GPU 2020

Oxford Pendaflex

STOCK No. 753

Davis-Besse Nuclear Power Station EP 1202.04

Unit No. 1 GPU 2020

Emergency Procedure EP 1202.04

Reactor Trip

NUCLEAR SAFETY RELATED

Record of Approval and Changes

Prepared by	J. Lingenfelter	4/18/75 Date
Submitted by	[signature] Section Head	4/2/76 Date
Recommended by	[signature] SRB Chairman	4/20/76 Date
QA Approval	NA Manager of Quality Assurance	Date
Approved by	[signature] Station Superintendent	4/20/76 Date

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OBSOLETE

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QA Approved N/A
Manager of Quality Assurance Date

Approved by [signature] 4/20/76
Station Superintendent Date

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The following portions of this procedure contain "Laters" which must be resolved prior to using that section.

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1. REACTOR TRIP FROM GREATER THAN 5 % POWER

1.1 SYMPTOMS

1.1.1 Annunciator Alarms

1. At least two of the four "RPS CH 1(2,3,or4) CH TRIP" alarms (if not manually tripped).
2. At least one of the following alarms (if not manually tripped).
    1. "RPS RC HI PRESS TRIP"
    2. "RPS RC HI TEMP TRIP"
    3. "RPS HI FLUX/NO RCP ON TRIP"
    4. "RPS CTMT HI PRESS TRIP"
    5. "RPS RC LO PRESS TRIP"
    6. "RPS RC PRESS-TEMP TRIP"
    7. "RPS FLUX-DFLUX - FLOW TRIP"
    8. "RPS HI FLUX TRIP"
3. "CRD TRIP CONFIRM"
4. "T-G MASTER TURB TRIP"

1.1.2 Individual and rod group in-limit lights on.

1.1.3 Rapid decrease in reactor power (neutron flux level).

1.1.4 Integrated Control System (ICS) in "track" mode.

1.2 AUTOMATIC ACTIONS

1.2.1 All control rods, except the axial power shaping rods (APSR's - group 8) will be fully inserted.

1.2.2 The turbine-generator will trip.

1.2.3 The ICS automatically transfers to the track mode; maintains SG level at low level limit.

1.2.4 The turbine bypass control valve setpoint for main steam header pressure will be changed to 995 psig.

1.3 IMMEDIATE ACTIONS

1.3.1 Verify that all control rods except the APSR's are fully inserted. If not, manually trip the reactor.

1.3.2 Verify that the turbine-generator has tripped. If not, manually trip the turbine.

1.3.3 Close the letdown isolation valve, MU 2B.

1.3.4 Maintain the pressoriser level above low level heater interlock (40"). If necessary, start the second makeup pump.

1.3.5 Verify that the turbine bypass valves are attempting to maintain main steam header pressure at 995 psig. If not, take manual control of bypass valves.

1.3.6 Verify that the ICS is in track and that the feedwater flow to the OTSG's is reduced. If either feedwater control station is in "Hand" manually reduce feedwater demand to zero.

1.3.7 If the reactor power indications show any sign of an increase, initiate boron addition.

1.4 SUPPLEMENTARY ACTIONS

1.4.1 Verify that the following actions are occurring; if not, take manual control of the feedwater system.

1. The steam generator levels (startup levels LI 5P9A1, B1 on the control room "Feed Pumps" panel C-5712) are being maintained at the low level limit (30").

2. If all four reactor coolant pumps have tripped, the steam generator levels should be maintained at about 50% on the "Operate Level Indication" (LRS-5P9A,B on the control room "Feed Pumps" panel C-5712), and the Loss of RC Flow - RC Pump Trip, EP 1202.14 should be implemented.

3. If the main feedwater pumps have tripped, verify that the auxiliary feedwater pumps are maintaining the minimum level; the loss of SG Feedwater Emergency Procedure, EP 1202.26, should be implemented.

1.4.2 Maintain a minimum level of 18 inches on "Makeup Tank Level" (LE-MU16 on control room "Reactor Coolant Makeup and Pressurizer Control" panel C-5703). Add boric acid and primary water to the Makeup Tank by initiating a batch addition as per Section 5 of the Boron Concentration Control Procedure, SP 1103.04.

NOTE: In this batch addition, both boric acid and primary (or demineralized) water are to be added with boric acid flow at least 20% of the total flow. Monitor "Boric Acid Flow" from FI-MU41 on panel C-5702 and total flow from the indicator on the batch controller.

1.4.3 Implement EP 1202.03, Turbine Trip. The sections of EP 1202.03 that pertain to the Reactor Coolant System may be deleted.

1.4.4 Verify that the turbine bypass valves control main steam header pressure at approximately 995 psig (as per "Throt Press" PRS-SP1B on control room "ICS and Reactor Control" panel C-5710); if not, take manual control using "Turbine Bypass Valves," PIC-ICS-12A,B. If low condenser vacuum inhibits bypass steam flow, verify (take manual action, if necessary) that the atmospheric exhaust valves are open and the turbine bypass valves are closed. This step does not apply if the SFRCS has been actuated.

1.4.5 Verify that the reactor coolant pressure returns to the normal operating pressure of 2155 psig as per "RC NR Press" PRS-RC2B,2A2 on control room "Reactor Coolant Makeup and Pressurizer Control" panel C-5705. In case of high pressure, verify that pressurizer spray is initiated at 2205 psig (if reactor coolant pumps are on) and that the pressurizer power relief valve opens at 2255 psig; if not, take manual control of the pressurizer spray valve and power relief valve. In case of low reactor coolant pressure, verify that the pressurizer heaters actuate to maintain pressure; if pressure and/or reactor coolant is lost implement EP 1202.06, Loss of RC/RC Pressure.

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1.4.6 When "Reactor Coolant Average Temperature (as per TR-RC7 or TI-RC7 on control room "ICS and Reactor Control" panel C-5707) stabilizes and begins to approach 546°F (saturation temperature for 995 psig) reduce the pressurizer level setpoint to 100 inches using "PRZR LEVEL" LIC-RC14 on control room "Reactor Coolant Makeup and Pressurizer Control" panel C-5705.

1.4.7 Initiate the calculation of a reactor shutdown margin as per Section 8 of Reactivity Balance Calculations, SP 1103.15.

1.4.8 Verify that the source range nuclear instrumentation ("Log Count Rate" NI-1,2 on control room "ICS and Reactor Control" panel C-5706) is activated when the intermediate range nuclear instrumentation ("Log N" NI-3,4 same panel) indicates $5x10^{-10}$ amps.

1.4.9 When steady conditions have been reached with average reactor coolant temperature at about 546°F, initiate the investigation of the cause of the trip. Request a Post Trip Review and Sequence of Events Printout.

1.4.10 Enter in the Operator's Log the last available criticality information including time, rod position, boron concentration, power level, and RCS average temperature.

1.4.11 Refer to EP 1102.03, Trip Recovery Procedure, for a completion of the cooldown to hot standby conditions and subsequent cooldown or startup.

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1.5 DISCUSSION

Only the Reactor Protection System (including the manual trip functions) can trip the reactor. The parameters monitored and the corresponding trip setpoints are described in SP 1105.02, Reactor Protection System Operating Procedure.

When the reactor is tripped the control rods (except group 8) fall by gravity into the core resulting in an immediate reduction of core power (power generally falls to about 5% of the initial power level and continues to fall thereafter). When the Reactor Coolant System (RCS) heat source is thus removed, the reactor coolant, originally at 582°F, is cooled by the water in the steam generators at a temperature of 530°F (saturation temperature for 870 psig). As the coolant temperature decreases the total volume of coolant decreases and care must be taken to prevent losing pressurizer level. At the same time the secondary steam pressure (and consequently the saturation temperature) is increasing and, because the turbine stop valves have closed due to the turbine trip, depending on the initial power level, the pressure may cause the main steam safety valves to open.

When the reactor is tripped the Integrated Control System will transfer the main steam header pressure setpoint to a value of 995 psig (125 psi greater than normal) which increases the saturation temperature of the water in the steam generator and reduces the reactor coolant heat loss. The 125 psi bias on main steam header pressure setpoint will be maintained until the reactor trip is reset; consequently, a steady state condition will be reached with average reactor coolant temperature at about 546°F corresponding to the saturation temperature of the 995 psig main steam pressure.

When the steady state condition is reached, a cooldown to 530°F is conducted as directed by the Trip Recovery Procedure, PP 1102.03, from which a normal restart or a normal cooldown may be initiated.

This procedure applies primarily to reactor trips from powers greater than 15%. For reactor trips from powers between 5 and 15% the procedure also applies with the exception that some automatic actions (specifically turbine trip and ICS going to "track" mode) may not occur, and the associated operator actions may be deleted (specifically the initiation of the Turbine Trip Emergency Procedure, SP 1202.03.)

2. REACTOR TRIP FROM LESS THAN 5% POWER

2.1 SYMPTOMS

2.1.1 Annunciator Alarms

1. At least two of the four "RPS CH 1 (2,3, or 4) CH TRIP" alarms (if not manually tripped)
2. At least one of the following alarms (if not manually tripped).
    1. "RPS RC HI PRESS TRIP"
    2. "RPS RC HI TEMP TRIP"
    3. "RPS HI FLUX/NO RCP ON TRIP"
    4. "RPS CTMT HI PRESS TRIP"
    5. "RPS RC LO PRESS TRIP"
    6. "RPS RC PRESS-TEMP TRIP"
    7. "RPS FLUX-DFLUX - FLOW TRIP"
    8. "RPS HI FLUX TRIP"
3. "CRD TRIP CONFIRM"

2.1.2 Individual and rod group in-limit lights on.

2.1.3 Rapid decrease in reactor power (neutron flux level).

2.2 AUTOMATIC ACTIONS

2.2.1 All control rods, except the axial power shaping rods (APSR's - group 8 will be fully inserted.

2.2.2 The turbine bypass control valve setpoint for main steam header pressure will be changed to 995 psig.

2.3 IMMEDIATE ACTIONS

2.3.1 Verify that all control rods except the APSR's are fully inserted. If not, manually trip the reactor.

2.3.2 If the reactor power indications show any sign of an increase, initiate boron addition.

2.3.3 Take manual control of the turbine bypass valves (or atmospheric vent valves) and control main steam header pressure to maintain RCS temperature and pressurizer level at their pre-trip conditions.

2.4 SUPPLEMENTARY ACTIONS

2.4.1 Verify that the reactor coolant pressure returns to the normal operating pressure of 2155 psig as per "RC NR Press" PRS-RC2B on contr room "Reactor Coolant Makeup and Pressurizer Control" panel C-5705. In case of high pressure, verify that pressurizer spray has actuated at 2205 psig (if reactor coolant pumps are on) and the pressurizer power relief valve opens at 2255 psig; if not, take manual control of the pressurizer spray valve and power relief valve. In case of low reactor coolant pressure, verify that the pressur actuate to maintain pressure; if pressure and/or reac lost implement EP 1202.06, Loss of RC/RC Pressure.

2.5 DISCUSSION

A reactor trip from less than 5% power causes no appreciable transients with the exception that the turbine bypass valves (or atmospheric vent valves) will attempt to control the main steam header pressure at 995 psig causing an increase in RCS temperature. For this reason, manual control of the valves should be initiated to maintain main steam header pressure at a point to hold RCS temperature and pressurizer level constant.

END

2.4.2 Initiate the calculation of a reactor shutdown margin as per Section 5 of Reactivity Balance Calculations, SP 1103.15.

2.4.3 Verify that the source range nuclear instrumentation (Log Count Rate NI-1, 2 on control room "ICS and Reactor Control" panel C-5706) is activated when the intermediate range nuclear instrumentation("Log N" NI-3,4 same panel) indicates 5×10^{-10} amps.

2.4.4 Take manual control of the"Turbine Bypass Valves"(or atmospheric vents) using PIC-ICS 12A, B on control room "ICS and Reactor Control" panel C-5710. Maintain the turbine header pressure at (or near) the saturation pressure for the RCS temperature (should be near the pre-trip value).

2.4.5 When steady state conditions have been reached, initiate investigation of the cause of the trip.

2.4.6 In the Operator's Log, record the last available criticality data including time, rod positions, boron concentration, power level, and RCS temperature.

2.4.7 Refer to PP 1102.03, Trip Recovery Procedure, to return the RCS to hot standby conditions.

NOTE: Portions of PP 1102.03 need not be completed as directed by the Shift Foreman; specifically, those portions of the procedure dealing with secondary plant equipment may not apply.