UNIT NO. _____ DATE / /

# REFUELING RECOVERY

(MODE 6 TO MODE 5)



## 1.0 PURPOSE

This procedure provides instructions for taking the unit from a refueling condition (Mode 6) to cold shutdown (Mode 5).

## 2.0 PRECAUTIONS AND LIMITATIONS

### 2.1 PRECAUTIONS

2.1.1 If the count rate on either Source Range Channel increases unexpectedly by a factor of two or more during any operation, the operation must be suspended immediately until a satisfactory evaluation of the situation has been performed.

2.1.2 Notify Health Physics prior to performing operations evolutions which may significantly alter radiation levels.

2.1.3 Notify Chemistry prior to installing or removing the Containment Equipment Hatch that containment ventilation flow will be changed during this evolution.

2.1.4 During periods of operation with the Reactor Coolant System (RCS) level below the Reactor Vessel Flange elevation (194 feet elevation), ongoing work activities should be closely scrutinized and any work activity limited that has the potential for reducing RHRS capability.

2.1.5 Inadvertent Containment Ventilation Isolation (CVI) may occur during the movement of the Reactor Vessel Head from the head stand to the cavity. Ensure Health Physics initiates compensatory actions to prevent inadvertent actuations.

2.2 LIMITATIONS

2.2.1 In Mode 5, shutdown margin shall be greater than or equal to the limit specified in Technical Specification 3.1.1.2, Figure 3.1-2.

2.2.2 When in Mode 5, with loops filled, at least one Residual Heat Removal train (RHR) shall be operable and in operation, and either:

a. One additional RHR train shall be operable, or

b. The secondary side water level of at least two Steam Generators shall be greater than 17% of wide range level. (Technical Specification 3.4.1.4.1)

2.2.3 While in Mode 5, one RHR train may be inoperable for up to 2 hours for surveillance testing provided the other RHR train is operable and in operation. (Technical Specification 3.4.1.4.1)

2.2.4 While in Mode 5 with the RCS loops not filled, two RHR trains shall be operable and at least one RHR train shall be in operation. Reactor Makeup Water Valves 1208-U4-175, 1208-U4-176, 1208-U4-177, and 1208-U4-183 shall be closed and secured in position (by mechanical stops), except 1208-U4-175 and 1208-U4-177 may be opened for short periods of time for chemistry control provided the Hi Flux at Shutdown Alarm is operable with a setpoint of less than or equal to 2.30 times background. (Technical Specification 3.4.1.4.2)

2.2.5 When in Mode 6, with the water level greater than or equal to 23 feet above the Reactor Vessel Flange, at least one RHR train shall be operable and in operation. (Technical Specification 3.9.8.1)

2.2.6 When in Mode 6, with the water level less than 23 feet above the Reactor Vessel Flange, two RHR trains shall be operable and at least one RHR train in operation. (Technical Specification 3.9.8.2)

2.2.7 While in Modes 4, 5, and 6 with the Reactor Vessel Head on, at least one of the following Cold Overpressure Protection Systems shall be operable:

a. Two Power Operated Relief Valves (PORV) with lift settings which do not exceed the limits established in Technical Specification Figure 3.4-4, or

b. Two RHR Suction Relief Valves each with a setpoint of 450 psig ±3%, or

c. The RCS depressurized with an RCS vent capable of relieving at least 670 gpm water flow at 470 psig. (Technical Specification 3.4.9.3)

2.2.8 While in Modes 5 and 6, at least one of the following Boron Injection Flow Paths shall be operable.

a. A flow path from the Boric Acid Storage Tank via a Boric Acid Transfer Pump and a Charging Pump to the Reactor Coolant System if the Boric Acid Storage Tank in specification 3.1.2.5a is operable, or

b. The flow path from the Refueling Water Storage Tank (RWST) via a Charging Pump to the RCS if the Refueling Water Storage Tank in Specification 3.1.2.5b is operable. (Technical Specification 3.1.2.1)

2.2.9 The temperature of both the primary and secondary coolant in the Steam Generators shall be greater than 70 degrees when the pressure of either coolant in the Steam Generator is greater than 200 psig. (Technical Specification 3.7.2)

2.2.10 While in Mode 5 two channels of Source Range Nuclear Instrumentation shall be operable (Technical Specification 3.3.1). One channel should be selected to Recorder NR-45 with the SOURCE RANGE HI FLUX LEVEL AT SHUTDOWN alarm operable.

2.2.11 While in Mode 6 both Source Range Neutron Flux Monitors shall be operable with continuous visual indication in the Control Room and one with audible indication in the Containment and Control Room. (Technical Specification 3.9.2)

2.2.12 While in Mode 6 (whenever fuel is in the Reactor Vessel with the Reactor Vessel Head Closure Bolts less than fully tensioned or with the head removed) Keff shall be maintained at 0.95 or less, or the boron concentration shall be maintained greater than or equal to 2000 ppm, whichever is more restrictive. Additionally, valves 1208-U4-175, 1208-U4-177, 1208-U4-183 and 1208-U4-176 shall be closed and secured in position (by mechanical stops), except 1208-U4-176 and 177 may be opened for short periods of time for chemistry control provided the Hi Flux at Shutdown Alarm is operable with a setpoint of less than or equal to 2.30 times background. (Technical Specification 3.9.1)

2.2.13 While in Modes 5 and 6, with the RCS level below Reactor Vessel Flange elevation (194 feet elevation), the RWST will be operable with a minimum volume of 99,404 gallons (9% of instrument span) of water at a boron concentration between 2400 and 2600 ppm.

3.0 INITIAL CONDITIONS

3.1 The RHR System is in service aligned to the RCS at a minimum total flow of 3000 gpm.

3.2 The Reactor Coolant Drain Tank (RCDT) is aligned to support RCS and/or Refueling Cavity draining operations.

3.3 The Component Cooling Water (CCW) System is in service.

3.4 At least one Nuclear Service Cooling Water (NSCW) train is in service.

3.5 Two Source Range Channels are in operation and highest channel selected to Recorder NR-45.

a. SOURCE RANGE HI FLUX LEVEL AT SHUTDOWN alarm operable,

b. Audible count rate in Containment and Control Room operable.

3.6 Reactor Vessel Head not installed.

3.7 Fuel Pool To Transfer Canal Gate is closed.

3.8 Transfer Tube Gate Valve is closed and locked.

INITIALS

4.0 INSTRUCTIONS

NOTE

Asterisk (*) steps beside INITIALS spaces indicates steps that generate additional documents.

4.1 POST REFUELING MODE 6 OPERATIONS

4.1.1 As directed by the Outage Area Supervisor and when necessary, ADJUST the Refueling Cavity level to support the Reactor Vessel and Head assembly per 13011, "Residual Heat Removal System".

UNIT NO. _____ INITIALS

4.1.2 OBTAIN from the Control Room Mode Change Binder or OBTAIN from the Surveillance Tracking Coordinator all deferred (not performed) surveillance tests required for Mode 5 entry. _____

SCHEDULE and COMPLETE those applicable test procedures prior to Mode 5 entry.

NOTE

As a precaution, Containment Building Penetrations Technical Specification 3.9.4 will be established during periods of Reactor Vessel Head movement.

CAUTION

Inadvertent Containment Ventilation Isolation (CVI) may occur during the movement of the Reactor Vessel Head from the head stand to the cavity. Ensure Health Physics initiates compensatory actions to prevent inadvertent actuations.

4.1.3 Prior to setting the Upper Internals Assembly

a. NOTIFY Chemistry that closure of the Containment Equipment Hatch will change containment ventilation flow. _____

b. NOTIFY Maintenance to reset the Containment Personnel Lock Interlock System, _____

c. PERFORM 14210, "Containment Building Penetrations Verification-Refueling", _____*

d. NOTIFY Chemistry to reset the PERMS Containment Low Range Area Monitors RE-0002 and RE-0003 alarm setpoint to 100 mR/hour. _____

e. INITIATE RWST cleanup per 13719, "Spent Fuel Pool Cooling And Purification System". _____

UNIT NO. _____ INITIALS

4.1.4 Prior to setting the Reactor Vessel Head, PERFORM the following:

a. VERIFY at least one of the Cold Overpressure Protection Systems operable by performing one of the following (Technical Specification 4.4.9.3):

(1) RHR Suction Relief Valves - VERIFY RHR Suction Valves open per 14000, "Operations Shift And Daily Surveillance Logs" and INITIATE shiftly surveillance per 14000, _____

(2) RCS Vent Path - VERIFY an RCS Vent Path per 14000, "Operations Shift And Daily Surveillance Logs" and INITIATE shiftly surveillance per 14000, _____

(3) PLACE the Cold Overpressure Protection System (COPS) in operation by performing the following:

(a) ENSURE PRZR PORV BLOCK VLV COLD OVERPRESSURE CNTL Handswitches HS-8000G and 8000H are in the BLOCK position, _____

(b) REQUEST I&C to perform an analog channel operational test on both PORV Actuation Channels per 24518, "Reactor Coolant Pressure (Wide Range) Protection II P-403 Analog Channel Operational Test And Channel Calibration" and 24519, "Reactor Coolant Pressure (Wide Range) Protection I P-405 Analog Channel Operational Test And Channel Calibration". _____ *

UNIT NO. _____ INITIALS

(c) VERIFY the following annunciators in alarm. _____

1 A COLD OP LOW AUCT RCS TEMP, (ALB 12 C04),

2 B COLD OP LOW AUCT RCS TEMP (ALB 12 C05).

(d) ARM the A and B COPS by placing handswitches HS-8000G and 8000H to ARM position, _____

(e) VERIFY the following annunciators alarmed upon arming COPS: _____

1 A COLD OP ACTU VLV HV-8000A NOT FULL OPEN (ALB 12 E06),

2 B COLD OP ACTU VLV HV-8000B NOT FULL OPEN (ALB 12 F06).

(f) ENSURE PRZR PORVs PV-455A and 456A are closed and the handswitches in AUTO, _____

(g) ENSURE OPEN PRZR PORV BLOCK valves HV-8000A and HV-8000B. _____

NOTE

This step satisfies Technical Specification surveillance requirement 4.4.9.3.1.c.

(h) VERIFY the following annunciators reset:

1 A COLD OP ACTU VLV HV-8000A NOT FULL OPEN (ALB 12 E06), _____

2 B COLD OP ACTU VLV HV-8000B NOT FULL OPEN (ALB 12 F06). _____

b. VERIFY SAFETY INJECTION Pumps A and B breakers are racked out and tagged per 12006, "Unit Cooldown To Cold Shutdown". _____

UNIT NO. _____ INITIALS

4.1.5 While operating with the RCS level below 17% pressurizer level (approximately 207 feet elevation) the following controls should be in effect:

a. Tygon tube watch is required any time the RCS level is being changed while the RCS level is below 17% (approximately 207 feet elevation) pressurizer level, _____

(1) Periodic comparison checks should be made every 4 hours between the Control Room Temporary RCS Level Monitors and the Tygon tube, _____

(2) The Control Room Monitors should agree within 7 percent of scale with the Tygon tube,

(3) Two out of three Level Monitors must agree before draining RCS below the top of the hot leg (188 feet 3 inches),

(4) If neither Control Room RCS Level Monitor is available, then a continuous Tygon tube watch should be established while RCS level is below 17% pressurizer level. _____

(5) DETERMINE closure status of Containment Equipment Hatch and ENSURE hatch is capable of being closed within 57 minutes or ENSURE hatch is closed prior to reducing RCS level below three feet below the Reactor Vessel Flange (191 ft. el.), _____

(6) A review of all Containment penetrations addressed in 14210, "Containment Building Penetrations - Refueling" should be accomplished to determine those which have been opened by manual means and an info LCO generated for those identified, _____

UNIT NO. _____ INITIALS

(7) Except when installing the Reactor Vessel Head, a minimum of two incore thermocouples shall be available. _____

(8) REQUEST I&C reset the designated ERF incore thermocouples alarm setpoint to alarm at 10°F above desired temperature per 00410-C, "Computer Software Control". _____

(9) If SG Nozzle Dams are to be installed and no cold leg opening is to be established, a vent path is required from the Reactor Vessel upper plenum.

This vent path can be satisfied by:

(a) Removing a pressurizer manway, or

(b) Removing a Steam Generator manway on a hot leg that will not be dammed, or

(c) Removing three pressurizer code safeties. _____

(10) If SG Nozzle Dams are to be installed and a cold leg opening is to be established, a vent path is required from the Reactor Vessel Upper Plenum by removing an SG manway on an HL that will not be dammed.

(11) If it is intended to operate at one foot above mid-nozzle level, the preferred RHR configuration is one train operating with a flow of 3000 gpm. _____

UNIT NO. _____ INITIALS

(12) While operating with SG Nozzle Dams installed, ENSURE one Safety Injection Pump is capable of being racked in and operated in the hot leg injection mode if needed,

(13) While level is in the region of the hot legs, TREND RHR Pump parameters on ERF for early detection of possible RHR Pump degradation due to vortexing,

(14) Minimum RCS level is one foot above mid-nozzle (188 feet 0 inches elevation) except for Steam Generator burping during initial drain down. For effective SG tube draining, RCS level should be lowered to 187 feet 6 inches. Upon completion of SG burping, RAISE RCS level to 188 feet - 0 inches and MAINTAIN at this level thereafter.

(15) A minimum of 4 Containment Cooling Units will be operable and capable of being started if required while RCS level is below 191 feet elevation.

b. COORDINATE with Outage Area Supervisor and INITIATE draining the Refueling Cavity to 190 feet per 13011, "Residual Heat Removal System", _____

DE-ENERGIZE all underwater lights prior to uncovering. _____

4.1.6 When the Reactor Vessel Head is ready to be lowered into place, VERIFY RCS water level is less than or equal to 190 feet. _____

UNIT NO. _____ INITIALS

4.1.7 Prior to lowering Reactor Vessel Head into place, DRAIN Reactor Cavity Seal Area by opening Reactor Cavity Seal Support Drain.

UNIT 1: 1-1213-U4-088 _____

_____ IV

UNIT 2: 2-1213-U4-088 _____

_____ IV

4.1.8 If it is necessary to perform any head lifts for O-ring inspections, deconning, etc., then prior to performing the lift, COMPLETE the applicable steps of 12007-C, "Refueling Entry" Core Alternations Checklist 2 and ATTACH to this procedure. _____

4.1.9 After the Reactor Vessel Head is lowered into place and during Head tensioning, MAINTAIN RCS water level at less than or equal to 190 feet. _____

4.1.10 If necessary, INITIATE reducing level to 1 foot above mid-nozzle (188 feet - 0 inches) or 189 feet with SG Nozzle Dams installed.

4.1.11 MAINTAIN RCS temperature utilizing RHR Outlet HV-0606 for Train A (HV-0607 for Train B) as high as possible but not to exceed 130°F. _____

UNIT NO. _____ INITIALS

4.1.12 . NOTIFY Health Physics that they may release the locked or posted access restrictions on the concrete plugs for the Fuel Transfer Tube bellows in the Fuel Handling Building and Containment Building. _____

4.1.13 Upon completion of refueling cavity decontamination activities:

a. ENSURE Maintenance removes the 2 Blind Flanges on the 12 inch drain lines in the Refueling Cavity, _____

_____ IV

b. ENSURE Maintenance has installed the Transfer Tube Blind Flange. (Technical Specification 4.6.1.1.a) _____

_____ IV

c. ENSURE the FHB HVAC Pre-heating Coil Thermostat is reset by verifying local handswitches HS-12470 and 12471 are in the OFF position, _____

d. CLOSE Reactor Cavity Seal Support Drain.

UNIT 1: 1-1213-U4-088 _____

_____ IV

UNIT 2: 2-1213-U4-088 _____

_____ IV

UNIT NO. _____ INITIALS

4.2 MODE 5 ENTRY

4.2.1 Prior to Maintenance completing the last head bolt tensioning (Mode 5 entry) PERFORM the following:

a. COMPLETE the following logs and VERIFY the requirements therein are met for entry into Mode 5:

(1) 14000, "Operations Shift And Daily Surveillance Logs". _____*

OBTAIN the new cycle curves for the Plant Technical Data Book from Reactor Engineering to be used for shutdown margin determinations.

If curves are not available, OBTAIN a method of performing shutdown margin determinations from Reactor Engineering.

(2) 14225, "Operations Weekly Surveillance Logs", _____*

(3) 14228, "Operations Monthly Surveillance Logs", _____*

(4) 14915, "Special Condition Surveillance Logs. _____*

b. REVIEW the following for impact on entering Mode 5:

(1) Jumper and Lifted Wire Log, _____

(2) Temporary Modification Log, _____

(3) Equipment Clearance Log, _____

(4) LCO Book, _____

(5) Outstanding Work Orders. _____

UNIT NO. _____ INITIALS

c. ENSURE that all surveillance test procedures scheduled per Sub-subsection 4.1.2 required for Mode 5 entry have been completed. _____

REVIEW the Control Room Mode change Binder or OBTAIN from the Surveillance Tracking Coordinator.

d. INITIATE Mode 5 log sheet readings per 14000, "Operations Shift And Daily Surveillance Logs", _____

e. OBTAIN On-Shift Operations Supervisor's approval to change status from Mode 6 to Mode 5.

_____ / / _____
OSOS Signature Date Time

4.2.2 When notified by Maintenance Department that the last Reactor Vessel Head Bolt is tensioned, LOG Mode 5 entry into the Unit Control Log Book. _____

4.2.3 This procedure is complete; REFER to 12001-C, "Unit Heatup To Hot Shutdown (Mode 5 to Mode 4).

Completed: _____
Signature Time / Date

Reviewed: _____
Signature Time / Date

Comments: _____

_____

5.0 REFERENCES

5.1 PROCEDURES

| | | |
|---|---|---|
| 5.1.1 | 12001-C | "Unit Heatup To Hot Shutdown (Mode 5 To Mode 4) |
| 5.1.2 | 12006-C | "Unit Cooldown To Cold Shutdown" |
| 5.1.3 | 13005 | "Reactor Coolant System Draining" |
| 5.1.4 | 13011 | "Residual Heat Removal System" |
| 5.1.5 | 13715 | "Component Cooling Water System" |
| 5.1.6 | 13719 | "Spent Fuel Pool Cooling And Purification System" |
| 5.1.7 | 14000 | "Operations Shift And Daily Surveillance Logs" |
| 5.1.8 | 14210 | "Containment Building Penetrations Verification-Refueling" |
| 5.1.9 | 14225 | "Operations Weekly Surveillance Logs" |
| 5.1.10 | 14228 | "Operations Monthly Surveillance Logs" |
| 5.1.11 | 14915 | "Special Condition Surveillance Logs" |
| 5.1.12 | 24518 | "Reactor Coolant Pressure (Wide Range) Protection II P-403 Analog Channel Operational Test And Channel Calibration" |
| 5.1.13 | 24519 | "Reactor Coolant Pressure (Wide Range) Protection I P-405 Analog Channel Operational Test And Channel Calibration" |

END OF PROCEDURE TEXT