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THREE MILE ISLAND NUCLEAR STATION
UNIT #2 EMERGENCY PROCEDURE 2202-2.1
STATION BLACKOUT

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Unit 1 Staff Recommends Approval

Approval NA Date —

Cognizant Dept. Head

Unit 2 Staff Recommends Approval

Approval NA Date —

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Unit 1 PORC Recommends Approval

NA Date —

Chairman of PORC

Unit 2 PORC Recommends Approval

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Chairman of PORC

Unit 1 Superintendent Approval

NA Date —

Unit 2 Superintendent Approval

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Manager Generation Quality Assurance Approval NA Date —

TMI 5B-A Rev 8/77

THREE MILE ISLAND NUCLEAR STATION
UNIT #2 EMERGENCY PROCEDURE #2202-2.1
STATION BLACKOUT

1.0 SYMPTOMS

1.1 Separation from the 230KV system and Turbine Generator trip as indication by:

1.1.1 Zero volts on 230KV BUS voltmeters on the Electric Control Console Panel No. 6A.

1.1.2 Generator breakers open as indicated by alarm on Control Room Panel No. 18.

2.0 IMMEDIATE ACTION

2.1 Automatic Action

2.1.1 Reactor trips due to loss of voltage to the Control Rod Drive System.

2.1.2 Turbine trips.

2.1.3 Control Room DC lighting is energized.

2.1.4 Turbine Driven Emergency Feedpump starts and commences to feed the OTSG's (Once Through Steam Generators).

2.1.5 Atmospheric steam dump valves, MS-V3A and 3B, control main steam pressure 1010 at psig.

CAUTION: If a primary to secondary leak is detected, immediately close the affected OTSG's atmospheric dump valve isolation valve (MS-V1A or 1B) to eliminate the potential of leakage and an unmonitored release path.

NOTE: The Instrument Air Compressors will not restart automatically. Therefore, the atmospheric steam dump valves, emergency feedwater regulation valves, pressurizer level control valve, and seal injection flow control valve will only function as long as the

reserve air in the air receivers is available. The Instrument Air Compressors should be restarted manually as soon as possible.

2.1.6 Turbine Generator DC Emergency Seal Oil Pump starts.

2.1.7 Turbine Generator DC Turning Gear Oil Pump starts.

2.1.8 DC Emergency Bearing Oil Pump for the Main Feedpump Turbine starts.

2.1.9 The DC Oil Lift pumps for the RC pumps start.

2.1.10 The Emergency Diesel Generators start.
DH-V5A and 5B automatically open.

2.1.11 Both Motor Driven Emergency Feedpumps start.

2.1.12 Ventilation fans in the Control Room, Cable Room, Mechanical Equipment Room, River Water Pump House and Diesel Generator Building start.

2.1.13 Make-up pumps (MU-P-1A and 1C) start. (MU-P-1B may service as Backup to either MU-P-1A or 1C).

2.1.14 Nuclear Services River Water pumps start.

2.1.15 Nuclear Services Closed Cooling Water pumps start.

2.1.16 The Intermediate Closed Cooling Water pump starts.

2.2 Manual Action

2.2.1 Verify:

2.2.1.1 The Turbine Driven Emergency Feedpump starts.

2.2.1.2 Atmospheric Steam Dump valves open when steam pressure reaches 1010 psig.

2.2.1.3 The following DC pumps start.

2.2.1.3.1 Turbine Generator DC Emergency Seal Oil Pump.

2.2.1.3.2 Turbine Generator DC Turning Gear Oil Pump.

2.2.1.3.3 DC Emergency Bearing Oil Pump for the Main Feedpump Turbine.

2.2.1.3.4 DC Oil Lift pumps for the RC pumps.

2.2.1.4 Both Diesel Generators start and the generator voltage is 4160 volts and the frequency is 59-61 Hertz.

2.2.1.5 The voltage available lights Unit Substations 2-11E, 2-12E, 2-21E, 2-22E, 2-31E and 2-41E energize.

2.2.1.6 Verify the following equipment has started and the associated systems are operating properly:

2.2.1.6.1 Nuclear Services Closed Cooling Water Pumps.

2.2.1.6.2 Motor Driven Emergency Feedwater Pumps.

2.2.1.6.3 Nuclear Services River Water Pumps.

2.2.1.6.4 Make-Up Pumps and DH-V5A and B open.

2.2.2 "START" both Instrument Air Compressors per 2104-2.3A. If the Instrument Air Compressors do not have sufficient capacity to maintain the air pressure above 85 psia, "CLOSE" the Turbine Building Instrument Air Isolation valve, IA-V29.

2.2.3 Verify the Intermediate Closed Cooling Water pumps start.

2.2.4 Verify the Emergency Feedwater Regulation valves, EF-V11A and B, are functioning properly and "CLOSE" EF-V32A and B. If EF-V11A and B are not operable maintain OTSG level by manually throttling EF-V32A and B.

2.2.5 Verify the Turbine Driven Emergency Feedpump is functioning properly and "STOP" both Motor Driven Emergency Feedpumps.

2.2.6 Verify RCP seal temperatures did not exceed 185^{0}F, and that seal leakage plus seal return flow does not exceed 1.9 gpm. If either condition exists, the RCP seals should be examined before further RCP operation.

2.2.7 If any of the following ICS Stations are in Hand, Steam Generator Reactor Demand, either Feedwater Demand, Main or Startup Feedwater Valve Demand, Feedpump Speed, Reactor Master and/or Diamond Station, runback the applicable ICS Station

3.0 FOLLOW-UP ACTION

3.1.1 Attempt to restore one 230KV line and BUS based on direction from the Dispatcher. If at least one 230KV is re-energized, re-energize plant 6900V, 4160V and 480V switchgear through the auxiliary transformer to enable start of the Reactor Coolant Pumps and energization of the pressurizer heaters to enable a normal cooldown per 2102-3.2.

3.1.2 If neither 230KV BUS can be energized, continue with cooldown by natural circulation using the emergency feedpumps, the OTSG's and the atmospheric dump valves to control the cooldown rate. Remain within the limits of the curve for cooldown by natural circulation (Figure #1).

NOTE: Pressurizer spray and heaters are not available for pressure control due to power loss. Primary system pressure decrease will be dictated by Pressurizer heat losses to ambient which will cause approximately 100 to 200 psi/hr decrease in primary system pressure.

3.2.1 If (2) MU pumps are running.

3.2.2 Close OH-V5A/B as required to maintain MU Tank level. Trip a MU pump as required to maintain pressurizer level.

3.3 Borate the Reactor Coolant System using the Borated Water Storage Tank as follows:

NOTE: Neither the Boric Acid Mix Tank, the Concentrated Waste Tank nor the Reclaimed Boric Acid Tank are available as a source of borated water during a Loss of Normal Power situation.

3.3.1 "OPEN" OH-V5A and 5B.

3.3.2 Manually "OPEN" the RC Letdown to Bleed Hold-up Tank Isolation Valve WDL-V46.

3.3.3 Determine to which R.C. Bleed Hold-up Tank the RC Letdown will flow and manually "OPEN" the RC Hold-up Tank Inlet Valve, either WDL-V963, WDL-V964 or WDL-V965.

CAUTION: These valves are located in a 3000 mr/hr radiation zone and exposure time must be minimized.

3.3.4 Manually "POSITION" MU-V8 to the "BLEED" position.

3.3.5 "CLOSE" MU-V10.

3.3.6 "CLOSE" MU-V12.

3.3.7 Monitor RC Bleed Hold-up Tank and Borated Water Storage Tank levels.

3.4 Following the addition of boric acid, sample the Reactor Coolant for boron concentration and verify shutdown margin per 2103-1.9.

3.5 During cooldown by natural circulation observe the following limits:

3.5.1 Upper OTSG downcomer to cold leg maximum $\Delta T=25^{\circ}F$.

3.5.2 The maximum cooldown rate is $100^{\circ}F/hr$.

3.5.3 Pressure to temperature limits are dictated by the curve for cooldown by natural circulation, figure #1.

3.6 Manually "JACK" the Main Feedpump Turbines when they have stopped. The turbines should be jacked 180° every 20 minutes.

3.7 Manually "JACK" the Main Turbine when it has stopped. The Main Turbine should be turned 180° every 30 minutes.

3.8 "START" one Control Building Area Fan-coil unit, AH-C-50A or B.

CAUTION: Do not exceed a load of 3 MW on either Diesel Generator.

3.9 If the Reactor Building temperature exceeds $112^{\circ}F$ "START" one RB Normal Cooling Unit and three RB Cooling Fans per 2104-5.1.

3.10 If the RB penetration cooling air outlet temperatures exceed $140^{\circ}F$ "START" one RB Penetration Forced Air Cooling Unit, AH-C-48A or B, per 2104-1.7.

3.11 "START" one Control Building River Water Booster pump and one Control Building Chiller Unit if required.

3.12 Energize portions of the Heat Tracing System as required.

3.13 Between 1820 psig and 1600 psig RC System pressure, bypass all SFAS channels for Safety Injection.

3.14 At 700 psig RC System pressure "CLOSE" CF-V1A and B, and "OPEN" and tag the power supplies to these valves.

3.15 At 500 psig RC System pressure rack out RB Spray pumps BS-P-1A and 1B, breakers to prevent unnecessary actuation and cut in low pressure instrumentation. (RC-3A-PI2).

3.16 At 275°F RC System temperature place the NDTT "AUTO-OFF" control switch for the electromatic relief valve RC-R2 to "AUTO" to actuate the 500 psig relief set point.

3.17 When the RC System temperature is below 250°F shift cooldown from the atmospheric dump valves to the Decay Heat Removal System as follows:

CAUTION: Do not exceed 3 MW load on either Diesel Generator.

3.17.1 Line up the Nuclear Services River Water System for Decay Heat Service Cooler Operation per 2104-3.1F.

CAUTION: Do not start a second NSRW pump in the operating header to prevent overloading a Diesel Generator.

3.17.2 "START-UP" the Decay Heat Closed Cooling Water Loop associated with the Decay Heat Service Cooler placed in operation per step 17a above. Refer 2104-3.3.

3.17.3 "START-UP" the Decay Heat Removal Loop associated with the operating Decay Heat Closed Cooling Water Loop. Refer to 2104-3.3.

3.18 When the Decay Heat Removal System is operating properly and is capable of removing of all the decay heat generated in the Reactor, terminate heat removal with the OTSG's as follows:

3.18.1 "CLOSE" the Atmospheric Dump valves, MS-V3A and B.

3.18.2 Fill the OTSG's to the proper shutdown level.

3.18.3 "STOP" the Turbine Driven Emergency Feedpump and "CLOSE" EF-V11A and B or EF-V32A and B.