbine Exhaust Hood Spray Switch to "OFF".

_____/_____
4.2.33 Notify HP to sample Unit Vent per Tech. Spec. Surveillance requirement 4.11.2.1.2.

_____/_____
4.2.34 For further power increase refer to OP/1/A/6100/03 (Controlling Procedure for Unit Operation).