

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/2/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 Refer to McGuire Limitations and Precautions (OP/0/A/6100/08), as applicable.
- 2.2 Do not exceed a stable startup rate of 1 DPM.
- 2.3 Overlap between source and intermediate and between intermediate and power range shall not be less than one decade.
- 2.4 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.
- 2.5 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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This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

4.1 Initial Conditions

_____/_____ 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 Two licensed Reactor Operators are in the Control Room.

_____/____ 4.1.5 The Steam Dump Control is set at 1092 psig and transferred to pressure control.

_____/____ 4.1.6 Tech. Spec Action Log has been reviewed for items that may effect entering Modes 2 or 1.

4.2 Procedure Date _____ Time _____ Initial _____

4.2.1 Perform startup 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 Ensure IAE has completed channel functional tests on

the following if not performed within the previous 92 days:

- 1) Intermediate Range, P6 Interlock
- 2) Reactor Trip, P4 Interlock

____/____

- 4.2.1.7 One rod position indicator is operable per Tech. Spec. 3.1.3.3.

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

____/____

- 4.2.2.1 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

____/____

- 4.2.2.2 Channel functional tests on the following if not completed within the previous 92 days:

- 1) Power Range, P7 Interlock
- 2) Power Range, P8 Interlock
- 3) Power Range, P10 Interlock

____/____

- 4.2.3 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. When possible, the shutdown banks should be withdrawn during any boron concentration change.

____/____

- 4.2.4 Adjust NC System boron concentration as required in Step 4.2.3 per OP/1/A/6150/09 (Boron Concentration Control) or OP/1/A/6200/02 (STRS).

____/____ 4.2.5 When desired, start one Feedwater Pump per OP/1/A/6250/01 (Condensate and Feedwater System) and secure Auxiliary Feedwater per OP/1/A/6250/02 (Auxiliary Feedwater System) when desired, and align system per Enclosure 4.1 (Alignment for Standby Readiness).

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, return both Train "A" and Train "B" resets to "Normal".

____/____ 4.2.6 When main feedwater is in service, match the steam generator levels and programmed level, then place feedwater bypass control valves in automatic when desired.

____/____ 4.2.7 After Step 4.2.1 is complete, place the MG sets in service per OP/1/A/6150/08 (Rod Control).

____/____ 4.2.8 Set the highest reading source range and intermediate range channels to record on the Nuclear Instrumentation Recorder (NR-45).

____/____ 4.2.9 Close or verify closed the reactor trip breakers and withdraw the shutdown banks to 100% withdrawn per OP/1/A/6150/08 (Rod Control).

____/____ 4.2.10 Defeat the "Source Range High Flux Level at Shutdown" alarm by the manual block switch on each of the source range drawers.

____/____ 4.2.11 Verify the "Source Range High Shutdown Flux Alarm Blocked" annunciator is illuminated.

____/____ 4.2.12 Complete Enclosure 13.2 of PT/1/A/4600/08 (Precriticality Surveillance Requirements for Unit Startup).

____/____ 4.2.13 Announce over the paging system that a recorder startup has commenced.

____/____ 4.2.14 Set NR-45 Recorder Chart Speed to Hi.

NOTE

If criticality is attained below the control rods' low insertion limit, reinsert all control rods and refer to OP/0/A/6100/06 (Reactivity Balance Calculation).

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

____/____ 4.2.15 Withdraw the Control Rod Banks per OP/1/A/6150/08 (Rod Control) to attain criticality.

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

____/____ 4.2.16.1 Select both IR channels to record on NR-45 when power is greater than 1×10^{-10} amps and "P-6 IR Permissive" lamps is illuminated.

____/____ 4.2.16.2 Block the S.R. High level trip and high voltage by placing both SR select switches to "Block".

____/____ 4.2.16.3 Verify the "SR Train A (B) Trip Blkd. Hi Voltage Off" permissive lamps illuminated.

____/____ 4.2.17 With reactor power leveled out at 1×10^{-8} amps record the following data: Time _____
Rod Position _____ Tave _____ °F

Boron Concentration _____ ppm

Record the following if OAC is operational:

Xenon Worth _____ pcm

Samarium Equil. Difference _____ pcm.

_____/____ 4.2.18 Verify H_2 blanket on NCDT per OP/0/A/6500/01 (Liquid Waste).

_____/____ 4.2.19 Select one PR Channel to record NR-45 Recorder and return NR-45 Recorder to slow speed.

_____/____ 4.2.20 Increase reactor power to 3%. If necessary continue heatup to no-load Tave.

_____/____ 4.2.21 Align and startup the MSR's per OP/1/B/6250/11 (Moisture Separator Reheater Operation) concurrent with the Turbine Generator.

NOTE Do not exceed 600 RPM until no-load Tave is attained.

_____/____ 4.2.22 Bring the main turbine to 1800 RPM per OP/1/A/6300/01 (Turbine Generator). Do not allow Tave to decrease below 551°F.

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

_____/____ 4.2.23 Increase reactor power to about 6% for a cold turbine start.

_____/____ 4.2.24 Increase reactor power to about 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 Bypass Mode selector switch to Tave control.

_____/____ 4.2.27 With reactor power greater than or equal to 10%, verify "P-10 Nuclear at Power Permissive" light illuminated, "P-13 Lo Turb.

Impulse Press Permissive" light off, and "P-7 Lo Power 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 approximately 5 minutes to reduce oscillations.

4.2.30.1 With Main Feedwater Control Valve in manual, throttle open Main Feedwater Control Valve until main feedwater bypass control valve slowly closes. When main feedwater bypass control valve closes, place Man/Auto station on Bypass Control to manual. Place 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 if desired.

_____/_____
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).