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ARD
CORPORATION

NINE MILE POINT UNIT 2

OPERATING PROCEDURES REFERENCED IN REV 4 EOPS

FOLLOW-ON TASK ANALYSIS

PREPARED FOR

NIAGARA MOHAWK POWER CORPORATION
301 Plainfield Road
Syracuse, New York 13212

NOVEMBER, 1990

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ARD
CORPORATION

November 16, 1990

Mr. Art Vierling
Niagara Mohawk Power Corporation
301 Plainfield Road
Syracuse, New York 13212

Dear Art:

Enclosed is the NMP-2 Follow-On Task Analysis Report for the Operating Procedures Referenced in the EOPs. In this report I have separated the Control and Display (C&D) discrepancies from the procedure discrepancies. I am a little concerned that I did not separate them in the EOP task analysis report. To encourage and facilitate review and assessment of the C&D discrepancies for the EOP task analysis, I have identified specific paragraphs in the report that address C&D discrepancies:

Page	Section	Paragraph
8	3.4	first two bullets
9	3.7	10.1.1 second and third bullets
10	3.7	10.2.5
10	3.7	10.3.7
10	3.7	10.3.14
11	3.8	11.3 third and fourth bullets
11	3.11	14.2.1 first two bullets
12	3.12	15.4
13	3.15	20.1
13	3.16	21.2.2 second bullet
13	3.16	21.2.5
14	3.17	22.15.5

The C&D discrepancies identified during the operating procedure task analysis are described in sections 3.1 through 3.1.6 of the enclosed report. Please call if you have any questions.

Sincerely,

Robert Klein
Human Factors Engineer

cc: George Lapinsky
Jerry Helker

NOV 19 1990

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1.0 INTRODUCTION

ARD Corporation has been contracted to update the NMP-2 Detailed Control Room Design Review (DCRDR) task analysis. The updated task analysis includes Operating Procedure (OP) tasks that are referenced in the Emergency Operating Procedures (EOPs). A report on the task analysis performed upon the flowchart EOPs and EOP-6 was submitted by ARD in October, 1990.

When sections of an OP are referenced in the EOPs, they may be required to be performed under emergency conditions; therefore, these procedure sections are being analyzed in a manner similar to the EOPs. The DCRDR task analysis is being updated to ensure that revisions to EOPs and related OPs do not have an adverse affect on the ability of operators to perform the tasks necessary to respond to emergency conditions.

The original task analysis was performed as part of the DCRDR in January, 1985 using Revision 0 Emergency Procedure Guidelines (EPGs). The current effort has identified new operator tasks required by the Plant Specific Technical Guidelines (PSTGs) and EOPs that were not previously identified during the original EPG task analysis.

The operator control and display requirements for performance of each of the new tasks were determined though the analysis of each of the procedure steps with NMP-2 Operations Subject Matter Experts (SMEs). A verification of availability and suitability of control and display requirements was performed in the NMP-2 control room. This report also contains a human factors review of the procedures, providing a critical analysis of aspects of the OPs which could contribute to operator error.

2.0 METHODOLOGY

2.1 Task Identification

Tasks that were not covered in previous task analysis efforts are included in this report. When an EOP references another procedure for completion of a step, that procedure is considered as part of the EOP and is included as part of the DCRDR task analysis. The following OPs were identified as being referenced in the EOPs:

OP Number	Section	Reference in EOPs
OP-10A	E.2, E.3, E.4, E.5	MSL
OP-25	F.4	MSL
OP-31	F.6, F.8, H.7	C2
OP-33	H.2, H.3	RPV
OP-35	F.2, F.3, H.1, H.4, H.5	C2
OP-37	H.3, H.5	RPV
OP-53A	H.6	MSL
OP-55	E.1	MSL, RR
OP-61A	E.3, E.5, H.1	PC
OP-62	E.2	PC
OP-101C	G.1, G.2, G.3, H.1	RPV, SC
OP-101D	G.1	SC

2.2 Identification of New Tasks

The OPs were not considered in any previous task analysis efforts, all OP tasks are assumed to be new tasks and have been examined as such.

2.3 Determination and Verification of Control and Display Requirements

A single task usually consists of several subtasks or action steps. Each action step was analyzed separately with respect to its purpose in accomplishing the higher order task and information and control needs for performing subtask activities. For each task and subtask a verification was performed to evaluate the availability and suitability of control and display requirements identified during the task analysis. The verification was performed in the NMP-2 control room and auxiliary control room with a SME from the Operations Department. Tasks that require operator actions to be performed in the plant were not covered by this analysis. During the verification, the SME would identify the instrumentation used to perform each task. The availability and suitability of each control and display was discussed for each instrument used in the performance of each task action step. Characteristics of the instrumentation were noted and discussed; for a pump control switch for example, the type of control switch, the available switch positions, the need for feedback, associated indications, and related display characteristics such as range, divisions, and units were analyzed to ensure that they provided the operator with sufficient information and control capabilities to perform the task effectively.

3.0 FINDINGS

The human engineering findings obtained from the task analysis on the OPs referenced in the EOPs include those related to control and display requirements and those related to the content and presentation of the procedures.

3.1 Control and Display Requirements Discrepancies

The task analysis identified the control and display requirements for the completion of each task. The verification analyzed the existing control panel controls and displays to determine the agreement between required and existing instrumentation. The following discrepancies between the control panel instrumentation required for task performance and what currently exists in the control room were identified.

3.1.1 OP-10A, Sections E.2 and E.4

3.1.1.1 Step 2.4.b specifies setting the control switch to ON to open waterbox vent AOV21A(B-F) and OFF to close waterbox vent. Control switch positions should specify OPEN and CLOSE to describe the operator action.

3.1.1.2 Step 4.13.2 directs the operator to open 2SWP*FV47/54A&B. The label on the control panel for this valve does not specify an identification number, it is only labeled LOOP A DISCH HEADER TOTAL FLOW TO CWS/LAKE. The label should specify the component identification number as well as a descriptive name to aid operators in quickly locating components.

3.1.2 OP-31, Sections F.6 and F.8

3.1.2.1 Steps 6.15 and 6.26 require the operator to monitor for RHR total flow at P601 > 1500 gpm but the lowest value on the control panel indicator is 2000 gpm. Indicator scale should be able to be read accurately by the operator for all operational conditions.

3.1.2.2 The Note preceding step 8.25 states that steam supply to RCIC isolates at 75 psia. The units displayed on the control panel pressure meter are psig.

3.1.3 OP-33, Section H.3

3.1.3.1 The first Caution prior to step 3.2 specifies that HPCS flow should not exceed 7175 gpm, but the control panel flow meter is in divisions of 200 gpm. The divisions of the instrument do not enable the operator to read the meter to the level of accuracy specified by the procedure.

3.1.3.2 Step 3.5.2 requires the operator to determine when HPCS System flow is greater than 850 gpm, but the lowest marking on the control panel meter is 2000 gpm. The range of the meter should be able to be read for all operating conditions.

3.1.4 OP-37, Section H.3

3.1.4.1 The first Caution at the beginning of the procedure section directs the operator not to exceed maximum non-regenerative heat exchanger Closed Loop Cooling Water (CCP) exit temperature of 180°F or pressure of 150 psig. These temperature and pressure values are not available in the control room.

3.1.4.2 Steps 3.4 and 3.9 direct operator to verify that 2WCS-FV135 is closed. Valve position indication for 2WCS-FV135 is not available in the control room. Controller 2WCS-FC1135 only shows demand, it does not display actual valve position.

3.1.5 OP-62, Section E.2

Step 2.12 directs the operator to throttle H_2 Recomb 1A(B) Inl From Contmt Isol Vlv HCS*MOV25A(B). This component is not identified on the control panel as a throttle valve.

3.1.6 OP-101C, Sections G.3 and H.1

3.1.6.1 Step 3.20 directs an operator action at reactor pressure of 75 psia, but control room pressure indicators measure units of psig.

3.1.6.2 Step 1.5.4.d directs operator action to be taken when Main Steam Lines are drained. There is no indication of Main Steam Lines drained in the control room.

3.2 General Procedure Format and Presentation

Well written procedures that present the content clearly and accurately are essential to effective operator performance. Good procedures employ a consistent format, state directions to be performed in precise operational terms, and incorporate human factors principles for presentation of instructional information. The OPs reviewed as part of this analysis consistently exhibited deficiencies in the following areas:

3.2.1 Multiple Operator Actions in a Single Procedure Step

Each procedure step should specify a single operator action. When several actions are required they should be broken into multiple steps or substeps. Procedure steps should be written as short directional statements that are easy to follow. The OPs frequently combine several actions into a single step that becomes a lengthy paragraph. When directions are presented as a paragraph, it is more likely that actions within the paragraph will be overlooked by the user.

3.2.2 Cautions and Notes

OP cautions and notes often contain procedure steps directing the operator to perform actions. Cautions should only provide information regarding possible personal injury or equipment damage while performing the procedure step. Notes should only provide background information that will facilitate performance of the step. Cautions and notes should always precede the step to which they apply. Whenever possible, cautions and notes should be presented on the same page as the related steps.

3.2.3 Ambiguous Information

Ambiguous terms (e.g.; enough, as desired, as appropriate) should be avoided. Procedure steps should provide definite directions and operational criteria. Precise terms should be used to avoid error due to operator misinterpretation.

3.2.4 Component Identification

NMP-2 OPs are very inconsistent regarding component identification. There should be definite rules for the identification of components within procedure steps. Identification numbers should be provided when they are available. Component identification should match that on component labels and switch positions should be capitalized and match switch nomenclature.

3.2.5 Level of Detail

The desired level of detail is one in which enough details are presented that the operator has all the information needed, but not so many details that the operator becomes confused by superficial or redundant information.

3.3 Specific Operating Procedure Discrepancies

The following sections list procedure errors and examples of discrepancies from good procedure writing practice identified during the OP task analysis.

3.3.1 OP-10A, Sections E.2 through E.5

Procedure Step	Comment
General	The practice of using a single procedure section to cover actions that may be performed on the same components in different loops causes confusion and is a possible source of operator error. The following are examples of the procedure inconsistencies and ambiguities: • The method of designating the different loops changes often, there are at least five ways used to indicate loops A through F: 2CWS-MOV2A(B-F) 2CWS-AOV21A(B)(C)(D)(E)(F) 2CWS-V285(B, C, D, E, F) 2CWS-MOV5(A-F) CWS-LS51A(-F) • Step 2.6.a: "Remove CWS-LS51A(F)." It is not clear whether this means remove A and F, A through F, A or F, or A, B, C, D, E, or F. The same ambiguity is also found in step 2.8: "Fully open 2CWS-MOG2A B C." • Step 2.7: "... discharge valve 2CWS-MOV5A opens." No other valves are specified in parenthesis, this implies that when operating other loops MOV5A is always to open.
2.3 2.8.1	Different names are used for the same equipment in the two steps. Step 2.3 refers to waterbox vents and 2.8.1 directs to open "valves" shut in step 2.3.
2.5.1	This is a conditional step based on basin water temperature being less than 40°F, but the procedure does not specify how to determine basin water temperature less than 40°F.
2.5.1 3.5.1	Procedure does not specify which bay of P856 to find the fuse to be removed. There are six equally probable options.

Procedure Step	Comment
2.5.1	FM is used as an abbreviation for "from", this is not an approved NMP-2 abbreviation and should be spelled out.
2.6	The first sentence of this step: "When using the priming pump, the waterbox full level switch will not clear as water is not being vented through it." The sentence directs no action and should therefore be presented as a Note providing additional information. Procedure steps should always direct operator actions.
2.7.1 2.8.1 2.8.2	The steps direct the operator to restore components manipulated in previous steps instead of specifying the component: "Replace cover removed in 2.6.a." This should be stated as: "Replace CWS-LS51A(F) cover."
2.9	The Note following step 2.9 states: "Steps 2.1 through 2.9 are applicable to any other pump with appropriate valve changes." The Note applies to the entire procedure section and should be placed at the beginning of the section.
3.0	Operations SME stated that the procedure should include a step to close, or verify closed, pump suction valve 2CWS-MOV2A.
4.5	The step states: "... gates are open enough to support the running pumps." This is an ambiguous statement, the step should specify exactly what is "enough".

Procedure Step	Comment
4.6	The letters identifying different parts of the step mixed with the component designations create a very confusing and hard to follow procedure step: "Locally verifying level in water box via tygon tube and manually actuating CWS-LS51A(-F) may be necessary to start the pumps; (a) remove cover (CWS-LS51A(-F)), (b) hold the switch until the pump starts, (c) replace cover." Each of the lettered parts of the step should be identified as a separate numbered substep.
4.13.1	The step directs the operator to: "control cooling tower basin level in the allowable band..." This is an ambiguous direction, the step should specify exactly what the "allowable band" is.
4.13.4	The last sentence of this step should be stated as a Caution or a Note. "Use extreme care in maintaining level to prevent overflow of basin or loss of circ pump suction head."

3.3.2 OP-31, Sections F.6, F.8, and H.7

Procedure Step	Comment
General	In the Note prior to procedure section F.6, it is recommended that RHR B be used instead of RHR A. But throughout the procedure, direction for performance of A is always presented before performance of B, RHR A(B). That should be reversed to provide further reminder of the recommendation for using RHR B.

Procedure Step	Comment
Caution F.6	In the Caution prior to section F.6, is the statement: "do not perform steps of this procedure which would lower concentration of boron within the RPV." This Caution does not provide enough information for the operator to effectively perform the procedure. It should state which steps will lower the concentration of boron and also what the operator should do instead of performing those steps.
6.7 6.9.10	The steps direct the operator to: "Place the associated MCC breaker to OFF, per Table II." The step should identify the breaker instead of referring the user to a table or using the phrase "the associated breaker".
6.9.7 6.9.16	The steps direct the operator to: "Open to the mid-stroke position..." The action of opening a valve to mid-stroke position should be described as "throttle open".
6.9.8.a	The step directs the operator to monitor Heat Exchanger Wtr Temp RHR Radwaste Outlet (PT7) on P601. The descriptive name is only indicated as a point on recorder E12-R601, the recorder identification number should be provided in the procedure.
6.9.8.b	Operations SME stated that conductivity of "< 2 umho" should be "> 2 umho".
6.9 6.21	These two steps are intended to perform the same function, one for RHR A and one for RHR B. The substeps are essentially the same, each specifying the intended loop, but the format of the overall steps are different. Step 6.10 (a two-digit step) is the same step for loop A as step 6.21.17 is for loop B. The inconsistent presentation of the warmup of system piping for loop A and loop B continues for approximately the next seven steps. The layout of the procedure specifying actions to be performed using loop A or B is already confusing, this inconsistent step format makes it worse.

Procedure Step	Comment
Caution 6.9.14	The Caution prior to step 6.9.14 directs the operator to: "...verify 2RHS*MOV1A is shut and 2RHS*MOV2A is open." The procedure also directs the operator to perform these actions in the two previous steps, 6.9.12 and 6.9.13. Cautions should not direct operator actions. There is no need to insert a redundant caution to reiterate already stated procedure steps.
6.9.8 6.9.17	These two steps are essentially directing the same activities but 6.9.17 includes an additional condition for the operator to determine: "Heat Exchanger Wtr Temp to RHR Radwaste outlet at P601 is $\leq$ 100°F of Rx water temperature." If the task is necessary, it should be included in both steps.
Note 6.14	The Note prior to step 6.14 includes the statement: "RHR pump temperature should be 100°F from coolant temperature..." It is not clear which temperature is to be higher. This should be stated as differential temperature.
6.24	The Reactor Recirculation Pump 1B Discharge Valve 1RCS*MOV18B and Pump Suction Valve 2RCS*MOV10B specified in the step are located on P602, not P603 as stated.
8.16	The step refers to TI89A(B), and then later to TI98A(B) as the same component. One of these references is a typographical error.
8.19	The step directs the operator to: "reperform steps 8.16, 8.17, and 8.18." The SME stated that the step should direct steps 8.14, 8.16, and 8.18 to be repeated.
8.19	The step does not state how often the steps are to be repeated or what criteria to use for proceeding to step 8.20. As it is stated, this step is an endless do-loop.

Procedure Step	Comment
Notes 8.22	The Notes prior to step 8.22 state all of the limitations for the following steps as a lengthy paragraph. These limitations should be listed in a more easily identifiable form or included as separate procedure steps.
Note 8.22	In the second Note prior to step 8.22, Heat Exchanger 1A(B) Service Wtr Outlet Temp [PT5(6)] is specified as being on TR 190. This recorder is identified on the control panel as E12-R601. Procedure nomenclature and component identification should correspond to that on the control panels.
8.23.3 8.25.3	The step directs the operator to: "Clear yellow hold out tag from 2RHS*MOV32A(B) MCC breaker and place the MCC breaker to ON." The step should provide the breaker identification number to help the operator to locate it.
Cautions 7.6 to 7.8	A Caution is placed prior to step H.7.6 which describes the use of RHR A, another Caution prior H.7.8 describes the use of RHR C. Should the same Caution be placed prior to H.7.7, describing the operation of RHR B?

3.3.3 OP-35, Section H.4

Procedure Step	Comment
4.2.2 4.2.3 4.2.4	SME felt that these steps were flow control steps and did not belong in the RPV Pressure Control section.

3.3.4 OP-37, Sections H.3 and H.5

Procedure Step	Comment
General	Procedure directs reject flow to radwaste and to the main condenser simultaneously. The operator, therefore, skips some steps and only performs half of others depending on where flow is being directed. This procedure structure greatly increases the probability that the operator will skip a step that should be performed, or perform a step incorrectly. These should be separated into separate procedure sections for directing flow to radwaste or directing flow to main condenser.
Caution 3	The Caution prior to the start of the procedure directs the operator to take the filter/demineralizers out of service to maintain filter demineralizer inlet temperature less than or equal to 120°F. Operations SME stated that taking filter/demineralizers out of service will not decrease temperature.
Note 3.2	The second Note prior to step 3.2 is a conditional statement directing operator action based on the following: "if reactor coolant water quality is not within limits." The step should state how water quality is measured and what the limits are. The step should at least provide a reference regarding where this information can be found.
3.7	The step provides valve identification numbers in both SWEC and GE formats. One format, that used on the control panel label, is sufficient.
3.7	Step directs operator to use flow controller thumbwheel to control flow. It is not necessary within a procedure to instruct operators on how to work equipment.

Procedure Step	Comment
Note 3.8	The Note prior to step 3.8 should be a procedure step. Notes should provide useful additional information to assist the operator in performing the procedure. This is a conditional step directing the operator to perform an action based on the condition of the flow rate.
3.8	The step directs operator actions to maintain temperature, level, and pressure but does not state within what limits they are to be maintained. The step should specify the limits to be maintained. SME stated that the appropriate limits should be: a. Specify temperature less than 120°F. b. and c. Specify level and pressure as directed by SSS.
3.13	The step includes the statement "as desired" at the end of the step. "As desired" is not needed and should be deleted.
5.3	The first sentence of the step provides operator direction regarding monitoring of cooling flow. The second sentence of the step is as follows: "Maximum obtainable flow is 1430 gpm prior to CCP to non-regenerative heat exchanger bypass valve operation." This sentence does not specify an operator action. It provides background information regarding the step; therefore, it should be presented as a Note prior to the step.

3.3.5 OP-53A, Section H.6

Procedure Step	Comment
General	Throughout the procedure, components are only identified by their identification number, it is helpful to describe the component or provide the exact label description.

3.3.6 OP-55, Section F.1

Procedure Step	Comment
General	Procedure steps do not always start with the action verb telling the operator the action to be performed. Most steps start by identifying the panel where the action is to be performed. A consistent format in procedure steps, with the action verb first, improves operator performance with procedures.
1.1 1.2	The lineups required by these steps are very extensive, the valve lineup is 6 pages long and the power supply lineup is 14 pages long. It is important that these lineups be complete prior to entering this procedure from the EOPs.
Notes 1.6 1.9	The Notes preceding these two steps are essentially the same, both notify the operator of the same condition, but they are stated differently. If the two notes provide the same information, they should be stated alike for ease of operator use and recognition.
1.10.1	The step states that "unit coolers can be manually started as required ..." This does not specify that they <u>should</u> be started. If the procedure requires that the unit coolers be started, then the operator should be directed to do so.

3.3.7 OP-61A, Sections E.3, E.5, and H.1

Procedure Step	Comment
3.1	The valve lineup specified by this step is 30 pages long. The step instructs the operator to perform the lineup, not just verify or ensure it is complete. This is a very lengthy step to be performed as part of an EOP.

Procedure Step	Comment
3.8.8	This step contains two conditional statements and one cautionary statement. Each of the conditional statements should be presented as separate steps and the cautionary statement should be presented as a caution prior to the steps.
3.9 to 3.9.5	These steps employ very poor step subordination and format structure. The leading instruction in step 3.9 is: "In GTS Building:" But in step 3.9.5 actions are specified to be taken in the reactor building. Proper subordination or grouping of procedure steps helps the operator to understand the relationship among steps.
Note 3.13.1	The first sentence of the note prior to 3.13.1 is not really a sentence, it only identifies two valves, it does not supply any additional information about them.
Note Caution 3.14	The Note prior to step 3.14 should be presented before the Caution so that the Caution is the last thing read by the operator prior to performing the step. The Note and the Caution should be on the same page as the associated procedure step.
3.14.7	The step directs the operator to throttle shut pressure valves by "manually adjusting controller 2GTS*PDIK5A(B)." The step does not specify any criteria for adjustment.
3.17	The step states: "When purge is complete..." The step does not specify how the operator is to know that the purge is complete. The procedure should provide criteria for purge completion.
Note 5.0	The final Note prior to the first step directs the operator to "modify steps appropriately" based on specified system conditions. This is an ambiguous direction, operational criteria for "appropriate" should be specified.

Procedure Step	Comment
5.5 5.5.1	The only statement in step 5.5 is: "At P875, position:" Step 5.5.1, which is directly subordinate, directs operator actions at P851. Step 5.5. appears to be unnecessary.
Notes 1.2.3	Each of the Notes prior to step 1.2.3 direct specific operator actions, they do not just provide additional background information. Each of these notes should be a separate procedure step.

3.3.8 OP-62, Section E.2

Procedure Step	Comment
2.4.a	The step directs the operator: "To process the Drywell atmosphere, open the following:" The list of components to open is on the following page. These should be kept together if possible.

3.3.9 OP-101C, Sections G.1, G.2, G.3, and H.1

General	Steps that reference other procedures are inconsistent about referencing specific procedure steps. SME stated that referencing steps in other procedures is helpful in locating the specific steps to be performed.
Note 1.10	The Note prior to step 1.10 specifies procedures to be completed prior to LPSP. Low Power Setpoint is 20% and should be specified.
1.18	The step lists five separate tasks as one step. Procedure steps ideally consist of a single action. When many actions are included in one step, the probability of the operator missing one of the tasks increases.

Procedure Step	Comment
1.20	The step directs the operator to: "Perform the following surveillance." Only one surveillance is listed with a bullet. The step should be stated as a simple direction not as a list.
3.20	The step mixes component identification by specifying some components only by identification number and others only by name. A consistent system of identifying component nomenclature should be established and used.
3.22	Shutdown range level indicator listed in the step as 2ISC-LI105, is identified on the control panel by a GE identification number instead of the identification number used in the procedure. Procedures should be consistent with control panel nomenclature and component identification.
1.0 Note 1	Note 1 prior to step 1.0 specifies: "all rods are inserted to or beyond Maximum Critical Banked Withdrawal Position." This is specified in EOPs as Position 02. Procedures should use the most commonly used nomenclature and be consistent.
1.5.4.b	The step states: "Reduce reactor water level (RWCU, MSL drains)." The parentheses are not needed at the end of the step. Step should specify more clearly that RWCU and MSL Drains are to be used to reduce reactor water level.
1.5.4.f	SME stated that the step should state "If main condenser is not available or until Main Steam Lines are drained...".

APPENDIX

OPERATING PROCEDURE TASKS REFERENCED IN REV 4 EOPs

OP-10A, SECTIONS E.2 THROUGH E.5

E. Startup Procedure

2.0 Pump 1A (B-F) Start With No Other Pumps Running

2.1 Open suction valve 2CWS-MOV2A(B-F) of pump to be started.

2.2
a. Verify pump is adequately vented by opening 2CWS-V234 and 2CWS-V228.
b. Observe a steady stream of water.

2.3 Shut associated pumps waterbox vents 2CWS-V156A(B-F) and 2CWS-V191A(B-F).

2.4 Vent condenser waterbox at local control panel 2CWS-PNL101:
a. Start condenser waterbox priming pump 2CWS-P3.
b. Open associated water box vent AOV21A(B-F) by placing its control switch ON and associated priming pump suctions 2CWS-V282A(B-F) and 2CWS-V285A(B-F).

Note Observe condenser waterbox white light is lit.

c. Shut associated waterbox vent AOV21A(B-F) by placing its control switch OFF, 2CWS-V282A(B-F) and 2CWS-V285A(B-F).
d. Stop condensate water pump priming pump 2CWS-P3.

2.5 Close tower bypass gates 2CWS-MOG52A, B, C such that only one gate is in the mid position.

2.5.1
a. Determine if basin water temperature is less that 40°F.
b. Remove fuse F1-2CWSN02 from P856 to defeat low temperature interlocks.

2.6 Defeat level switch to allow pump to start:
a. Remove CWS-LS51A(F) cover.
b. Visually verify waterbox full by tygon tube level.
c. Manually actuate micro-switch to allow pump start and hold until pump is running.

2.7
a. Place control switch 2CWS-P1 in start position at P851.
b. Verify pump starts.
c. Verify discharge valve 2CWS-MOV5A opens.

2.7.1 Replace cover.

2.8
a. Determine when pump settles out.
b. Ensure pump running amps do not exceed 110 amps.
c. Fully open 2CWS-MOG52A, B, C.

2.8.1 Open associated pumps waterbox vents 2CWS-V156A(B-F) and 2CWS-V191A(B-F).

2.8.2 Replace fuse F1-2CWSN02.

OP-10A, Section E.3

3.0 Pump 1A Start with No Other Pumps Running Using Jet Motive Pump

3.1 Verify blowdown valves 2CWS-V40, V39, V38, V37, and V133 (pump 1B through 1F) are closed.

3.2 Verify blowdown valve for pump 1A is open and P1A waterbox is adequately vented.

3.3
a. Verify pump is adequately vented by opening 2CWS-V234 and 2CWS-V228.
b. Verify a steady stream of water.

3.4
a. Open 2CWS-V212 from the fish jet motive pump.
b. Throttle down on 2SWP-V932 to protect the pump from runout.

3.5 Close tower bypass gates 2CWS-MOG52A, B, C such that only one gate is in the mid position.

3.5.1
a. Determine if basin water temperature is less that 40°F.
b. Remove fuse F1-2CWSN02 from P856 to defeat low temperature interlocks.

3.6
a. Determine when water box level clears.
b. Close 2CWS-V41 and any open waterbox vents.

3.7 Open pump suction valve 2CWS-MOV2A.

3.8
a. Place control switch 2CWS-P1 in start position at P851.
b. Verify pump starts.
c. Verify discharge valve 2CWS-MOV5A opens.

3.9
a. Determine when pump settles out.
b. Ensure pump running amps do not exceed 110 amps.
c. Fully open 2CWS-MOG52A, B, C.

3.10 Close 2CWS-V212 and throttle open 2SWP-V92 to return fish jet pump to normal.

3.10.1 Replace fuse F1-2CWSN02.

4.0 Pump Start with One or More Circulating Pumps Running

4.1 Verify running pump's blowdown valve is open.

4.2 Verify pump is adequately vented.

4.3 Verify waterbox suction valve is open and discharge valve is shut.

4.4 Vent condenser waterbox at local control panel 2CWS-PNL101:
- a. Start condenser waterbox priming pump 2CWS-P3.
- b. Open the associated waterbox vent AOV21A(B-F) by placing control switch to ON, 2CWS-V282A(B-F) and 2CWS-V285A(B-F).

Note Verify waterbox white light is lit to indicate pump primed.
- c. Shut associated waterbox vent AOV21A(B-F) by placing control switch to OFF, 2CWS-V282A(B-F) and 2CWS-V285A(B-F).
- d. Repeat steps 4.4.b and 4.4.c for all waterboxes to be filled.
- e. Stop condenser waterbox priming pump 2CWS-P3.

4.5 Verify cooling tower bypass gates are open enough to support the running pumps.

4.6
- a. Visually verify waterbox tygon tube level.
- b. Remove cover CWS-LS51A(F).
- c. Manually actuate micro-switch to allow pump start and hold until pump is running.
- d. Replace cover CWS-LS51A(F).

4.7
- a. Place control switch 2CWS-P1 in start position at P851.
- b. Verify pump starts.
- c. Verify discharge valve 2CWS-MOV5A opens.

4.8
- a. Determine when pump settles out.
- b. Ensure pump running amps do not exceed 110 amps.
- c. Fully open 2CWS-MOG52A, B, C.

4.9 Repeat steps 4.1 through 4.9 until all pumps running.

4.11 After all pumps running, place cooling tower in the mode applicable per section F.2.0.

4.12 Notify chemistry and radiation protection to verify flow rate instrument and RE157 are in service.

4.13.1
- a. Determine if blowdown flow is not practical or permissible.
- b. Control cooling tower basin level in the allowable band using evaporative loses and service water makeup.

4.13.2
- a. Establish blowdown flow to the lake by opening 2SWP*FV47/54A, B until 2CWS-LV140 is controlling blowdown flow via level setpoint at a rate of approximately 14,000 gpm.
- b. Maintain approximate 14,000 blowdown flow.

5.0 <u>Pump Start With One or More Circulating Pumps Running Using the Blowdown Line</u>

5.1 Verify running pump's blowdown valve is open.

5.2 Verify pump is adequately vented.

OP-10A, Section E.5 (continued)

5.3 Verify waterbox suction valve is open and discharge valve is shut.

5.4 Open blowdown valve for waterbox to be filled.

5.5 a. Ensure waterbox full by observing computer points.
b. Ensure waterbox full by uncapping and venting via CWS-V163A(B-F) while watching level in tygon tube.

5.5.1 a. Determine if waterbox is full but computer point does not agree.
b. Manually actuate appropriate CWS-LS51(A-F) as follows:
1. Remove switchcover.
2. Hold switch to indicate box full until pump starts.
3. Replace switchcover.

5.6 Verify enough bypass gates or distribution gates open to support flow of running pumps.

5.7 Open suction valve of pump 2CWS-MOV2(A-F) to be started.

5.8 a. Determine when suction valve is full open.
b. Start pump 2CWS-MOV2(A-F).

5.8.1 Verify discharge valve 2CWS-MOV5(A-F) goes open.

5.8.2 Ensure steady state pump amps do not exceed 110 amps.

5.9 Determine if no further venting or filling is required.

F.4.0 Shifting Reboiler Steam Supply from Main to Auxiliary Boiler Steam

4.1 Verify auxiliary boiler is in service.

4.2 Set clean steam reboiler extraction supply isolation 2ESS-STV104 to CLOSE at P851.

4.3 Set clean steam reboiler main steam supply 2ESS-STV112 to CLOSE at P851.

4.4 Shut clean steam reboiler drain tank 1A(B) isolation valve 2CNA-HV34A(B).

4.5 Set auxiliary boiler steam inlet to clean steam reboiler 2ASS-AOV145 to OPEN.

4.6 Monitor clean steam reboiler operation per 1.0 of this procedure.

OP-31, SECTIONS F.6, F.8, AND H.7

F. Normal Operation

6.0 RHR 1(B) Shutdown Cooling Operation

Note 1 Determine reactor coolant temperature > 280°.
2 Determine RHR pump temperature.
3 Temperature difference should be < 100°.

Caution Do not perform steps of the procedure that would lower boron concentration.

6.1 Verify RPV pressure less than 128 psig.
6.1.1 Remove special jumper AP-60 P609, device JA, TB2 points 16 and 17 in accordance with AP-3.3.2.
6.1.2 Observe annunciator 602218, NSSS group 5 isolation signal, is illuminated.
6.1.3 Remove special jumper AP-61 P609, device JA, TB2 points 16 and 17 in accordance with AP-3.3.2.
6.1.4 Observe annunciator 602224, NSSS group 5 isolation signal, is illuminated.

6.2 Maintain RPV level between 179 - 187 inches.
6.2.1 Use condensate/feed in accordance with N2-OP-3 to maintain level. (Same as RC/L-2 008)
6.2.3 Use CRD in accordance with N2-OP-30 to maintain level. (Same as RC/L-2 009)
6.2.4 Use RCIC in accordance with N2-OP-35 to maintain level. (Same as RC/L-2 010)
6.2.4 Use RWCU in accordance with N2-OP-37 to maintain level.

6.3 Direct chemistry sample.

6.4 Place RHR pump 1A(B) at P601 in PULL-TO-LOCK.

6.5 Flush RHR A(B).

6.6 Isolate RHR A(B) system pressure pump.
6.6.1 Shut CSL*P1 supply to RHR A stop check 2RHS*V47 to isolate RHR A system pressure pump.
6.6.2 Shut CSL*P2 discharge stop check to RHR B loop 2RHS*V61 to isolate RHR B system pressure pump.

6.7.1 Verify pump 1A(B) minimum flow valve 2RHS*MOV4A(B) shut at P601.
6.7.2 Place associated MCC breaker OFF per table II.

6.8.1 Clear yellow hold out tag from SDC suction outside isolation valve 2RHS*MOV113.
6.8.2 Place MCC breaker ON.

OP-31, Section F.6 (continued)

6.9 Warmup RHR A system piping.
6.9.1 Notify radwaste.
6.9.2 Unlock and open RHR pump 1A discharge header drain to radwaste 2RHS*V41.
6.9.3 Reset SDC isolation signals by pressing inboard and outboard MSIV and drain valve manual isolation reset pushbuttons at P602.
6.9.4 Open SDC A return 2RHS*MOV40A at P601.
6.9.5 Clear yellow holdout tag from SDC A test check valve bypass 2RHS*MOV67A and set MCC breaker to ON.
6.9.6 Open SDC A test check valve bypass 2RHS*MOV67A at P601.
6.9.7 Throttle open, to mid-stroke position, manual drain isolation to radwaste from A, B, C loops 2RHS-V91.
6.9.8 a. Verify HX water temperature RHR radwaste outlet (PT7) $\leq 180^{o}F$ at P601.
b. Verify conductivity on ERF point RHSCA100 is <2 umho.
c. Shut manual drain isolation to radwaste from A, B, C loops 2RHS*V91.
6.9.9 Shut SDC A test check valve bypass 2RHS*MOV67A at P601.
6.9.10 Place MCC breaker for SDC A test check valve bypass 2RHS*MOV67A to OFF.
6.9.11 Shut SDC A return 2RHS*MOV40A at P601.
6.9.12 Shut or verify shut 2RHS*MOV1A at P601.
6.9.13 Open or verify open 2RHS*MOV2A at P601.
6.9.14 Open SDC suction inside isolation valve 2RHS*MOV112 at P601.
6.9.15 a. Throttle open SDC suction outside isolation valve 2RHS*MOV113 at P601.
b. Determine if RPV water level decreases.
c. Shut SDC suction outside isolation valve 2RHS*MOV113 at P601 until level is restored.
6.9.16 Throttle open to mid-stroke position manual drain isolation to radwaste from A, B, C loops 2RHS*V91. (Same as 6.9.7)
6.9.17 a. Verify HX water temperature RHR radwaste outlet (PT7) $\leq 180^{o}F$ at P601.
b. Verify conductivity on ERF point RHSCA100 is <2 umho.
c. Shut manual drain isolation to radwaste from A, B, C loops 2RHS*V91.
6.9.18 Shut and lock RHR pump 1A discharge header drain to radwaste 2RHS*V41.

6.10 Notify rad protection to start 2SWP*RE23A and verify monitor is on line and working properly.

6.11.1 Open SWP inlet to RHR HX A 2SWP*MOV90A at P601.
6.11.2 Throttle open HX 1A service water outlet valve 2SWP*MOV33A.
6.11.3 Verify service water to RHR A HX flow up to 7400 gpm at P601.

6.12 Stop reactor recirculation pump 2RCS*P1A at P602.

6.13 Shut reactor recirculation pump 1A discharge valve 2RCS*MOV18A or pump suction valve 2RCS*MOV10A at P602.

OP-31, Section F.6 (continued)

Caution Determine if RHR shutdown cooling can be established and maintained.

6.14 Start RHR pump 1A at P601.

Note Determine if recirculation pump is running in the opposite loop.

6.15 Throttle open SDC A return 2RMS*MOV40A.
6.15.1 Observe 7450 gpm RHR A total flow at P601.
6.15.2 Determine if system flow greater than 1500 gpm is achieved within 15 seconds.
6.15.3 Trip RHR pump 1A.
6.15.4 Close or verify closed main turbine bypass valves.

Caution Monitor RPV cooldown rate. Not to exceed 100°F/hr.

6.16 Throttle shut HX 1A inlet bypass valve 2RHS*MOV8A to increase RPV cooldown rate.

6.17 Throttle open HX 1A inlet bypass valve 2RHS*MOV8A to decrease RPV cooldown rate.
Caution Monitor RHR HX 1A service water outlet temperature at P601. Not to exceed 130°F.
6.17.1 Determine if HX 1A inlet bypass valve 2RHS*MOV8A is full open.
6.17.2 Throttle shut HX 1A service water outlet valve 2SWP*MOV33A.
6.17.3 Determine if there is little or no decay heat.
6.17.4 Close 2RHS*MOV12A.

6.18 Perform applicable sections of N2-OSP-RCS@001 to comply with tech spec 3.4.6.1.

6.19 Determine when shutdown cooling has been established.
6.19.1 Notify radiation protection.
6.19.2 Verify established controls are adequate.

6.20 Notify Chemistry.

6.21 Warmup RHR B piping system.
6.21.1 Notify radwaste. (Same as 6.9.1)
6.21.2 Reset SDC isolation signals by pressing inboard and outboard MSIV and drain valve manual isolation reset pushbuttons at P602. (Same as 6.9.3)
6.21.3 Throttle open, to mid-stroke position, RHR discharge to radwaste 2RHS*V142.
6.21.4 Open SDC B return 2RHS*MOV40B at P601.
6.21.5 Clear yellow holdout tag from SDC B test check valve bypass 2RHS*MOV67B and set MCC breaker to ON.
6.21.6 Open SDC B test check valve bypass 2RHS*MOV67B at P601.
6.21.7 Open RHR discharge to radwaste 2RHS*MOV149 on P601.

OP-31, Section F.6.21 (continued)

6.21.8 a. Verify HX water temperature RHR radwaste outlet (PT7) $\leq 180^{o}F$ at P601. (Same as 6.9.8.a)
b. Verify conductivity of ERF point RHSCA100 is <2 umho. (Same as 6.9.8.b)
c. Shut RHR discharge to radwaste 2RHS*MOV149.

6.21.9 Shut SDC B test check valve bypass 2RHS*MOV67B at P601.

6.21.10 Place MCC breaker for SDC A test check valve bypass 2RHS*MOV67A to OFF.

6.21.11 Shut SDC B return 2RHS*MOV40B at P601.

6.21.12 Shut or verify shut 2RHS*MOV1B at P601.

6.21.13 Open or verify open 2RHS*MOV2B at P601.

6.21.14 Close heat exchanger bypass valve 2RHS*MOV8B.

6.21.15 Open SDC suction inside isolation valve 2RHS*MOV112 at P601.

6.21.16 a. Throttle open SDC suction outside isolation valve 2RHS*MOV113 at P601.
b. Determine if RPV water level decreases.
c. Shut SDC suction outside isolation valve 2RHS*MOV113 at P601 until level is restored.

6.21.17 Notify rad protection to start 2SWP*RE23B and verify monitor is on line and working properly.

6.21.18 Open SWP inlet to RHR HX B 2SWP*MOV90B.

6.21.19 a. Thottle open HX B service water outlet valve 2SWP*MOV33B at 601.
b. Determine coolant discharge to radwaste is > 180^{o}.

6.21.20 Open RHR discharge to radwaste 2RHS*MOV149.

6.21.21 a. Verify HX water temperature RHR radwaste outlet (PT7) $\leq 180^{o}F$ at P601.
b. Verify conductivity on ERF point RHSCA100 is <2 umho.
c. Shut manual drain isolation to radwaste from A, B, C loops 2RHS*V91.
d. Shut RHR discharge to radwaste 2RHS*MOV149.

6.21.22 Shut RHR discharge to radwaste 2RHS*MOV142.

6.21.23 Open HX bypass valve 2RHS*MOV8B.

6.22 a. Throttle open HX 1B service water outlet valve 2SWP*MOV33B.
b. Verify service water to RHR A HX flow less than 7400 gpm at P601.

6.23 Stop reactor recirculation pump 2RCS*P1B at P603.

6.24 Shut reactor recirculation pump 1B discharge valve 2RCS*MOV18B or pump suction valve 2RCS*MOV10B at P603.

6.25 Start RHR pump 1B at P601.

6.26 Throttle open SDC B return 2RMS*MOV40B.

6.26.1 Observe 7450 gmp RHR B total flow at P601.

6.26.2 Determine if system flow greater than 1500 is achieved within 15 seconds. (Same as 6.15.2)

6.26.3 Trip RHR pump 1B.

6.26.4 Close or verify closed main turbine bypass valves.

OP-31, Section F.6 (continued)

6.27 Increase RPV cooldown rate.
6.27.1 Throttle shut HX 1B inlet bypass valve 2RHS*MOV8B to increase RPV cooldown rate.
6.27.2 Open RHR B to reactor head spray 2RHS*MOV104 to increase RPV cooldown rate.

6.28 Decrease RPV cooldown rate.
6.28.1 Throttle open HX 1B inlet bypass valve 2RHS*MOV8B to decrease RPV cooldown rate.
6.28.2 Shut RHR B to reactor head spray 2RHS*MOV104 to decrease RPV cooldown rate.
6.28.3 Determine if HX 1B inlet bypass valve 2RHS*MOV8B is full open.
6.28.4 Throttle shut HX 1B service water outlet valve 2SWP*MOV33B.
6.28.5 Determine if there is little or no decay heat.
6.28.6 Close 2RHS*MOV12B.

6.29 Perform applicable sections of N2-OSP-RCS@001 to comply with tech spec 3.4.6.1. (Same as 6.18)

6.30 Determine when shutdown cooling has been established. (Same as 6.19)
6.30.1 Notify radiation protection.
6.30.2 Verify established controls are adequate.

6.31 Notify Chemistry.

8.0 <u>RHR HX A(B) Steam Condensing Operation</u>

8.1.1 Clear the yellow holdout tags from HX 1A(B) condensate to RCIC 2RHS*MOV32A(B) and place the MCC breaker to ON.
8.1.2 Clear the yellow holdout tags from HX 1A(B) drain to suppression pool 2RHS*MOV37A(B) and place the MCC breaker to ON.
8.1.3 Clear the yellow holdout tags from HX 1A(B) steam supply valve 2RHS*MOV22A(B) and place the MCC breaker to ON.
8.1.4 Clear the yellow holdout tags from HX 1A(B) steam supply bypass valve 2RHS*MOV80A(B) and place the MCC breaker to ON.

8.2 Notify rad protection to start 2SWP*RE23A and verify monitor is on line and working properly. (Same as 6.10)

8.3 Open SWP inlet to RHR HX A 2SWP*MOV90A(B) at P601.

8.4.1 Throttle open HX 1A(B) service water outlet valve 2SWP*MOV33A(B).
8.4.2 Verify service water to RHR A(B) HX flow 7400 gpm at P601.

8.5 Shut HX 1A(B) outlet valve 2RHS*MOV12A(B) at P601.

8.6 Shut HX 1A(B) inlet valve 2RHS*MOV9A(B) at P601.

8.7 Open HX 1A(B) vent valve 2RHS*MOV26A(B) at P601.

OP-31, Section F.8 (continued)

8.8 Open HX 1A(B) vent valve 2RHS*MOV27A(B) at P601.

Note 1 Monitor suppression pool temperature.
2 Start RHR B(A) as required.

8.9 Open HX 1A(B) drain to suppression pool 2RHS*MOV37A(B) at P601.

8.10 Set HX 1A(B) 2RHS*LV17A(B) and 2RHS*PV21A(B) air control valve switch to ON at P601.

Note 1 Determine if large level oscillations are observed as level is coming on scale.
2 Shift level controller to manual.
3 Observe level stabilizes.

8.11 Set HX 1A(B) level controller to 99 at P601 and place in AUTO.

8.12 Set HX 1A(B) pressure controller to 0 at P601 and place in AUTO.

8.13 Set steam condensate to RCIC pressure controller to 65 and place in MAN and adjust output to 100%.

8.14.1 Set RHR HX A(B) steam supply drain trap bypass 2RHS*SOV94A(B) to OPEN at local panel 2RHS*PNL100.

8.14.2 Set RHR HX A(B) steam supply drain trap bypass 2RHS*SOV95A(B) to OPEN at local panel 2RHS*PNL100.

8.14.3 Set RHR HX A(B) steam supply drain trap isolation 2RHS*SOV70A(B) to OPEN at local panel 2RHS*PNL100.

8.14.4 Set RHR HX A(B) steam supply drain trap isolation 2RHS*SOV71A(B) to OPEN at local panel 2RHS*PNL100.

8.14.5 Set RHR HX A(B) steam supply drain trap isolation 2RHS*SOV72A(B) to OPEN at local panel 2RHS*PNL100.

8.14.6 Set RHR HX A(B) steam supply drain trap isolation 2RHS*SOV73A(B) to OPEN at local panel 2RHS*PNL100.

8.15 Open steam supply bypass valve 2RHS*MOV80A(B) at P601.

8.16.1 Determine when TI89A(B) reaches 200°F (TI98A is located in RHR A valve pit on RB196, TI98B is located in RHR B valve pit behind the ladder).

8.16.2 Shut RHR HX A(B) steam supply drain trap bypass valve 2RHS*SOV94A(B) at local panel 2RHS*PNL100.

8.17 Set HX 1A(B) pressure controller to achieve 50 psig on HX 1A(B) press on P601.

8.18.1 Determine when TI79A(B) reaches 200°F (TI798A is located in RHR A valve pit on RB196, TI79B is located above RHR B valve pit).

8.18.2 Shut RHR HX A(B) steam supply drain trap bypass valve 2RHS*SOV95A(B) at local panel 2RHS*PNL100.

OP-31, Section F.8 (continued)

8.19.1 Open HX 1A(B) steam supply valve 2RHS*MOV22A(B) at P601.
8.19.2 Re-perform steps 8.16 through 8.18.

8.20 Shut steam supply bypass valve 2RHS*MOV80A(B).

8.21 Increase HX 1A(B) pressure controller to maintain 200 psig on HX 1A(B) press on P601.

Note 1 Determine RHR HX A(B) service water differential temperature.
1.1 Determine service water discharge header A(B) temperature.
1.2 Determine HX 1A(B) service water outlet temperature from PT5(6) on TR 190.
2 Do not exceed RHR HX service water differential temperature of 42°F with RHR HX steam pressure at 200 psig.
3 Do not exceed RHR HX service water differential temperature of 29°F with RHR HX steam pressure less than 200 psig.
4 Do not allow HX inlet steam pressure to fall below 45 psig.
5 Maintain RHR HX A(B) level greater than 80% until HX level has stabilized.

8.22 Control RPV cooldown rate.
8.22.1 Lower HX 1A(B) level controller setpoint to decrease RPV cooldown rate.
8.22.2 Raise HX 1A(B) level controller setpoint to increase RPV cooldown rate.

8.23 Operate in conjunction with RCIC.
8.23.1 Manually start RCIC (N2-OP-35) with recirculation established to the condensate storage tank.
8.23.2 Verify steam condensate to RCIC pressure controller is set to 65 psig and set to AUTO.
8.23.3 Clear yellow hold out tag from 2RHS*MOV32A(B) MCC breaker and set breaker to ON.
8.23.4 Verify HX 1A(B) outlet conductivity less than 2uohm/cm at P601.
8.23.5 Open HX 1A(B) condensate to RCIC 2RHS*MOV32A(B).
8.23.6 Shut HX 1A(B) drain to suppression pool 2RHS*MOV37A(B).
8.23.7 Operate RCIC in steam condensing mode per N2-OP-35.

8.24 Determine if HX 1A(B) pressure decreases to less than 200 psig.
8.24.1 Throttle open HX 1A(B) to maintain 200 psig.
8.24.2 Reduce RPV cooldown rate to prevent exceeding RHR HX A(B) service water differential temperature of 29°F.

8.25 Determine if RCIC is to be shutdown.
8.25.1 Open HX 1A(B) drain to suppression pool 2RHS*MOV37A(B) to shift RHR HX condensate discharge.
8.25.2 Shut HX 1A(B) condensate to RCIC 2RHS*MOV32A(B) to shift RHR HX condensate discharge.
8.25.3 Place 2RHS*MOV32A(B) MCC breaker to OFF.
8.25.4 Shutdown RCIC using OP-35.

OP-31, Section F.8 (continued)

8.26.1 Monitor HX 1A(B) pressure before it reaches 45 psig.
8.26.2 Shutdown from steam condensing mode.

H. Off Normal Procedures

7.0 RHR A(B)(C) Suppression Pool Pumpdown

7.1 Verify liquid radwaste system flowpath is lined up to receiving tanks.

7.2 Start RHR pump 1A(B)(C) at P601.

7.3 Verify pump 1A(B)(C) minimum flow valve 2RHS*MOV4A(B)(C) is open at P601.

7.4.1 Throttle open RHR pump 1A(B)(C) return to suppression pool 2RHS*FV38A(B)(C).
7.4.2 Observe approximately 7000 gpm on RHR A(B) flow at P601.
7.5 Verify pump 1A(B)(C) minimum flow valve 2RHS*MOV4A(B)(C) is shut at P601.

7.6 When operating RHR A:
7.6.1 Unlock and open RHR pump 1A discharge header drain to radwaste 2RHS*V41.
7.6.2 Throttle open manual drain isolation to radwaste from RHR A(C) loops 2RHS-V91 to achieve desired flow rate.
7.6.3 Determine when desired suppression pool level is reached.
7.6.4 Shut RHR A(C) loop manual drain isolation to radwaste 2RHS-V91.
7.6.5 Shut and lock RHR pump 1A discharge header drain to radsaste 2RHS*V41.

7.7 When operating RHR B:
7.7.1 Open RHR discharge to radwaste 2RHS*MOV149.
7.7.2 Throttle open RHR discharge to radwaste 2RHS*MOV142 to achieve desired flow rate.
7.7.3 Determine when desired suppression pool level is reached. (Same as 7.6.3)
7.7.4 Shut RHR A(C) discharge to radwaste 2RHS*MOV149.

7.8 When operating RHR C:
7.8.1 Unlock and open RHR pump 1C discharge header drain to radwaste 2RHS*V87.
7.8.2 Throttle open manual drain isolation to radwaste from RHR A(C) loops 2RHS-V91 to achieve desired flow rate. (Same as 7.6.2)
7.8.3 Determine when desired suppression pool level is reached. (Same as 7.6.3)
7.8.4 Shut RHR A(B) loop manual drain isolation to radwaste 2RHS-V91.
7.8.5 Shut and lock RHR pump 1C discharge header drain to radwaste 2RHS*V87.

7.9 Shut RHR pump 1A(B)(C) return to suppression pool 2RWS*FV38A(B)(C) at P601.

OP-31, Section H.7 (continued)

7.10 Verify pump 1A(B)(C) minimum flow valve 2RHS*MOV4A(B)(C) is open at P601. (Same as 7.3)

7.11 Stop RHR pump 1A(B)(C) at P601.

OP-33, SECTIONS H.2 AND H.3

H. Off Normal Procedures

2.0 Suppression Pool Fill by Gravity Drain

2.1 Throttle open test return to suppression pool CSH*MOV111 at P601 as required to begin transferring water from condensate storage tank to the suppression pool.

2.2 Monitor condensate storage tank and suppression pool levels.

2.3.1 Determine when required suppression pool level is reached.
2.3.2 Shut test return to suppression pool CSH*MOV111 at P601.

2.4 Restore condensate storage tank level (N2-OP-4).

3.0 Suppression Pool Fill Using HPCS Pump

3.1 Verify standby condition status checks in accordance with this procedure.

Caution Do not allow HPCS pump to operate in a runout flow condition of greater than 7175 GPM.

3.2 Start HPCS pump 1 CSH*P1 at P601.

3.3 Verify minimum flow bypass valve CSH*MOV105 opens at P601.

3.4 Monitor condensate storage tank and suppression pool levels. (Same as 2.2)

3.5 Increase rate of transferring water from condensate storage tank to suppression pool.
3.5.1 Throttle open test return to suppression pool CSH*MOV111 to increase rate of transferring water from condensate storage tank to suppression pool. (Same as 2.1)
3.5.2 Determine when HPCS flow is greater than 825 gpm.
3.5.3 Verify minimum flow bypass valve CSH*MOV105 shuts.

3.6 Perform when desired suppression pool level is reached.
3.6.1 Shut test return to suppression pool CSH*MOV111 when desired suppression pool level is reached. (Same as 2.3.1 and 2.3.3)
3.6.2 Stop HPCS pump 1 CSH*P1.
3.6.3 Shut minimum flow bypass valve CSH*MOV105.

3.7 Restore condensate storage tank level in accordance with N2-OP-4. (Same as 2.4)

OP-35, SECTIONS F.2, F.3, H.1, H.4, AND H.5

F. Normal Operation

2.0 Manual Initiation

2.1 Manually initiate RCIC.
2.1.1 Rotate RCIC manual initiation pushbutton collar to ARMED.
2.1.2 Press RCIC manual initiation pushbutton.

2.2.1 Verify gland seal system air compressor starts.
2.2.2 Verify 2ICS*MOV116 lube oil cooling water supply valve opens.
2.2.3 Verify 2ICS*MOV159 opens and turbine speed increases.
2.2.4 Verify 2ICS*MOV120 opens after approximately 10 seconds.
2.2.5 Verify 2ICS*MOV126 discharge to reactor opens.
2.2.6 Verify 2ICS*MOV143 pump minimum flow to suppression pool shuts when RCIC system total flow exceeds 150 gpm.
2.2.7 Verify RCIC injection testable check valves 2ICS*AOV156 and 2ICS*AOV157 open.
2.2.8 Verify the RCIC flow controller establishes and maintains a RCIC total flow of 600 gpm injecting into the reactor pressure vessel.
2.2.9 Verify RCIC system drain valve 2ICS*AOV109 shuts.
2.2.10 Verify RCIC system drain valve 2ICS*AOV110 shuts.
2.2.11 Verify RCIC system drain valve 2ICS*AOV130 shuts.
2.2.12 Verify RCIC system drain valve 2ICS*AOV131 shuts.

3.0 Manual RPV injection

3.1 Set the RCIC flow controller to MANUAL and 20% output.

3.2 Start the gland seal air compressor.

3.3 Open 2ICS*MOV116 lube oil cooling water supply valve.

3.4 Start RCIC turbine.
3.4.1 Open 2ICS*MOV159 turbine steam supply bypass valve.
3.4.2 Verify RCIC turbine speed increasing. (Same as 2.2.3)
3.4.3 Open 2ICS*MOV120 turbine steam supply valve.

3.5 Verify 2ICS*MOV143 pump minimum flow to suppression pool opens.

3.6 Open 2ICS*MOV126 pump discharge to reactor.

3.7 Slowly increase RCIC turbine speed using flow controller in MANUAL.

3.8.1 Verify RCIC turbine speed increases. (Same as 2.2.3)
3.8.2 Verify RCIC pump discharge pressure increases.

OP-35, Section F.3 (continued)

3.9.1 Determine when RCIC pump discharge pressure exceeds reactor pressure.
3.9.2 Verify testable check valves 2ICS*AOV156 and 2ICS*AOV157 open. (Same as 2.2.7)
3.9.3 Verify RCIC flow increases.
3.9.4 Verify 2ICS*MOV143 pump minimum flow to suppression pool shuts when RCIC system total flow exceeds 150 gpm. (Same as 2.2.6)

3.10 Continue to increase RCIC turbine speed until injection flow reaches 600 gpm.

3.11 Set RCIC flow controller to AUTO.

H. Off Normal Procedure

1.0 RCIC Injection Flow Control

Caution Maintain RCIC turbine speed greater than 1500 RPM.

Caution Do not allow RCIC system flow to exceed 600 GPM.

1.1 Controller setpoint adjustment.
1.1.1 Verify RCIC flow controller in AUTO.
1.1.2 Raise or lower RCIC system flow setpoint to control reactor vessel water level.
1.1.3 Verify proper RCIC system response.

1.2 Flow rejection to condensate storage tanks.
1.2.1 Open 2ICS*MOV124 test return to condensate storage tank.
1.2.2 Throttle open 2ICS*MOV108 test return to condensate storage tank to decrease RPV injection flow.
1.2.3 Throttle shut 2ICS*MOV108 test return to condensate storage tank to increase RPV injection flow.
1.2.4 Throttle open 2ICS*MOV108 as required to maintain reactor injection inboard and outboard testable check valves 2ICS*AOV156 and 2ICS*AOV157 shut to stop RPV injection flow.

4.0 RPV Pressure Control

4.1 Manually initiate RCIC (Section F.2 or F.3).

4.2 Establish recirculation flow to condensate storage tank to throttle or stop RPV injection flow.
4.2.1 Open test return to condensate storage tank ICS*MOV124 to establish recirculation to the condensate storage tank. (Same as 1.2.1)
4.2.2 Throttle open test bypass to condensate storage tank ICS*FV108 as required to maintain reactor injection inboard and outboard test check valves ICS*AOV157 and AOV156 shut to stop RPV injection flow. (Same as 1.2.4)

4.2.3 Throttle open test bypass to condensate storage tank ICS*FV108 to decrease RPV injection flow. (Same as 1.2.2)

4.2.4 Throttle shut test bypass to condensate storage tank ICS*FV108 to increase RPV injection flow. (Same as 1.2.3)

5.0 Defeating RCIC Low Steamline Pressure Isolation

5.1 Remove relays E51-K86 in P618 and E51-K78 in P62.

5.2 Reinstall relays E51-K86 in P618 and E51-K78 in P62.

OP-37, SECTIONS H.3 AND H.5

H.3.0 Flow Rejection

Caution Do not exceed maximum non-regenerative heat exchanger closed loop cooling water exit temperature of 180°F or pressure of 150 psig.

Caution Take filter/demineralizers out of service or decrease reject flow to maintain filter demineralizer inlet temperature less than or equal to 120°F.

Caution Do not open reject to waste collector tank 2WCS-MOV106 and reject to main condenser MOV107 simultaneously.

Caution Verify condensate/feedwater/CRD is operating and controlling reactor water level, or RCIC is available to maintain reactor water level.

3.1 Verify RWCU has started.

Note Throttle return to feedwater isolation valve 2WCS*MOV200 as required to provide back pressure for reject operations.

3.2.1 Determine if reject flow is to be directed to radwaste.
3.2.2 Clear yellow hold out on reject to waste collector tank valve 2WCS-MOV106, power supply at 2NHS-MCC008, cubicle 2C.

3.3.1 Determine if reject flow is to be directed to main condenser.
3.3.2 Clear yellow hold out on reject to main condenser valve 2WCS-MOV107, power supply at 2NHS-MCC008, cubicle 2E.

3.4.1 Verify the demand from 2WCS-FC1135 (2G33-R606) to the WCS blowdown flow controller 2WCS-FV135 is 0.
3.4.2 Verify 2WCS-FV135 is closed.

3.6.1 Open reject to waste collector tank valve 2WCS-MOV106.
3.6.2 Open reject to main condenser 2WCS-MOV107.

Note Verify liquid radwaste collector tanks have enough capacity to accept flow.

3.7.1 Throttle open WCS blowdown flow controller 2WCS-FV135 at reject flow manual control station on P602.
3.7.2 Observe desired reject flow rate as indicated on 2WCS-FR1602.

Note 1 Determine desired flow cannot be obtained with 2WCS-FV135 fully open.
2 Throttle open 2WCS-MOV108 to obtain desired flow.

3.8 Increase or decrease demand on reject flow control valve 2WCS-FV135.
3.8.1 Increase or decrease demand on reject flow control valve 2WCS-FV135 to maintain non-regenerative heat exchanger outlet temperature.
3.8.2 Increase or decrease demand on reject flow control valve 2WCS-FV135 to maintain reactor water level.

OP-37, Section H.3.8 (continued)

3.8.3 Increase or decrease demand on reject flow control valve 2WCS-FV135 to maintain reactor pressure.

3.9 Determine when operation in the reject mode is no longer desired.
3.9.1 Decrease flow at reject flow control valve 2WCS-FV135 manual control station 2WCS-FC135 at P602 to 0.
3.9.2 Verify valve 2WCS-FV135 is closed. (Same as 3.4.2)

3.11 Close reject to waste collector tank valve 2WCS-MOC106 and open 2NHS-MCC008 cubicle 2C if flow was directed to radwaste.

3.12 Close reject to main condenser valve 2WCS-MOV107 and open 2NHS-MCC008 cubicle 2E if flow was directed to main condenser.

3.13 Close/verify closed WCS blowdown restricting orifice bypass valve 2WCS-MOV108.

5.0 Maximizing RWCU System Cooling on Loss of Shutdown Cooling, or to Assist Reactor Pressure Control

Caution If 120°F is achieved at the non-regenerative heat exchanger outlet, the RWCU filter demineralizers should be isolated.

Note Determine if time permits to remove all filter/demineralizers from service prior to starting another RWCU pump.

5.2.1 Determine if both RWCU pumps are in operation.
5.2.2 Start additional pump(s).

5.3 Ensure that adequate cooling flow is being supplied to the non-regenerative heat exchanger (N2-OP-13).

5.4 Throttle open cleanup demin bypass 2WCS*MOV110 to maximize RWCU flow.

5.5 Remove filter demineralizers from service in accordance with N2-OP-37, section F.2.

5.6 Operate RWCU system as required to maintain desired pressure or desired cooldown rate.

H. Off Normal Procedure

6.0 Placing the Control Building Special Filter Train in Service Manually

6.1 Record data on Attachment 1 in accordance with F.1.0.

6.2 Close 2HVC*MOV1A and 2HVC*MOV1B.

6.3 Start 2HVC*FN2A or 2HVC*FN2B.

6.4 When ready to secure special filter train, return control switch to normal-after-stop.

6.5 Open 2HVC*MOV1A and 2HVC*MOV1B.

E. Startup Procedure

1.0 Turbine Building Ventilation Startup

1.1 Ensure all 2HVT valves and dampers are lined up in accordance with Table I.

1.2 Ensure 2HVT system power supplies are lined up in accordance with Table II.

1.3.1 Ensure 2HVT system controllers are lined up in accordance with Table IV.

1.3.2 Monitor D/P at turbine building differential pressure gauge 2HVT-PDI117 on 2CES-IPNL202.

Note Monitor fan running current on ammeter located at 2CES-IPNL202.

Caution Ensure equal number of supply and exhaust fans are started and placed in operation.

1.4.1 Start one turbine building ventilation exhaust air fan 2HVT-FN2A, 2B, or 2C at 2CES-IPNL202.

1.4.2 Ensure associated ventilation exhaust air fan discharge damper 2HVT-AOD2A, 2B, or 2C fully opens.

1.5.1 Start one turbine building ventilation supply air fan 2HVT-FN1A, 1B, or 1C at 2CES-IPNL202.

1.5.2 Ensure associated ventilation supply air fan discharge damper 2HVT-AOD1A, 1B, or 1C fully opens.

Note Adjust controller 2HVT-PDC117 at 2CES-IPNL202 to ensure ventilation supply air bypass dampers 2HVT-MOD4A and 2HVT-MOD4B position to maintain turbine building differential pressure at -0.25 in. WG.

1.6.1 Start a second turbine building ventilation exhaust air fan 2HVT-FN2A, 2B, or 2C at 2CES-IPNL202.

1.6.2 Ensure associated ventilation exhaust air fan discharge damper 2HVT-AOD2A, 2B, or 2C fully opens. (Same as 1.4.2)

1.7.1 Start a second turbine building ventilation supply air fan 2HVT-FN1A, 1B, or 1C at 2CES-IPNL202.

1.7.2 Ensure associated ventilation supply air fan discharge damper 2HVT-AOD1A, 1B, or 1C fully opens. (Same as 1.5.2)

1.8 Place standby (non-running) turbine building supply and exhaust air fan control switches to AUTO at 2CES-IPNL202.

1.9.1 Verify unit heater switches for 2HVT-UHE201 through 258 are in the AUTO position.

1.9.2 For fan recirculation, set the unit heater control switch to FAN.

OP-55, Section E.1 (continued)

1.10.1 Verify unit cooler switches for 2HVT-UC201A through UC226 are set to AUTO at 2CES-IPNL202.

1.10.2 Manually start unit coolers by placing control switches to START.

1.11 Monitor supply air temperature using supply fans discharge temperature 2HVT-TI103 at 2CES-IPNL202.

1.12 Start air conditioning unit 2HVT-ACUS2 by pressing start button at local turbine building sample room.

1.13 Start turbine building vent booster fan 2HVT-FN8 locally outside load center room 2NJS-US10.

1.14 Start air conditioning unit 2HVT-ACUS4 locally at turbine building ventilation exhaust equipment area.

1.15 Start air conditioning unit 2HVT-ACUS1 by pressing start button locally at charcoal decay bed room.

OP-61A, SECTIONS E.3, E.5, AND H.1

E. Startup Procedure

3.0 Primary Containment Inerting Following Outage

3.1 Perform valve lineup in accordance with Table I.
3.1.1 Perform SGTS valve lineup in accordance with N2-OP-61B, Table I.
3.1.2 Verify primary containment pressure nitrogen inlet flow control valve 2CPS-FV125 closed at P873.

3.2 Perform electrical lineup in accordance with Table II.
3.2.1 Perform SGTS electical lineup in accordance with N2-OP-61B, Table II.

3.3 Verify nitrogen available from 2GSN-TK1A and TK1B.
3.3.1 Locally verify 2GSN-PIS8A and/or 8B indicate between 150 and 195 psig.
3.3.2 Locally verify 2GSN-LIS10A and/or 10B indicate greater than 5500 gallons.

3.4. Locally place electric vaporizers 2GSN-EV2A, 2B, 2C, and 2D in service:
3.4.1 Open isolation valves 2GSN-V24A through D.
3.4.2 Open isolation valves 2GSN-V26A through D.
3.4.3 Open outlet trip block valves 2GSN-V200A through D and V201A through D.

3.5 Set 2GSN-EV2A through D main handle switches to ON.

3.6 Set 2GSN-EV2A through D heater power control switches to ON.

3.7 Verify 2GSN-EV2A through D green power ON and red instrument power ON indicators are lit.

3.8.1 At high flow control station 2GSN-PNL167, verify:
a. 2GSN-V28 open.
b. 2GSN-V30 open.
c. 2GSN-V126 open.
d. 2GSN-V90 open.
e. 2GSN-V34 closed.
f. 2GSN-PI152 reads 150-200 psig.
g. 2GSN-PI156 reads about 30 psig.
h. 2GSN-TI122 reads above 55°F.
3.8.2 Open 2GSN-V34 to establish nitrogen flow.
3.8.3 Close 2GSN-V34 when 2GSN-TI122 reads above 55°F.
3.8.4 Verify 2GSN-PI156 does not exceed 30 psig.

3.9.1 Open 2GSN-V85 in GTS building.
3.9.2 Open 2GSN-AOV143 (control switch located at 2GSN-LCS840, next to AOV).
3.9.3 Verify 2CPS-FN1 suction damper 2CPS-DMP1 closed.
3.9.4 Verify discharge valve 2CPS-V26 closed.
3.9.5 Verify 2GSN-V88 open in reactor building.

OP-61A, Section E.3 (continued)

3.10 Open 2GSN-V80 in yard.

3.11 Verify PI140 reads about 30 psig.

3.12.1 Verify alignment through SGTS.
3.12.2 Start N2-OSP-CPS-@001.

3.13.1 Set primary containment purge exhaust to SBGTS isolation valve 2GTS*AOV101 to open on P873.
3.13.2 Set suppression pool purge outboard outlet isolation valve 2CPS*AOV111 to open on P873.
3.13.3 Set drywell purge outboard outlet isolation valve 2CPS*AOV110 to open on P873.
3.13.4 Set drywell purge outboard inlet isolation valve 2CPS*AOV104 to open on P873.
3.13.5 Set suppression pool purge outboard inlet isolation valve 2CPS*AOV105 to open on P873.
3.13.6 Set suppression pool purge pressure outboard inlet isolation valve 2CPS*SOV119 to closed on P873.
3.13.7 Set drywell purge outboard inlet isolation valve 2CPS*SOV120 to closed on P873.
3.13.8 Open 2IAS*SOV168 and 2IAS*SOV180 at P851.
3.13.9 Open drywell purge inboard outlet isolation valve 2CPS*AOV108.
3.13.10 Open suppression pool purge nitrogen supply inboard outlet isolation valve 2CPS*AOV109/SOV133.
3.13.11 Close suppression pool purge pressure inboard inlet isolation valve 2CPS*SOV121.
3.13.12 Close drywell purge pressure inboard inlet isolation valve 2CPS*SOV122.
3.13.13 Close drywell purge inboard inlet isolation valve 2CPS*AOV106.
3.13.14 Close suppression pool purge nitrogen supply inboard inlet isolation valve 2CPS*AOV107/SOV132.

Caution Standby gas treatment should not be started unless preparations are complete and nitrogen purge can commence without delay.

3.14.1 Set SBGTS train A(B) initiation control switch at P870 (P871) to START.
3.14.2 Verify SBGTS train A(B) inlet valve from reactor building vent 2GTS*MOV1A(B) opens.
3.14.3 Verify SBGTS train A(B) inlet valve 2GTS*MOV2A(B) opens.
3.14.4 Verify SBGTS discharge fan A(B) discharge valve 2GTS*MOV3A(B) opens.
3.14.5 Verify SBGTS train A(B) decay heat cooling 2GTS*MOV4A(B) remains shut.
3.14.6 Verify SBGTS train B(A) decay heat cooling 2GTS*MOV4B(A) remains shut.
3.14.7 Verify SBGTS discharge fan 2GTS*FN1A(B) starts.
3.14.8 Determine if GTS operation is affecting reactor building differential pressure.
3.14.9 Adjust reactor building in/out differntial controller 2GTS*PDIK5A(B) at P870 (P871) to throttle close pressure valves 2GTS*PV5A(B).

3.15 Perform the following to establish containment purge with nitrogen:
3.15.1 Open drywell purge inboard inlet isolation valve 2CPS*AOV106 at P875.
3.15.2 Open suppression pool purge nitrogen supply inboard inlet isolation valve 2CPS*AOV107/SOV132 at P875.

3.16 Monitor drywell/suppression chamber purge:
3.16.1 Monitor drywell nitrogen purge flow on 2CPS-FI102 at P873.
3.16.2 Monitor suppression chamber nitrogen purge flow on 2CPS-FI103 at P873.
3.16.3 Monitor drywell pressure on 2CMS*PI1A/B at P601.
3.16.4 Monitor suppression chamber pressure on 2CMS*PI168 at P601.
3.16.5 Monitor containment oxygen concentration 2CMS*AIX71A on P601.
3.16.6 Monitor containment hydrogen concentration 2CMS*AIX6A on P601.
3.16.7 Monitor nitrogen supply temperature 2GSN-TI138 at P601.
3.16.8 Monitor SGTS filter train flow 2GTS*FR10A/B on P870/P871.

3.17.1 Determine when purge is complete.
3.17.2 Notify Chemistry.

5.0 <u>Startup of Primary Containment Purge (with Air) to Prior to Refueling Outage</u>

Note 1 Do not begin primary containment purge until reactor is in mode 4.
2 Do not begin deinerting prior to 24 hours before descending to 15% full power.

5.1.1 Perform valve lineup in accordance with Table I. (Same as 3.1.1)
5.1.2 Perform SGTS valve lineup in accordance with N2-OP-61B, Table I. (Same as 3.1.2)
5.1.3 Perform SGTS electical lineup in accordance with N2-OP-61B, Table II. (Same as 3.2.1)

5.2 Verify normal HVR supply and exhaust fans in service per N2-OP-52.

5.3.1 Locally open primary containment purge fan 2CPS-FN1 suction damper DMP1 and discharge valve V26 in GTS building.
5.3.2 Locally close nitrogen supply header shutoff valve 2GSN-AOV143 at 2GSN-LCS840.
5.3.3 Verify 2GSN-V80 closed.

5.4.1 Verify primary containment purge fan 1 2CPS-FN1 stopped.
5.4.2 Verify drywell purge outboard inlet isolation valve 2CPS*AOV104 open.
5.4.3 Verify suppression pool purge outboard inlet isolation valve 2CPS*AOV105 open.
5.4.4 Verify drywell purge outboard outlet isolation valve 2CPS*AOV110 open.
5.4.5 Verify suppression pool purge outboard outlet isolation valve 2CPS*AOV111 open.
5.4.6 Verify drywell purge outboard inlet isolation valve 2CPS*AOV120 closed.
5.4.7 Verify suppression pool purge pressure outboard outlet isolation valve 2CPS*SOV119 closed.
5.4.8 Verify primary containment press nitrogen inlet flow control valve 2CPS-FV125 closed.

OP-61A, Section E.5 (continued)

5.5.1 Open 2IAS*SOV168 and *SOV180 at P851.
5.5.2 Open drywell purge inboard inlet isolation valve 2CPS*AOV106 at P875. (Same as 3.15.1)
5.5.3 Open suppression pool purge nitrogen supply inboard inlet isolation valve 2CPSAOV107/SOV132 at P875. (Same as 3.15.2)
5.5.4 Open drywell purge inboard outlet isolation valve 2CPS*AOV108. (Same as 3.13.9)
5.5.5 Open suppression pool purge nitrogen supply inboard outlet isolation valve 2CPS*AOV109/SOV133. (Same as 3.13.10)
5.5.6 Close suppression pool purge pressure inboard inlet isolation valve 2CPS*SOV121. (Same as 3.13.11)
5.5.7 Close drywell purge pressure inboard inlet isolation valve 2CPS*SOV122. (Same as 3.13.12)

5.6.1 Set primary containment purge exhaust to SBGTS isolation valve 2GTS*AOV101 to open on P873. (Same as 3.13.1)
5.6.2 Verify alignment through SGTS. (Same as 3.12.1)

5.7 Start or verify operation of 2GTS*FLT1A(B).
5.7.1 Set SBGTS train A(B) initiation control switch at P870 to START. (Same as 3.14.1)
5.7.2 Verify SBGTS train A(B) inlet valve from reactor building vent 2GTS*MOV1A(B) opens. (Same as 3.14.2)
5.7.3 Verify SBGTS train A(B) inlet valve 2GTS*MOV2A(B) opens. (Same as 3.14.3)
5.7.4 Verify SBGTS discharge fan A(B) discharge valve 2GTS*MOV3A(B) opens. (Same as 3.14.4)
5.7.5 Verify SBGTS train A(B) decay heat cooling 2GTS*MOV4A(B) remains shut. (Same as 3.14.5)
5.7.6 Verify SBGTS train B(A) decay heat cooling 2GTS*MOV4B(A) remains shut. (Same as 3.14.6)
5.7.7 Verify SBGTS discharge fan 2GTS*FN1A(b) starts. (Same as 3.14.7)
5.7.8 Determine if GTS operation is affecting reactor building differential pressure. (Same as 3.14.8)
5.7.9 Adjust reactor building in/out differntial controller 2GTS*PDIK5A(B) at P870 (P871) to throttle close pressure valves 2GTS*PV5A(B). (Same as 3.14.9)

5.8 Start primary containment purge fan 1 2CPS-FN1.

5.9 Monitor plant systems/parameters:
5.9.1 Monitor drywell purge air flow greater than 1700 cfm on 2CPS-FI102.
5.9.2 Monitor suppression chamber air flow greater than 1000 cfm on 2CPS-FI103 at P873.
5.9.3 Monitor drywell pressure on 2CMS*PI1A/B at P601. (Same as 3.16.3)
5.9.4 Monitor suppression chamber pressure on 2CMS*PI168 at P601. (Same as 3.16.4)
5.9.5 Monitor containment oxygen concentration 2CMS*AIX71A on P601. (Same as 3.16.5)
5.9.6 Monitor containment hydrogen concentration 2CMS*AIX6A on P601. (Same as 3.16.6)

OP-61A (continued)

H. Off Normal Procedure

1.0 High Primary Containment Pressure Response

Note Determine drywell/suppression chamber pressure below 45 psig.

1.1 Isolate nitrogen supply to drywell and suppression chamber.
1.1.1 Determine nitrogen low flow makeup to primary containment in service.
1.1.2 Isolate nitrogen supply to drywell and suppression chamber by closing primary containment pressure nitrogen inlet flow control valve 2CPS-FV125 at P873.
1.1.3 Allow primary containment pressure to decay down.
1.1.4 Close drywell purge outboard inlet isolation valve 2CPS*SOV120 at P873. (Same as E.3.13.7)
1.1.5 Close drywell purge pressure inboard inlet isolation valve 2CPS*SOV122 at P875 to isolate flow only to drywell. (Same as E.3.13.12)
1.1.6 Close suppression pool purge pressure outboard inlet isolation valve 2CPS*SOV119 at P873. (Same as E.3.13.6)
1.1.7 Close suppression pool purge pressure inboard inlet isolation valve 2CPS*SOV121 at P873 to isolate flow only to suppression chamber. (Same as E.3.13.11)

Caution Determine if containment temperature is above 150°.

1.2 When required by EOP-PCP-2 or when rapid depressurization is required, perform the following:
1.2.1 Set SBGTS train A(B) initiation control switch at P870 to START. (Same as E.3.14.1)
1.2.2 Verify SBGTS train A(B) inlet valve from reactor building vent 2GTS*MOV1A(B) opens. (Same as 3.14.2)
1.2.3 Verify SBGTS train A(B) inlet valve 2GTS*MOV2A(B) opens. (Same as 3.14.3)
1.2.4 Verify SBGTS discharge fan A(B) discharge valve 2GTS*MOV3A(B) opens. (Same as 3.14.4)
1.2.5 Verify SBGTS train A(B) decay heat cooling 2GTS*MOV4A(B) remains shut. (Same as 3.14.5)
1.2.6 Verify SBGTS train B(A) decay heat cooling 2GTS*MOV4B(A) remains shut. (Same as 3.14.6)
1.2.7 Verify SBGTS discharge fan 2GTS*FN1A(b) starts. (Same as 3.14.7)
1.2.8 Determine if GTS operation is affecting reactor building differential pressure. (Same as 3.14.8)
1.2.9 Adjust reactor building in/out differntial controller 2GTS*PDIK5A(B) at P870 (P871) to throttle close pressure valves 2GTS*PV5A(B). (Same as 3.14.9)

Note 1 Place purge outboard/inboard valve override switches to OVERRIDE to open CPS valves during LOCA/high drywell pressure conditions.
2 Remove containment isolation signal from high drywell pressure.
3 Place jumper from terminal point M3 to T3 for IAS*SOV168.
4 Place jumper from terminal point M2 to T2 for IAS*SOV180.

OP-61A, Section H.1.2 (continued)

1.2.10 Open primary containment purge depressurization to SBGTS isolation valve 2GTS*SOV102.

1.2.11 Open 2IAS*SOV168 and 2IAS*SOV180 at P851. (Same as 3.13.8)

1.2.12 Open drywell purge inboard outlet isolation valve 2CPS*AOV108 at P875 and drywell purge outboard outlet isolation valve 2CPS*AOV110 at P873 to reduce suppression chamber pressure. (Same as 3.13.3 and 3.13..9)

1.2.13 Open suppression pool purge nitrogen supply inboard outlet isolation valve 2CPS*AOV109 at P875 and suppression pool purge outboard outlet isolation valve 2CPS*AOV111 at P873. (Same as 3.13.2 and 3.13.11)

1.2.14 Monitor drywell pressure on 2CMS*PI1A/B at P601. (Same as 3.16.3)

1.2.15 Monitor suppression chamber pressure on 2CMS*P168 at P601. (Same as 3.16.4)

1.2.16 Determine when primary containment venting/pressure reduction is no longer required.

1.2.17 Close primary containment purge depressurization to SBGTS isolation valve 2GTS*SOV102.

1.2.18 Close drywell purge outboard outlet isolation valve 2CPS*AOV110 and suppression pool purge outboard outlet isolation valve 2CPS*AOV111 at P873.

1.2.19 Close drywell purge inboard outlet isolation valve 2CPS*AOV108 and suppression pool purge nitrogen supply inboard outlet isolation valve AOV109 at P875.

1.2.20 Close 2IAS*SOV168 and 2IAS*SOV180 at P851.

1.2.21 Remove jumpers that were installed and restore override switches to normal.

1.2.22 Stop operating SGTS filter trains by placing SBGTS train A(B) isolation control switch to STOP at P870 (P871).

1.2.23 Verify SBGTS inlet valve from reactor building vent 2GTS*MOV1A(B) is in AUTO and closes.

1.2.24 Verify SBGTS train A(B) inlet valve 2GTS*MOV2A(B) is in AUTO and closes.

1.2.25 Verify SBGTS discharge fan A(B) discharge valve 2GTS*MOV3A(B) is in AUTO and closes.

1.2.26 Verify SBGTS discharge fan 2GTS*FN1A(b) is in AUTO and stops.

1.2.27 Verify SBGTS train B(A) decay heat cooling 2GTS*MOV4B(A) is in AUTO and remains shut.

1.2.28 Control primary containment nitrogen inerting supply via primary containment pressure nitrogen inlet flow control valve 2CPS-FV125/HIC125 at P873.

1.2.29 Maintain drywell pressure at -0.5 to +0.75 psig.

OP-62, SECTION E.2

E. Startup Procedure

2.0 Startup of Recombiner 1A(B) Following a LOCA

Note Procedure entry condition: containment hydrogen concentration of 3.4% or containment oxygen concentration of 3.7%.

2.1.1 Verify primary containment pressure is less than 17.1 psig.
2.1.2 Verify containment temperature is less than 210°F.
2.1.3 Verify containment hydrogen concentration is below 5%.

2.2.1 Determine if LOCA isolation signal is present.
2.2.2 Place LOCA override keylock switch to OVERRIDE at P873 (P875).

2.3.1 Determine if manual isolation signal is present.
2.3.2 Rotate Div I(II) hydrogen recombiner manual isolation pushbutton collar to RESET and press pushbutton.
2.3.3 Verify amber light out at P602.

2.4 Establish a recombiner 1A(B) suction flow path.
2.4.1 Open inlet from drywell outboard isolation valve HCS*MOV3A(B) to process drywell atmosphere.
2.4.2 Open inlet from drywell inboard isolation valve HCS*MOV6A(B) to process drywell atmosphere.
2.4.3 Open inlet from suppression chamber outboard isolation valve HCS*MOV2A(B) to process suppression chamber atmosphere.
2.4.4 Open inlet from suppression chamber inboard isolation valve HCS*MOV5A(B) to process suppression chamber atmosphere.

2.5 Open return to suppression pool outboard isolation valve HCS*MOV1A(B).

2.6.1 Open return to suppression pool inboard isolation valve HCS*MOV4A(B).
2.6.2 Verify HCS*MOV4A(B) has red and green indication for about 13 seconds.

2.7 Hold open control switch for hydrogen recombiner A(B) inlet from containment isolation valve HCS*MOV25A(B) at P873 (P875).

2.8 Open cooling water bypass valve HCS*SOV10A(B) at P873 (P875).

2.9 Verify cooling water drain valve HCS*SOV11A(B) shut at P873 (P875).

2.10 Start recombiner by setting hydrogen recombiner 1A(B) to OPERATE at P873 (P875).

2.11 Verify cooling water inlet valve HCS*SOV26A(B) opens at P873 (P875).

2.12.1 Throttle hydrogen recombiner 1A(B) inlet from containment isolation valve HCS*MOV25A(B).
2.12.2 Verify 150 CFM HCS thru gas flow at P873 (P875).

2.13 Verify recombiner 1A(B) startup white light is lit.

G. Shutdown Procedure

1.0 Power Reduction

1.1 Reduce power from 100% to 45%. (OP-101D)

1.2 Notify load dispatcher of reactor shutdown schedule.

1.3.1 Verify reactor power at 45%.
1.3.2 Verify reactor is below 80% rodline.

1.4 Remove heater drain pumps from service. (N2-OP-8)

1.5.1 Close recirculation flow control valve. (Same as OP-101D, 1.3.2)
1.5.2 Verify reactor power is 40%.

1.6 Transfer reactor recirculation pumps to LFMG set. (N2-OP-29)

Note Remove condensate demineralizers as required during shutdown.

1.7.1 Continue control rod insertion.
1.7.2 Verify power reduction.

1.8 Verify RWM proper sequence is loaded.

1.9 Verify RWM BELOW LPAP light illuminates on P603.

1.10 Verify RPS A(B) CONT & STOP V CLOSURE BYPASSED, window 603112 (603412), alarm illuminates.

1.11.1 Verify reactor power at 25%.
1.11.2 Verify Rod Sequence Control System (RSCS) red and amber LED display lights illuminated on P603.

Note Verify rod position is per RSCS and RWM program before reaching low power setpoint.

1.12 Verify no rod withdrawal or rod insert errors present on RWM panel.

1.13 Verify group III steam drain valves automatically open on P824.

1.14 Perform feedwater pump and level control valve transfer. (N2-OP-3)

1.15 Line up scavaging steam to the main condenser. (N2-OP-2)

1.16 Verify WH BLK/INS BLK light on RSCS panel is not illuminated.

1.17.1 Determine power approximately 20%.
1.17.2 Verify RSCS "ABOVE LPSP" light extinguished on P603.
1.17.3 Complete N2-OSP-RMC-@004 within one hour.

OP-101C, Section G.1 (continued)

1.18.1 Transfer RWCU to full reject to main condenser. (N2-OP-37)
1.18.2 Clear yellow holdouts on 2WCS-MOV106 and 2WCS-MOV107.
1.18.3 Energize valves as required.
1.18.4 Reinstate the RWCU HI DISCH PRESS alarm to 602321 by closing H13-P630 alarm cutout TB3-0777.

1.19 Verify RWM BELOW LPSP light illuminates on P603. (Same as 1.9)
1.20.1 Determine RWM is in effect.
1.20.2 Perform N2-OSP-RMC-@003, Rod Worth Minimizer Operability within one hour.

1.21 Transfer feedwater control to single element at P603.

1.22.1 Determine thermal power is not yet reduced to less than 15% of rated.
1.22.2 Deinert the primary containment. (N2-OP-61A).

1.23 Transfer instrument nitrogen system to instrument air system. (N2-OP-61A)

1.24.1 Determine power approximately 15%.
1.24.2 Remove MSRs from service. (N2-OP-2)

1.25 Continue to insert control rods per control rod pull sheet.

1.26.1 Determine generator output approximately 100MWE.
1.26.2 Transfer house loads to reserve power. (N2-OP-71)

1.27 Verify group II and group I main steam line drains automatically open on P824.

1.29.1 Insert control rod until generator load is approximately 75MWE.
1.29.2 Remove turbine generator off line. (N2-OP-68)

1.30 Verify main turbine bypass valves are controlling reactor pressure.

1.31 Shutdown turbine. (N2-OP-21)

1.32 Shutdown generator. (N2-OP-68)

1.33 Verify GETARS is in sentinel mode.

1.34 Initiate condenser neck spray. (N2-OP-3)

2.0 Transfer to Startup Mode

Note Maintain condenser vacuum by SJAE during depressurization using bypass valves.

2.1.1 Determine when reactor power decreases to approximately 5 to 10% by the APRM recorder.
2.1.2 Place the IRM range selector switches on range 10.

2.2 Insert all IRM detectors.

2.3 Perform APRM/IRM overlap surveillance test. (N2-OSP-NMS-@001)

2.4.1 Place the 8 IRM/APRM and IRM/RBM recorder selector switches to IRM.
2.4.2 Place one IRM recorder in each division to fast speed.

2.5 Position IRM range switches as necessary to maintain a reading between 25 and 75 on the 0-125% scale.
2.6 Place reactor mode switch to STARTUP/HOT STANDBY.

2.7 Perform N2-ISP-NMS-N@009, IRM channel functional test.

2.8.1 Transfer feedwater control valve to 2FWS-LV55A(B). (N2-OP-3)
2.8.2 Verify the reactor level is controlled between 178.4" and 187.3".

2.9.1 Reduce main turbine bearing oil temperature to 80° - 90°F (2TML-TI132) by adjusting bearing oil temperature controller 2TML-HIC132 at panel P851.
2.9.2 Verify turning gear automatically engaged.

2.10 Reinstate the annunciator alarms for the Appendix R valves defeated per OP-101A.
2.10.1 Restore the annunciator relay log for each alarm.
2.10.2 Reinstate valve motor control power loss to annunciator 601431:
2.10.3 Request electrical maintenance to lift and reland the following leads:

Valve No.	Cubicle	Lifted Leads	Reland To
2RHS*MOV22A	17A	Board 17AB Term 7	Board 17AB Term 6
2RHS*MOV32A	18A	Board 18AB Term 7	Board 18AB Term 6
2RHS*MOV67A	22A	Board 22AB Term 7	Board 22AB Term 6
2RHS*MOV80A	23A	Board 23AB Term 7	Board 23AB Term 6
2RHS*MOV113	21A	Board 21AB Term 7	Board 21AB Term 6

2.10.4 Clear the temporary modification. (AP-6.1)
2.10.5 Clean the defeated annunciator relay logic. (AP-6.1)
2.10.6 Reinstate valve motor control power loss to annunciator 601631:
2.10.7 Request electrical maintenance to lift and reland the following leads:

Valve No.	Cubicle	Lifted Leads	Reland To
2RHS*MOV22A	24A	Board 24AB Term 7	Board 14AB Term 6
2RHS*MOV32B	15A	Board 15AB Term 7	Board 15AB Term 6
2RHS*MOV67B	21C	Board 21CB Term 7	Board 21CB Term 6
2RHS*MOV80B	22A	Board 22AB Term 7	Board 22AB Term 6

OP-101C, Section G.2 (continued)

2.11 Determine turbine bypass valve at about 20% open. Remove main steam loads.
2.11.1 Place main condenser low vacuum bypass switches in BYPASS at P609 and P611.
2.11.2 Shutdown steam jet air ejector. (N2-OP-9)
2.11.3 Shutdown offgas. (N2-OP-42)
2.11.4 Start mechanical vacuum pump. (N2-OP-9)
2.11.5 Shift steam supply to clean steam reboiler from main steam to auxiliary steam. (N2-OP-25)
2.11.6 Determine if pressure regulator was used to open bypass valve.
2.11.7 Continue reactor cooldown to close bypass valve.

3.0 Reactor Cooldown

3.1 Insert control rods to reduce power. (Same as 1.25)

3.2 Aid in controlling cooldown rate.
3.2.1 Shut or verify shut 2MSS-AOV87A, B, C, D.
3.2.2 Shut or verify shut 2MSS-AOV88A, B.
3.2.3 Determine reactor cooldown rate remains or becomes excessive.
3.2.4 Shut outboard MSIVs. (N2-OP-1)

3.3.1 Log RPV pressure and coolant temperature every 30 minutes. (N2-OSP-RCS-@001)
3.3.2 Determine cold shutdown is reached.

3.4 Downrange IRMs as necessary to maintain a reading between 25 to 75 on the 0-125% scale. (Same as 2.5)

3.5 Insert SRMs as required to maintain a count rate between 100 and 10^5CPS.

3.6 Verify group I steam line drains automatically open on P824. (Same as 1.27)

3.7 Insert control rods to reduce power. (Same as 1.25)

3.8.1 Place mode switch in REFUEL.
3.8.2 Place mode switch in SHUTDOWN.
3.8.3 Secure H_2/O_2 analyzers. (N2-OP-82)

3.9.1 Verify RPS A(B) MANUAL TRIP window 603111 (603411) alarm comes in.
3.9.2 Observe mode switch is placed in SHUTDOWN.

3.10.1 Place scram discharge volume high level switches to BYPASS.
3.10.2 Reset the scram at P603.

3.11 Log the time when all the rods are inserted in CSO log to determine the decay time for refueling operation.

OP-101C, Section G.3 (continued)

3.12.1 Remove RRCS, Div I and Div II from service. (N2-OP-36B)
3.12.2 Determine if return to reactor power operation is not imminent.

3.13 Reduce reactor pressure by the bypass valve opening jack or pressure regulator setpoint to maintain cooldown rate.

3.14 Place main condenser low vacuum bypass switches in BYPASS at P609 and P611. (Same as 2.11.1)

3.15.1 Determine reactor pressure approximately 500 psig.
3.15.2 Switch feedwater control to 2CNM-LV137.
3.15.3 Trip feedwater pump. (N2-OP-3)

3.16.1 Determine reactor pressure 150 psig.
3.16.2 Use bypass valve opening jack to maintain desired cooldown rate.
3.17.1 Determine when reactor pressure is below 128 psig.
3.17.2 Warmup and place RHR in shutdown cooling mode. (N2-OP-31)

3.18 Shut main turbine bypass valve after RHR is in shutdown cooling operation. (N2-OP-31)

3.19 Secure condenser neck spray by placing the control switch for 2CNM-MOV126 at panel P851 to the CLOSE position.

3.20.1 Determine reactor pressure 75 psia.
3.20.2 Verify RCIC automatic isolated.
3.20.3 Verify 2ICS*MOV121 shuts.
3.20.4 Verify 128 shuts.
3.20.5 Verify trip and throttle valve shuts.

3.21 Determine if condenser vacuum is no longer required.
3.21.1 Close MSIVs. (N2-OP-1 or N2-OSP-MSS-CS001)
3.21.2 Shutdown mechanical vacuum pump. (N2-OP-9)
3.21.3 Open condenser vacuum breakers 2ARC-MOV5A, B, C.
3.21.4 Shutdown clean steam reboiler. (N2-OP-25)

3.22.1 Determine if forced shutdown cooling is not available during cold shutdown condition.
3.22.2 Raise reactor water level between 227 and 243 inches on shutdown range level indicator 2ISC-LI105 at P851 to establish natural circulation flow path.

3.23.1 Determine reactor pressure 5 psig.
3.23.2 Open reactor head vents 2MSS*MOV118 and 2MSS*MOV119 at P602.

3.24 Shut 2MSS*MOV108, head vent to main steam line.

3.25 Secure plant auxiliary systems.

3.26.1 Determine when moderator temperature is less than 200°F.
3.26.2 Transfer RWCU return to feedwater. (N2-OP-37)

OP-101C (continued)

H Off Normal Procedure

1.0 Reactor Scram

1.1 Determine if reactor scram is anticiapated and time permits.
1.1.1 Reduce power with recirculation flow to reduce unit transient.
1.1.2 Determine if reactor scram has occurred.
1.1.3 Place mode switch in SHUTDOWN.

1.2.1 Determine if reactor protection system has not tripped.
1.2.2 Turn both manual scram switch collars to ARMED position and depress both switches on either side of P603.

1.3. Verify all rods are inserted.
1.3.1 Verify all rods are inserted using full core display.
1.3.2 Verify all rods are inserted using rod sequence control panel.
a Depress ROD F.I/BYPASS pushbutton to select rod F.I.
b Observe F.I backlight.
c Observe all rod red LED lights illuminate.
1.3.3 Verify all rods are inserted using rod worth minimizer on P603.
a Depress ROD TEST/SELECT pushbutton and verify SELECT backlight is illuminated.
b Randomly select a control rod and verify WITHDRAW ERROR window is clear.
c Depress ROD TEST/SELECT pushbutton and verify SELECT backlight is off.
1.3.4 Verify all rods are inserted using process computer rod position printout.

1.4 Verify reactor power is decreasing on APRMs.

Note 1 Determine if feedwater control valves are placed in MANUAL or otherwise overridden.
2 Monitor reactor water level until AUTO level control is restored.

1.5 Observe reactor level and pressure.
1.5.1 Maintain reactor level between 178.4 and 187.3 inches using any combination of:
a Condensate and feedwater. (Same as RC/L-2 008)
b RCIC. (Same as RC/L-2 010)
c HPCI. (Same as RC/L-2 011)
d CRD pumps. (Same as RC/L-2 009)
1.5.2 Secure flow to the vessel at level 8 (202.3").
1.5.3 Trip condensate booster pumps if reactor pressure drops below their discharge pressure.
1.5.4 Maintain reactor pressure by main turbine bypass valves or SRVs. (Same as RC/P-2 015 and 016)

OP-101C, Section H.1 (continued)

1.5.5 Determine if reactor water level reaches main steam lines (250 inches).

- a Verify feedwater flow to the reactor is secured.
- b Reduce reactor water level (RWCU, MSL drains).
- c Determine if reactor pressure is increasing.
- d Before EHC reactor pressure setpoint is reached, take manual control of the turbine bypass valves with the opening jack to stabilize reactor pressure.
- e Determine if reactor pressure is decreasing.
- f Determine if main steam lines are drained.
- g If MSIVs are shut, attempt to equalize pressure and open them to regain pressure control with the bypass valves.
- h Determine if main condenser is not available.
- i Use SRVs to control pressure.

1.6.1 Fully insert SRM and IRM detectors. (Same as G.2.2)

1.6.2 Place IRM/APRM, IRM/RBM recorder select switch to IRM. (Same as G.2.4.1)

1.7.1 Trip turbine generator.

1.7.2 Verify turbine generator tripped.

1.8 Verify house loads have transferred to reserve power. (Same as G.1.26.2)

1.9 Verify that scram discharge volume vent and drain valves are shut. on P603.

1.10 Verify reactor recirculation pumps have auto transferred to LFMG sets. (Same as G.1.6)

1.11.1 Transfer RWCU to full reject to main condenser. (Same as G.1.18.1)

1.11.2 Manually trip RWCU pumps.

G. Shutdown Procedure

1.0 Power Reduction from 100% to 45%

1.1 Notify load dispatcher of power reduction.

1.2 Receive authorization from SSS to reduce power.

Note 1 Determine rate of change of reactor thermal power.
2 Notify radiochemistry technician.
3 Periodically check rodline during power decrease.

Caution Monitor core flow.

Caution Ensure power transfer of steam supplies to building heating intermediate HX (2ESS-STV105 closes and 2ASS-STV143 opens).

1.3.1 Determine desired reactor power level or 65%.
1.3.2 Close down reactor recirculation flow control valve.

1.4 Transfer reactor recirculation flow control to LOOP MANUAL by pressing MAN pushbutton on LOOP FLOW CONTROL M/A stations.

1.5 Remove one of three operating condensate or condensate booster pumps from service. (N2-OP-3)

1.6 Verify clean steam reboiler transfer to main steam at P851.
1.6.1 Verify clean steam reboiler main steam supply 2ASS-STV112 opens.
1.6.2 Verify clean steam reboiler extraction steam supply 2ESS-STV104 shuts.

Note Verify sufficient condensate demineralizers are in service to handle increase in condensate system flow.

1.7.1 Remove condensate demineralizer from service as required. (N2-OP-5)
1.7.2 Operate with an extra demineralizer until all the heater drain pumps are removed.

1.8 Insert control rods to about 45% power in reverse order of control rod pull sheet.

1.9 Determine if continued power reduction is necessary.

07-58-91

Rep 4

ANSWERS TO ARD COMMENTS

ATTACHMENT 1

✓ Rewrote and restructured Attachment 1 to give panel-by-panel format. Removed valve group identification.

✓ Added expected/desired valve position

✓ Changed format for multiple check offs as suggested

✓ Changed division references to roman numerals

✓ 1.1.6 Spelled out "Fast Speed"

✓ 1.2.4 Identified as "Tip Ball Isolations" (See 1.2.7 below)

✓ 1.2.5 Rewrote Group 4.1 to Groups 6 + 7 Isolation

✓ 1.2.6 Rewrote/reformatted as suggested

✓ 1.2.7 Attachment 1 to be rewritten again to better format and identify isolation valves to be checked (not referenced "(6 valves)") rather identify valves as labelled on control panel. Valves will be identified individually N.2

✓ 1.2.8 Used word "START" per EOP-5, Appendix A

✓ 1.3.1 Rewrote/reformatted as suggested

✓ 1.3.2 Rewrote/reformatted as suggested

Used EOP-5 designations whenever possible, however, where label plates in the plant differed from EOP-5 => As Marked terminology is used.

1.3.3 "Time Delay" spelled out

"ADS 105 ~~SRC DMRR~~ Started" added Sec. timer

ATTACHMENT 2

✓ In process of installing "EOP TAPE" and pictorial operator aids in local panels.

✓ Added instructions to give pulled relays to SSS

ATTACHMENT 4

✓4.2.2 Fixed sentence as suggested

ATTACHMENT 8

✓8.1 Changed "#" to "PSIG"

✓8.4 Fixed Typo

ATTACHMENT 10

✓10.0 Changed to CAUTION

✓10.1.1 ✓Fixed table

✓installed STA-~~icons~~ (KONS)

✓EOP tape and pictorial operator aids being placed

✓10.2.2 Alternate methods of depressurizing to the condenser ~~VIA~~ (V. d.) MSL drains were investigated. Although this method may impose formidable restrictions on an operator with respect to timeliness of execution and radiation ~~exposing~~ exposure it remains the best option.

✓10.2.5 Valve has position indicator and the position can be verified by use of a metal machinist's rule to be staged in the "EOP tool drawer"

✓10.3.7 Operator aid will be installed

✓10.3.11 Changed "Bump" to Throttle"

✓10.3.13 ✓Changed verbiage to ~~merit~~ match ~~labeling~~ labelling

✓Added instructions to "Monitor for Temp Rise". No action is required, step is included to identify proper completion of previous steps.

✓10.3.14 Added NOTE to identify indicator as labelled

what about p. indicators that don't exist on P603?
X Att. 10 will be corrected to ref. correct panel & indicators

ATTACHMENT 11

✓11.1 SWITCHES LABELLED "R31A-S1A" AND "R31A-S1B" IN PLANT

✓11.3 Changed manipulation to be performed in back panel

access through rear like the others? YES or edited to identify difference? What about need for jumpers? Will be pre-staged

ATTACHMENT 11 (Cont)

11.4 Appropriate to give SSS responsibility to determine how/when/how many defeated interlocks to restore OK, but do we need a restoration procedure? They're developing master-list

ATTACHMENT 12

Was deleted as reviewed

ATTACHMENT 13

Changed wording to "Above 4%"

ATTACHMENT 14

Changed headings as suggested

14.2.1 Identified need for fuse pullers and will stage in "EOP Tool Drawer"

EOP tape and pictorial operator aids ~~bring~~ being staged

Drive water flow on C12-R602 may go off scale high when maximized. This is deemed permissible as the numerical valve of flow in GPM is not critical and this condition will only exist in an emergency ~~condition.~~ situation

14.3.4 Fixed reference

14.3.5 Fixed switch label reference

14.4 Deleted "CR"

14.3.8 Added "Place RWM in Operate" vice "Unbypassed"

ATTACHMENT 15

15.1.3 Deleted reference

15.4 Will forward comment to Conceptual Engineering for resolution

Added step to close 2SLS*V34 and 2SLS*V35 to put system in a safe condition. Restoration per SSS instructions.

ATTACHMENT 16

16.1.1 Staging EOP tape and pictorial operator aids

ATTACHMENT 18

18.1.1 Changed verbiage as recommended

ATTACHMENT 20

20.1 Staging EOP tape and pictorial operator aids

Jumpers being made WR 189901, 189908, 161635

ATTACHMENT 21

21.2.2 Added "Bay F" to location

EOP tool drawer to contain fuse pullers

21.2.5 EOP tape and pictorial operator aids being staged

21.2.9 Broke step out of CAUTION into separate step

21.5.9 Fixed references

21.5.10 Fixed references

ATTACHMENT 22

22.0 Removed CAUTION and placed step in procedure as part of Step 22.5.

22.9.2 Changed 2RHS*MOV25A to 2RHS*MOV15A

22.15.5 Changed to verify flow via ERF computer point RHSFA107(108)

ATTACHMENT 25

25.1.4 Fixed references

ANSWERS TO ELECTRICAL REVIEW COMMENTS

Pg 1

ATT 2

I AM LEAVING THE WORDING AS IS BASED ON
① RPV PRESSURE IS BEING MONITORED VICE RCIC SUPPLY PRESSURE
② RCIC TURBINE CAN ONLY BE SUPPLIED FROM RPV (CAN'T RUN FROM ANY SOURCE OR ANY OTHER SOURCE ⇒ ∴ RPV PRESS ; RCIC SUPPLY PRESS ARE SYNONYMOUS.

ATT 3

① ~~I AM SATISFACTORY COMMENT~~ CHANGED "SHUT" TO "CLOSE/CLOSED"

② 3.2.1 a) PROCEDURE IDENTIFIES LEADS AS LABELLED IN PLANT ALSO ROP TAPE AND PICTORIAL OPERATOR AID BEING STAGED

b) ADDED NOTE IDENTIFYING 88 PSID INTERLOCK

3.3.1 a) PROCEDURE IDENTIFIES LEADS AS LABELLED IN PLANT ALSO ROP TAPE AND PICTORIAL OPERATOR AID BEING STAGED

b) ADDED NOTE IDENTIFYING 130 PSID INTERLOCK

3.4.1 a) ADDED NOTE IDENTIFYING 130 PSID INTERLOCK

b) PROCEDURE IDENTIFIES LEADS AS LABELLED IN PLANT ALSO ROP TAPE AND PICTORIAL OPERATOR AID BEING STAGED

3.5.1 a) PROCEDURE IDENTIFIES LEADS AS LABELLED IN PLANT ALSO ROP TAPE AND PICTORIAL OPERATOR AID BEING STAGED
b) CORRECTED TYPO.

3.5.2 ADDED NOTE IDENTIFYING 130 PSID INTERLOCK

4.1.1 NO DEVICE NUMBER ON P601 JUST LABELLED "FLOW CONTROLLER" - RESOLVED BY PUTTING "FLOW CONTROLLER" IN ALL CAPITAL LETTERS

ATT 5. BLANKETLY CHANGED ALL VALVE OPERATIONS FROM "SHUT" TO "CLOSE(D)"

5.0 CHANGED WORDING FOR CLARITY

5.1 NZ-OP-11 SERVICE WATER SYSTEM SECTION H.5.6 [redacted] LOSS OF DIVISIONAL OFF-SITE POWER, CONTAINS A CAUTION LIMITING THE OPERATING OG TO ONE SWP PUMP. ⇒ NO NOTE REQ'D IN EOP-6

5.3 ~~NOT REQ'D~~ NOT RRQ'D ⇒ FREQUENTLY OPERATED (PLANT/SIMULATOR) THROTTLE VALVE ~~ADDED "(THROTTLE VALVE) IDENTIFICATION~~

5.4 ADDED FOR CONSISTANCY "P601"; "HOLDING SWITCH" NOT REQ'D (SEE 5.3 ABOVE

5.5 ADDED PGCC KEY NOTE

5.6 ADDED "P601" FOR CONSISTANCY

5.7 ADDED PGCC KEY NOTE

5.8 a) DO NOT WANT TO DEFEAT ΔP INTERLOCK (SWP PIPING PROTECTION) SEE NOTE PRECEDING STEP 5.8

5.8 b) ADDED STEP TO JUMPER ACROSS E TO D OF B22H-K53B } (P622)
AND TO LIFT LEAD @ CONTACT L B22H-K53B }

5.8 c) ADDED STEP TO JUMPER ACROSS A TO B OF B22H-K54 } (P623)
AND TO LIFT LEAD @ CONTACT R B22H-K54 }

5.9 a), b), c) DESCRIBE RHR SYSTEM INTERLOCKS THAT ARE REQUIRED KNOWLEDGE AND WELL TRAINED ON ⇒ NO CHANGE TO EOP-6 REQ'D

5.10 ADDED "or verify closed"

5.13 ADDED

5.14 NOT REQ'D SEE COMMENT 5.1 ABOVE

ATT 6

BLANKETLY CHANGED VALVE POSITION(ING) FROM "SHUT" TO "CLOSE(D)"

STEP 6.1.8.C. REQUIRES VERIFICATION OF RPV PRESS < FPW PRESSURE PRIOR TO OPENING THE LAST ISOLATION BETWEEN RPV & FPW

6.1.1 PUMP CONTROL SWITCH LOCATION NOT REQ'D

6.1.2. "HOLD SWITCH" INSTRUCTION NOT REQ'D

6.1.8 STEP 6.1.8.C. REQUIRES VERIFICATION OF RPV PRESS < FPW PRESS

6.1.4 LOCATION OF 2RHS*V70 ADDED (RB 289)

6.1.5 LOCATION OF 2CNS-V621 ADDED (RB 289).

6.1.5, 6.1.9-d, 6.2.5 ⇒ "BLANK" CHANGED TO "BLIND"

6.1.8-c "FPW-PI 215" ADDED

6.1.8-d SEE COMMENT 6.1.8

6.2.1 NOT REQ'D

6.2.2 ADDED "CLOSED"

6.2.2 (b→h) "HOLD SWITCH" INSTRUCTION NOT REQ'D

6.2.8 IDENTIFIED IN STEP 6.2.8.C.

ATT 7

BLANKETLY CHANGED "SHUT" TO "CLOSE(D)"

~~ATT~~ ATT 7 (CONT)

GN 2), 3): ADDED RPV PRESS VERIFICATION FOR CSH AND NOTE TO ~~TS~~ LPCI AND CSL STEPS

7.2.2-b CHANGED AS ~~SUGGESTED~~ SUGGESTED

7.2.4-b CHANGED AS SUGGESTED

7.2.3, 7.2.4 } ORDER CHANGE ~~WAS~~ ACCOMPLISHED BASED ON CAUTION @ BEGINNING OF PROCEDURE (DON'T INJECT...)

7.2.4 TYPO FIXED

7.3 IT IS ACCEPTABLE TO INJECT THROUGH LPCI B & C SIMULTANEOUSLY

7.3.3, 7.3.4 } STEP ORDER IS CORRECT

7.3.2 CHANGED

7.3.4, 7.3.5 CHANGED

ATT 8

8.1 NOT REQ'D

8.2 NOT REQ'D

8.3 MOVED TABLE

8.5, 8.6 ADDED "previously opened" TO STEPS FOR CLARIFICATION

8.7 ADDED "Restore As directed by SSS"

ATT 9 NO COMMENTS

ATT 10

CHANGED "SHUT" TO "CLOSE(D)"

CAUTION: ⇒ NOT REQUIRED ~~ADD TO UNDERSTOOD THAT~~
ADDED CLARIFICATION TO WORDING OF 10.1

10.1.3 CHANGED STEP AS FOLLOWS
① ADDED INSTRUCTIONS TO PLACE MSIV IN&O! OUTBD CONTROL SWITCHES TO CLOSE
② DID NOT CHANGE MSIV & DRAIN ISOLATION RESET (IDENT. AGREES W/PLANT LABELLING

10.2.3 ADDED 2MSS-MOV187 TO LIST

10.2.2 THIS STEP IS AUTHORIZED AND ACCEPTABLE DURING ATWS CONDITIONS AND IF REQUIRED TO CONTROL PRESSURE IN NON-ATWS CONDITIONS

10.3.3 ADDED 2MSS-MOV187 TO LIST

10.3.7 REMOVED "+" REPLACED W/"–"

10.3.13 DEVICE NUMBERS ARE UNNECESSARY AS THE PROCEDURE IDENTIFIES EQUIPMENT AS LABELLED IN PLANT

10.3.13 C33-R605 & C33-R609 ARE AS REQUIRED INDICATING DEVICES ARE LABELLED IN PLANT

10.3.15 DEVICES IDENTIFIED IN NOTE [redacted] PRECEDING STEP 10.3.14

10.3.18 TURBINE BYPASS VALVES [redacted] ARE NOT NUMBERED NOR INDIVIDUALLY CONTROLLED

ATT 11 THE BWROG-EPG AUTHORIZES USE OF RWCU (RECIRC MODE) TO SUPPORT RPV PRESSURE CONTROL WHEN SLC INJECTION IS REQ'D. UNDER THESE CONDITIONS, BYPASSING F/D'S IS REQ'D, UNLESS F/D'S ARE BEING USED TO INJECT BORON. ADDITIONALLY, RWCU SYSTEM MASS IS TAKEN INTO ACCOUNT IN COLD & HOT S/D BORON WEIGHT CALCULATIONS

ATT 11 (CONT)

11.1 FIXED TYPO (P623 to P632)

ATT 12 DELETED

ATT 13

13.1 POSITIONS ID NUMBERS NOT REQUIRED, PROCEDURE IDENTIFIES EQUIPMENT AS LABELLED IN PLANT.

13.2.1 13.2 IDENTIFIES P603

13.2.2 CHANGED TO "DIV I & II POTENTIAL ATWS" (603422)
ADDED STEP 13.2.3 "CRD SCRAM AIR HEADER PRESS H/LO" (603306)

13.3.1 N2-OP-36A SECTION F.1.2 → F.1.4 DESCRIBES VERIFICATION
13.3.2 STEPS FOR WCS ISOLATION/SLC INITIATION

13.4 RESET POSITIONS ARE LABELLED "RRCS RESET" IN PLANT

ATT 14 CHANGED FROM "SHUT" TO "CLOSED" WHERE APPLICABLE

14.1 a) } DELETED STEPS TO REMOVE FUSES F11 A/B AND F12 A/B
14.1 b) }

14.3 a) CHANGED WORDING TO "ARI KEYLOCK TEST SWITCHES" AS PER PLANT LABELLING

14.4.c) ADDED TO STEP 14.4.C.2 "REACTOR SCRAM RESET SWITCHES FOR CHANNELS A, B, C & D TO THE RESET POSITION"

14.4.d) 14.4.d.1 → 4 ALL IDENTIFIED CONSISTANT WITH IN-PLANT LABELLING

14.5 a) PUMP CONTROL LOCATION NOT REQUIRED

ATT 14 (CONT)

14.5.e) NEW RWM, ~~CHG~~ CHANGED TO "BYPASS/OPERATE/TEST SWITCH"

14.5.h) P603

ATT 15

CHANGED SYSTEM REFERENCE ABBREVIATION TO "SLC" CONSISTANTLY PER ROP-5

15.8 SLS* MOVSA(5B) ARE NORMALLY OPEN VALVES ~~REFLECTED SYS 15.2~~ ADDED "CHECK OPEN"

ATT 16

16.10 FIXED TYPO

ATT 17 NO COMMENTS RECEIVED

ATT 18

18.1.1.e) ADDED "P851"
18.1.1.f) ADDED "P602"
18.1.1.g) ADDED "P602"
18.1.2.a) ADDED "THROTTLE VALVE" AND "P824"
18.1.2.a.1 STEP NOT NECESSARY AS VALVE CAN BE REQUIRED IRRESPECTIVE OF MANUAL ISOLATION COLLAR ~~LOCK~~ POSITION
18.1.2.b. ADDED "P602"
18.1.2.d. ADDED "P602"
18.1.2.e. ~~BE~~ CHANGED "*" TO "—"; ADDED "THROTTLE VALVE"; "P602"
18.1.3 ~~ADDED~~ NOT NECESSARY, ALL LICENCED OPERATORS KNOW LOCATION
18.1.4 ZMSS-AOV 87A,B,C & D ARE NORMALLY OPEN
18.2.2. ADDED "P601"
18.3.2. ADDED "P601"
18.2.1 } ADDED "JUMPER CONTACTS M2 TO T2 OF RELAY BLOCK ES1A-K33"
18.3.1 } ADDED "JUMPER CONTACTS M2 TO T2 OF RELAY BLOCK ES1A-K15"

ATT 19

PROCEDURE REWRITTEN, IN REVIEW BY SYS ENG.

ATT 20

20.1.A ATTACHMENT 20 IS JUST FOR DEFEATING INTERLOCKS THE OP-3 OFF NORMAL WILL GOVERN FEED-UP

ATT 21

CHANGED "SHUT" TO "CLOSED" WHERE APPLICABLE

21.3.1 ADDED STEP AS SUGGESTED

21.3.3 CHANGED "BLANK" TO "BLIND"

ATT 21 (CONT)

21.3.3 } TERMINAL 9 DOES HAVE MORE THAN ONE LEAD
21.3.4 } ADD WORDS TO STEP TO LIFT "BOTH LEADS"

21.4.1.g. NO, 21.4.1.e REFERS TO 2GTS*MOV4A WHILE STEP 21.4.1.g REFERS TO 2GTS*MOV 4/B

21.4.2 CHANGED "BLANK" TO "BLIND"

21.5.1.2. ADD WORDS TO LAND BOTH LEADS LIFTED IN 21.3.3/21.3.4

ATT 22

CHANGED "SHUT" TO "CLOSED(O)" WHERE APPLICABLE

22.2 NOT NECESSARY, CIRCUIT DOES NOT HAVE "SPRING IN", BUT SWITCH DOES NOT SPRING RETURN FROM "OPEN"

22.4.2 } NOT NECESSARY, AS THESE VALVES DO NOT OPEN ~~AUTOMATICALLY~~ AUTOMATICALLY
22.4.b } AND ARE NORMALLY SHUT

22.6.a NOT NECESSARY, AS THIS VALVE IS NORMALLY OPEN AND WILL LIKELY BE UNSHUTTABLE (FOR 10 MIN)

22.6.b } NOT NECESSARY, AS THESE VALVES DO NOT AUTO ISOLATE
22.6.c } AND ARE NORMALLY OPEN.

22.7.1 CHANGED FROM "ADJUST" TO "THROTTLE FOR CLARITY

22.7.1 NOT NECESSARY

22.7.2a NOT NECESSARY, AS THIS VALVE IS NORMALLY SHUT AND DOES NOT AUTO OPEN

ATT 22 (CONT.)

22.7.3 NOT NECESSARY

22.11
22.8
22.9
22.10
} ORDER OF STEPS IS APPROPRIATE, AS IT PROVIDES LOGICAL ORDER TO FIRST SUPPLY SPRAY IN RISING DEGREES OF FLOW AND THEN REMOVE IN SAME ORDER

22.11.2 "IF OPEN" REMOVED

22.8.5 MOVED NOTE TO AFTER 22.9

22.14.2
22.14.3
} NOT NECESSARY

ATT 23

ATTACHMENT IS REFERENCED AND INVOKED BY THE ECP FLOWCHART FIGURES (MAX CONTAINMENT WATER LEVEL)

ATT 24

24.2 ADDED "P873"

24.3 THIS STEP HAS BEEN RETAINED DUE TO
(1) ITS SIMPLICITY AND EASE OF PERFORMANCE
(2) SHOULD A CCP VALVE OPENED IN 24.2 FAIL IN MID POSITION OR FAIL TO SEND A PROPER OPEN SIGNAL TO THE UNIT COOLER CIRCUITRY, THE FAN CAN STILL BE RESTARTED
(3) IN THE EVENT A U.C.'s CCP SUPPLY CANNOT BE RESTORED, THE OPERATION OF THE FAN WILL STILL AID IN CIRCULATION IN THE DRYWELL AIR SPACE

24.4 ADDED "P873"

ATT 25

25.1 ADDED OVERRIDE STEPS

G.N. CHANGED "SHUT" TO "CLOSE(D)" WHERE APPLICABLE

25.2.1.A.11.b CHANGED TYPO

25.2.1.b.2.d CHANGED TYPO

25.2.2.I.7 HVR PA Ø1 IS CORRECT PROCESS COMPUTER
25.3.2.I.7 POINT FOR R/B BLDG ~~&~~ DIFF PRESSURE

ATT 26

26.1 SGTS IS ONLY PREVENTED FROM STARTING DUE TO RPV LEVEL AND/OR DRYWELL PRESS. SHOULD HVR SENSE A RADIATION RELEASE (ABOVE/BELOW REFUEL FLOOR ~~RAD~~ RB VENT EXHAUST RAD MONITORS – ZHVR ~~RM~~ 32'S OR 14'S) SGTS WILL STILL START AND HVR WILL AGAIN ISOLATE (RESIC 7HVR-10

26.2 ADDED INSTRUCTIONS TO RETURN RB UNIT COOLERS TO AUTOMATIC OPERATION (STEP 26.2.3.b)

26.2.4 ADDED "P101, SGTS BLDG"

Att 27

27.0 ADDED ABBREVIATIONS

27.3.2. ADDED " PERFORM STATUS CHECKS per N2-OP-82 sect. F.1.