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REGION V

Report No.: 50-397/90-20

Docket No.: 50-397

License No.: NPF-21

Licensee: Washington Public Power Supply System (WPPSS)
P. O. Box 968
Richland, Washington 99352

Facility Name: Washington Nuclear Project No. 2 (WNP-2)

Inspection At: WNP-2 Site, Benton County, Washington 70775

Inspection Conducted: September 4 through September 13, 1990

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Approved: L. Miller, Chief, Operations Section — 10-9-90 Date Signed

Inspection Summary:

Emergency Operating Procedures Inspection conducted September 4-13, 1990 (Report 50-397/90-20).

Area Inspected:

The inspection was a human factors evaluation of the EOPs, a validation of the plant-specific EOPs by plant walkdowns, an evaluation of the EOPs using simulator exercises, a review of the EOP training program, and a sampling review of engineering calculations supporting the EOPs.

The inspection team used Inspection Procedure No. TI 2515/92, Revision 1 as guidance during the inspection.

Results:

The inspection team concluded that the WNP-2 EOPs, although adequate, were, in places, difficult for operators to use, with a potential for causing safety-significant errors.

There were weaknesses in technical justifications for significant deviations from the Owners Group Guidelines and some areas of the EOPs did not conform to the requirements of the writer's guide.

Procedure walkdowns with operators indicated that the verification and validation of EOPs and support procedures were marginal. Calculation errors resulted in errors in the EOP graphs.

The specific inspection findings are documented in Section 1, "Inspection Details," of this report. These findings were discussed with the licensee's staff identified in Attachment C of this report.

Summary of Violation: None

Summary of Deviations: None

Open Items Summary:

(Open) Open Item 50-397/90-20-01, Primary Containment Venting Deviation Justification

(Open) Open Item 50-397/90-20-02, Primary Containment Flooding Deviation Justification

(Open) Open Item 50-397/90-20-03, Steam Cooling Deviation Justification

(Open) Open Item 50-397/90-20-04, Development and Verification & Validation of EOPs and EOP support procedures

(Open) Open Item 50-397/90-20-05, Implementation of EOP Caution 1, "RPV Level Instruments," concerning operability limitations due to reactor building temperature conditions

(Open) Open Item 50-397/90-20-06, Calculation Errors in EOP Graphs

INSPECTION DETAILS
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Note: Task 6, "Interviews with EOP users, developers, and other appropriate plant staff", was incorporated into Tasks 1-5 by the inspection team.

INSPECTION DETAILS

1. Comparison of the WNP-2 EOPs and the BWR Owners' Group Emergency Procedure Guidelines (BWROG EPGs) (Task 1)

The team inspection compared the WNP-2 Emergency Operating Procedures with the BWROG EPGs, Revision 4, to ensure that the licensee had generated procedures in accordance with the owners' group recommendations. The EOPs reviewed are listed in Attachment D to this report. Where significant deviations between these documents were identified, the team verified that the deviations were adequately justified and documented, except as follows.

The team identified the following three deviations and one deficiency during the comparison review.

(Open) Open Item 50-397/90-20-01, Primary Containment Venting Deviation Justification

EOP 5.2.1, "Primary Containment Control," Revision 5, Primary Containment Pressure flowchart contained a significant deviation from the BWROG EPGs, Revision 4. The deviation concerns venting containment with core damage greater than 10%. The EPG criteria requires venting containment to the environment if containment pressure cannot be maintained below the Primary Containment Pressure Limit (PCPL). If primary containment pressure cannot be reduced, the EPG directs spraying the drywell (at the expense of core cooling, if necessary, since water would be redirected to containment spray, from direct Reactor Pressure Vessel (RPV) injection) to reduce primary containment pressure. If core damage is less than 10%, WNP-2 uses the same guidance as the BWROG EPGs, which is to vent first (regardless of core damage).

However, if core damage is greater than 10%, the WNP-2 criteria is to spray the drywell first. If the drywell cannot be sprayed, the WNP-2 guidance is to then vent the primary containment to the environment. The licensee justification for the deviation is documented in the WNP-2 EPG Deviation Document, Primary Containment Control, pages 19 - 22. The licensee justification emphasizes that because the containment is not expected to "actually yield" until pressure is well above the PCPL, the potential off-site dose is not warranted. WNP-2 states that the criteria to vent "before" the PCPL is reached is inappropriate. However, the WNP-2 justification does not provide engineering calculations or documentation to support this conclusion.

The trade-off between venting containment, at risk to the general population, and the potential to exceed the PCPL due to a delay in venting should be based on well justified and documented calculations. The team concluded this issue was significant, and that the philosophical and technical issues still need to be resolved.

The licensee acknowledged this finding, and committed to pursue the issue with the BWROG. This issue was referred to the Office of Nuclear Reactor Regulation for evaluation.

(Open) Open Item 50-397/90-20-02, Primary Containment Flooding Deviation Justification

EOP 5.1.4, EOP Flooding, Revision 0 contained a significant deviation from the BWROG EPGs, Revision 4. The deviation concerns initiation of primary containment flooding if the RPV water level remains below the top of active fuel (TAF), after the initiating event and attempts at mitigation with emergency core cooling systems (ECCS).

The BWROG EPG, Revision 4 requires containment flooding initiation if the RPV water level remains below the TAF (for ATWS and non-ATWS conditions). WNP-2 deviates from the criteria for both ATWS and non-ATWS conditions.

For non-ATWS conditions, WNP-2 did not require primary containment flooding, but instead directed all available ECCS be aligned for RPV injection, with a suction from the suppression pool.

For ATWS conditions, WNP-2 directs flooding only if: 1) RPV level cannot be maintained above 2/3 TAF with either High Pressure Cooling System (HPCS) or Low Pressure Cooling System (LPCS) injecting at rated flow, or 2) RPV level cannot be maintained above TAF, without HPCS or LPCS injecting at a flow rate greater than 6000 gpm, or 3) RPV level is unknown and neither HPCS or LPCS injection flow is above 6000 gpm.

The team concluded additional justification and further review would be required. The licensee acknowledged the issue and committed to resolve the issue with the BWROG. The issue was referred to the Office of Nuclear Reactor Regulation for review and evaluation.

(Open) Open Item 50-397/90-20-03, Steam Cooling Deviation Justification

EOP 5.5.1 RPV Control, Revision 7 contains a significant deviation from the BWROG EPGs, Revision 4. Revision 4 to the BWROG EPG requires that with no RPV injection source available when RPV levels drops to minus 210 inches (about 2/3 core height), Emergency Depressurize the RPV (to maximize the steam cooling effects, given the limited RPV water inventory).

However, the EOPs specified that, with no RPV injection source available other than RCIC, CRD, SLC or ECCS Keep-Full pumps, continue to inject into the RPV with RCIC, CRD, SLC or ECCS Keep-Full pumps. The EOPs did not require emergency depressurization until RPV level can not be determined, rather than at minus 210 inches (which is within the indicating range).

The issue is when to initiate emergency RPV depressurization, under various RPV level and injection availability conditions. The concern deals with determining the best core cooling method (to maintain an adequate coolable core geometry) under very low core water level degraded conditions.

The team concluded that additional justification and further review was required. The licensee committed to resolve the issue with the BWROG. The issue was referred to the Office of Nuclear Reactor Regulation for review and evaluation.

(Open) Open Item 50-397/90-20-05, Implementation of EOP Caution 1, "RPV Level Instruments," concerning operability limitations due to reactor building temperature conditions

EOP Caution 1, "RPV Level Instruments," EOP 5.0.0, "EOP Cautions," Revision 1, concerned the temperature effects on instrument line runs which affect RPV level instrument accuracy. The caution required operators to know the temperature near RPV level instrument line runs in the secondary containment, to determine if fluid in the instrument lines was near the saturation temperature for the RPV pressure. If the temperatures in these areas reached or exceeded saturation conditions, RPV level indications could be erroneously high. This would mislead operators, and could lead to further degradation of the event. However, WNP-2 does not have remote or local reading temperature instruments for instrument line runs to determine these temperatures. Also, portable instruments were not pre-staged and available to compensate for the lack of installed instrumentation.

It was also noted that the licensee changed the wording of the caution from the EPG, Revision 4 guidelines. The wording was changed from keep the temperature "below the saturation temperature" to do not permit the temperature to go "above the saturation temperature." The change was non-conservative as the WNP-2 wording omits the case of temperature "equal to the saturation temperature." If the temperature near the instrument lines was equal to the saturation temperature, reliable RPV level reading could not be assured.

The caution, as it was implemented by the licensee, was non-conservative and could result in operators using unreliable RPV level instruments.

This open item was acknowledged by licensee personnel who indicated that corrective action would be formulated.

2. Technical and Human Factors Review (Task 2)

The team reviewed the EOPs listed in Attachment D to ensure that the procedures were technically adequate and appropriately incorporated the guidelines provided to the licensee by the Owners' Group. During this review, the team considered the following criteria:

The prioritization of accident mitigation strategies in the EOPs was appropriate.

The step sequence of the BWROG guidelines was followed or deviations were adequately justified.

EOP entry, decision, and exit points were clearly specified and correct.

Transitions within and between procedures were appropriate and well defined.

Deviations between the WNP-2 EOPs, as defined by the licensee's Plant Specific Technical Guidelines (PSTGs), and the BWROG guidelines had been identified and justified.

Deviations required by the plant-specific design had been incorporated as necessary.

Notes and caution statements were used properly.

Plant-specific values and setpoints were correct, and adverse containment values were provided.

The EOPs adhered to the requirements of the plant-specific EOP writer's guide.

The following deficiencies resulted from the technical and human factors reviews of the WNP-2 EOPs and supporting procedures, during this phase of the inspection.

2.1 Technical Review

a. Deficiencies in EOP Development

The following are examples of deficient EOP development which were identified by the inspector. They are organized under the associated procedure reviewed during this portion of the inspection.

(1) EOP 5.3.1, Secondary Containment Control, Revision 6: See Attachment B, Example #1 for the flowchart under discussion.

The decision block that stated, "If an area temperature exceeds its maximum safe operating temperature in more than one area (Table 1)," could be misleading. Table 1 referenced by the step contains many "areas" (left to one's interpretation of, "area"). Both areas and rooms are called locations on the table. For example, the table references the RWCU Pipe Routing Area R511 and the RWCU Pump Room, and if the operator interpreted this area and room as only one area, appropriate action would not be taken. The intent of the step is to take action when any two "locations" exceed maximum safe operating temperature. Misreading the step could result in failure to depressurize the plant as required. This same style decision block appears in all three legs of this procedure. This human factor deficiency should have been identified during the EOP developmental phase.

(2) EOP 5.1.2, "Failure To Scram," Revision 6:
See Attachment B, Example #2 for the flowchart under discussion.

The procedure had a confusing step which had potential to cause errors in performing safety-significant actions. The EOP step that started with "If Necessary, Override ECCS Valve Logic per 5.5.1, . . ." was confusing to operators, because "If necessary" could be taken to apply to the entire step of lowering RPV level rather than just to the action of overriding ECCS interlocks using an ESP support procedure, as intended. The step should start with and emphasize the required action. In this case the action is obscured by the long procedure title and modifier, "If necessary." The step should be clarified. This wording is contrary to accepted human factors standards.

The significance of this concern was confirmed during interviews with the licensed operators in the operating crew performing the simulator functional test of the EOPs (see Section 4).

(3) See Attachment B, Example #3 for the flowchart under discussion.

The procedures direct operators to perform actions in a specific manner through the use of a number of different terms (e.g., "with the following systems," "using only those RHR pumps..," "...via RFW-PCV-10A/B"). Because operators are trained to respond to differences in structure as equal to differences in meaning, performance of these steps may be delayed or confused as operators attempt to interpret the steps and identify the needed actions. To prevent this problem, similar steps should be written using the same terminology. This inconsistency in structure is the result of incomplete directions in the writer's guide. This is contrary to accepted human factors standards.

Numerous other examples of deficient EOP development are provided in Attachment A, section A1.

b. EOP Verification and Validation Deficiencies

The following are examples of deficient EOP verification and validation which were identified by the inspection. They are organized under the associated procedure reviewed during this portion of the inspection.

(1) See Attachment B, Example No. 4 for the flowchart section under discussion.

(Open) Open Item 50-397/90-20-06, Calculational Errors in EOP Graphs. EOP 5.0.1, EOP Graphs, Revision 0, Heat Capacity Temperature Limit (HCTL) and Pressure Suppression Pressure Limit (PSPL) curves did not agree with the calculations from General Electric and WNP-2 engineering, NE-02-89-20, Revision 0, and NE-02-89-27, Revision 0. The inspector found a non-conservative error in the PSPL where the EOP graph did not match the calculation. The licensee acknowledged the error and considered the event reportable. The error was subsequently reported to the NRC under 10 CFR 50.72.

Upon further review the licensee identified another error in the HCTL curve. These errors would have allowed degraded plant conditions to continue in the "unsafe regions" of these graphs. The licensee subsequently documented the errors in Problem Evaluation Report (PER) 290-698 on September 13, 1990.

Control room instruments CMS-LR-3 and CMS-LR-5, suppression pool level, were red-lined at a value different than EOP 5.1.1, "RPV Control," Revision 7, specifies. For the EOP step "Can S.P. Level Be Maintained Below 52 Ft," the operators would use suppression pool level instrument CMS-LR-3 and CMS-LR-5. The instrument had a red line at 51 feet rather than 52 feet. The meters should have been marked consistently with EOP steps. The same instruments in the simulator were not marked with a red line. This item was turned over to the licensee for correction. The mismarking could result in operators misreading the indicators and terminating all injection earlier than necessary, causing additional core damage.

Several other examples of deficient EOP verification and validation are provided in Attachment A, Section A2.

The team concluded that, in general, the Plant Specific Technical Guidelines were technically adequate and accurately incorporated the BWROG EPGs. Deviations from the BWROG EPGs with some exceptions (identified in the previous section) were adequately justified and documented.

2.2 Human Factors Review

The WNP2 Symptomatic Emergency Operating Procedures Writer's Guide, Plant Procedure Manual 5.0.2 (PPM 5.0.2), selected EOPs, ESPs and other PPMs were reviewed for consistency with human factors principles described in NUREG-0899 and NUREG-1358. The desktop review identified a number of human factors concerns, two of which were in areas considered highly related to human error-decision steps and transitions within and between procedures.

Specific examples in this area are provided in Section 3 of this report, as the findings were gathered during the plant walkdown portion of this inspection. However, the technical human factors issues are presented here for completeness.

a. Decision steps

The most significant human factors concern identified in the WNP2 EOPs/ESPs was a weakness in the design and implementation of decision steps, also known as conditional or logic steps.

Decision making plays an important role in the performance of EOPs. Because this capability is often degraded during periods of high stress, it is important that decision steps be presented to operators as simply as possible, in clear and consistent structure.

Inconsistent and complex presentation of decision steps will make the procedure more difficult to use and increase the possibility of error. Operators will interpret the meaning of variations in presentation. Different operators may interpret the variations in different ways, leading to differences in execution of the procedures, some of which will be incorrect. Operators faced with complex and inconsistent procedure steps will be more likely to abandon the use of the procedure and depend on their own experience and training to address the event at hand.

Several different types of weak decision steps were identified in the WNP2 EOPs/ESPs. Some were due to inadequacies in the writer's guide. Examples 4a and 4b, of Attachment B illustrate the following human factors concerns:

The WNP2 writer's guide allowed alternative designs for the same type of logic step. The "continuation condition step" described on page 38 was essentially the same type of step as the "hold point" described on page 39. Because the flowchart format of the EOPs used design as well as the content of a step to convey meaning, different designs suggested different meaning and therefore different types of action to operators.

The writer's guide design for "continuation condition" steps splits the condition from its contingent action. The condition was attached to the previous action symbol. This structure suggests a relationship that may not exist, it increases the length and complexity of the step, and it interferes with the link between a condition and its contingent action. The failure to use some form of emphasis to clearly identify the contingent action (such as "THEN") also reduced the link between the condition and contingent action. Two different operators experienced difficulty in using this type of structure during simulator exercises. This indicated a potential for operators errors on safety-significant actions during emergencies.

The WNP2 writer's guide also allowed the use of qualifiers that could confuse and cause error. When an action step followed by a clause beginning "EXCEPT," "WHEN," or "other than," the position of the qualifier clause may cause it to be read AFTER the action is begun. In addition, the complexity of the step is greatly increased by the use of such clauses. An operator error occurred during simulator exercises due to incorrect performance of such a step.

The team also observed that inadequate verification against the writer's guide requirements, also resulted in inconsistencies within the procedures. Some examples of this are included in Attachment A, Section A.1, "EOP Development."

This was of particular concern, considering the complex symbology incorporated in the EOP flowcharts (see Section 4.1 for examples where operators were confused by complex EOP flowchart structure).

In most cases where such problems are identified in a desktop review, the findings must be presented as related only to potential error. However, at WNP2 the team observed the effect of these overly complex and inconsistent decision steps during the simulator scenarios described in section 4 of this report. The operator errors that resulted from difficulty in execution of decision steps provide evidence of the safety significance of these issues.

b. Transitions

Movement within and between procedures can be disruptive and confusing, and cause unnecessary delays and errors. Therefore, when it is necessary for an operator to reference other procedures or exit one procedure and branch to another procedure, it is particularly important that the instructions be clearly and consistently structured. The WNP2 writer's guide directions on referencing and branching (pp. 13, 31-32) was unclear. Its definitions of referencing vs. branching provided no clear distinction. Examples 4a and 5, of Attachment B, illustrate these concerns.

In addition, variation in the presentation of transitions was found within the procedures, as a result of inadequate verification against the writer's guide (see Section 3 of this report).

c. Other writer's guide issues

The WNP2 writer's guide contains several weaknesses other than those mentioned previously that could contribute to operator difficulty in the use of the procedures. Examples 5 and 6, of Attachment B are examples of those weaknesses.

"Contingency condition callouts," such as "RPV FLOODING IS REQUIRED," are used within the flowcharts. However, these callouts are placed within an action step symbol. As a result, they appear to direct the operator to transition directly from the callout to the necessary contingency. During simulator exercises, an operator attempted to transition directly from such a symbol, which would have resulted in skipping an important decision symbol. (See Example 5, of Attachment B).

Cautions call operator attention to potential equipment damage or personnel injury. Because of the critical nature of this information, cautions should be emphasized and located where they will not be overlooked. WNP-2's EOPs place all of the EOP cautions in PPM 5.0.0, "EOP Cautions." This placement of cautions in a separate procedure makes it difficult for operators to use the information. During simulator scenarios, operators did not always read the cautions. If the information in cautions is truly critical, operators should not be required to transition to another location to read it. If the information in a caution is superfluous, it should not be contained in a caution. (See Example 6, of Attachment B).

To minimize inconsistency, an inclusive list of approved action verbs is an important part of an EOP writer's guide. The action verb list within the WNP2 EOP writer's guide was noninclusive. In addition, it contained verbs having the same meaning (e.g., control and maintain; stop and terminate). This was not consistent with basic human factors criteria.

The team concluded that the writer's guide design for decision steps and also for transitions, contained human factors deficiencies that had a potential for causing operator difficulty and error in the use of the procedures (see Section 3, Open Item #4).

3. Review of EOPs by Plant Walkdowns (including the Control Room) (Task 3)

3.1 Plant Walkdown Evaluations

The team conducted detailed walkdowns of all EOPs and EOP enclosures. This included a sampling of applicable sections of supporting procedures referenced by the EOPs. During walkdowns, team members asked operators to locate and demonstrate or simulate the demonstration of equipment necessary to carry out the EOP. The inspectors requested operators to obtain hand tools, jumpers, spanners, hoses, ladders and other equipment and physically demonstrate use where possible. Additional walkdowns were conducted to resolve questions and to evaluate the ability of a cross section of operators to implement the EOPs. Shift Managers, Control Room Supervisors, Shift Technical Advisors, Reactor Operators, and Nuclear Equipment Operators participated in the walkdowns and discussions. Selected walkdowns were evaluated by the team human factors specialist, in order to complete the human factors evaluation.

The team concluded that, with the exceptions noted, the operators were able to execute or simulate executing the EOPs and supporting procedure steps. Most steps and actions were carried out with little difficulty or assistance. The team noted the relay and jumpering locations were well specified by the procedure, and with few exceptions the operators were knowledgeable in the execution of enclosure steps.

a. Examples of Deficiencies in the EOPs Found During the Plant Walkdowns. They are organized under the associated procedure that was inspected, unless stated otherwise.

The method of procedure retrieval and verification used by operators for emergency support procedures could cause significant delay in implementing emergency actions:

Controlled copies of emergency support procedures were not available for Reactor Operator and Equipment Operator use during emergencies. The operators had to remove procedures from controlled volumes in the main control room and radwaste control room and make copies on local copy machines. This delayed implementing ESPs from 5 to 15 minutes during the walkdowns and could do the same during emergencies. Additionally, copy machines at both locations were powered from non-safety electrical buses which may not be available during emergencies.

Additional delay was encountered because operators called the control room to verify the procedure was the latest revision. Verification during emergencies would burden the control room with unnecessary calls, and was contrary to the requirements of PPM 1.2.3 "Use of Controlled Plant Procedures," Revision 14, Paragraph 1.2.3.5.B.1 which indicated verification was not required for procedures from the main or radwaste control rooms.

EOP 5.1.2, "Failure To Scram," Revision 6:

The procedure had a confusing step which had potential to cause errors in performing safety-significant actions. The EOP step that started with "If Necessary, Override ECCS Valve Logic per 5.5.1, . . ." was confusing to operators because "If necessary" could be taken to apply to the entire step of lowering RPV level rather than just to the action of overriding ECCS interlocks using an ESP support procedure. The step should start with and emphasize the required action. In this case the action is obscured by the long procedure title and modifier, "If necessary." The step should be evaluated and clarified. This finding was discovered during interviews with operators during this portion of the inspection. This concern was also observed during the simulator portion of this inspection (see Section 2.1.a (2) and 4.1).

EOP 5.1.4, "RPV Flooding," Revision 0:

The procedure contained a step concerning Minimum Alternate RPV Flooding Pressure (MARFP) that was confusing to operators due to complex logic and branching. The MARFP action of exiting from the step "If No SRVs Can Be Opened," to the step "Can At Least 5 SRVs Be Opened," was confusing. The licensee should evaluate reworking the step or providing additional training to operators.

ESP 5.5.17, "Primary Containment Flooding," Revision 0:

Steps 2 and 3 of the procedure are "if statements" that require the Shift Manager or Control Room Supervisor to concurrently recheck entry conditions while executing all other flowchart EOPs. The additional "if statements" not contained within the flowchart EOPs add difficulty and burden to the operators. Major decision points should be on the flowcharts to ensure viability and continued tracking.

PPM 2.3.3, Containment Atmospheric Control, Revision 14:

Section 5.1, Step 5 refers to Board K1(K2). This same board was referred to as P827 in other procedures. This problem was generic to other procedures where in some cases the General Electric H13-PXXX designation was used, and other times the letter designation was used. The procedures should be reviewed and revised to insure consistency in panel identification.

PPM 3.3.1, "Reactor Scram," Revision 12:

Step 3.3.1.5.3 references the use of PPM 2.2.3, Revision 12 (Reactor Water Cleanup). The inspector found that the PPM 2.2.3, Revision 12 in the control room included numerous deviations (i.e., temporary procedure changes). Some of the deviations made in the procedure (pen and ink changes) where not listed on the deviation form at the beginning of the procedure. Additionally, the copy quality of the altered page 12 of 69 was poor and difficult to read. The licensee should consider upgrading their procedure deviation system.

PPM 2.10.1, "Reactor Building HVAC, Revision 13":

Step 6 directed the operator to place the damper control in AUTO. The operator stated that common practice was to insure the indicating needle is within the red circle prior to going to auto. The extra operator action was not specified in the procedure. Step 10 appeared to indicate REA-FN-3 was in the CRD repair room. The operator located the fan (after a delay) on the level above.

PPM 2.3.3, "Containment Atmospheric Control," Revision 14:

Section 5.8, Steps 3 and 4 required operation of keylock switches, CAC-FCV-1A(1B) and CAC-FCV-4A(4B). The installed switches were correctly labeled, but they were not of the keylock switch type.

PPM 2.10.1, "Reactor Building HVAC", Revision 13:

Section 5.1 contained several steps that had deficiencies. The inspector identified the following deficiencies:

> Step 5 required placing control switches ROA-FN-1A(1B) in the AUTO position. There was no AUTO position indicated for the switches.
>
> Steps 11 and 12 indicated that the REA-FIC-3A setpoint should be adjusted by the operator. The operator did not know, and the procedure did not specify, that the adjustment was an internal adjustment. Other controllers had adjustment knobs external to the controller housing. The procedure should be specific or more training should be provided to operators.

ESP 5.5.19, "RPV Draining To Restore RPV Level Indication," Revision 0:

Paragraph 5.5.19.2 specifies one 15 foot step ladder (RHR-A pump room) for use in reaching RHR-V-67 to open the valve. The prestaged ladder was an 8 foot step ladder, which was inadequate to safely reach and open the valve. The licensee replaced the ladder with a 10 foot ladder and plans to write a procedure deviation to specify the 10 foot ladder. The inspector considered the action appropriate.

ESP 5.6.1, "Station Blackout," Revision 0:

Step 5.27 directed the operator to reference another procedure. The actions involved are simply the closure of five breakers listed in ESP 5.6.1 and a few simply related actions. If this is in fact a simple task of which all licensed operators are aware, the use of this procedure should not be disrupted by a transition to another procedure.

Step 12b. of the procedure performed isolation to prevent a reactor core isolation cooling (RCIC) system isolation or reactor trip on high exhaust pressure. The step shuts isolation valves RCIC-PS-9A and RCIC-PS-9B to isolate the pressure switches but does not remove instrument line caps between the valves and pressure switches. With an unvented dead leg, valve leakage or temperature changes could cause an RCIC isolation and defeat the purpose of the step. The step should be evaluated and revised.

The blackout procedure listed no tools or equipment to execute the procedure. At a minimum, flashlights, keys for failed doors, and wrenches to replace compressed air bottles would be needed. The procedure should be reviewed and necessary tools and equipment should be listed and prestaged.

Step 5.4.a directs operators to shut HPCS-V-4 when RPV water level reaches 40.5". A WNP-2 operator believed that this was technically incorrect and stated that the appropriate action was to allow the valve to shut automatically (which it should do at 55.5").

Other findings in this area are detailed in Attachment A.

3.2 Verification and Validation Program Evaluation

The team also reviewed WNP2's verification and validation program (V&V). The V&V process is necessary to assure that the procedures (1) integrate WNP2 plant-specific technical information, including setpoints; (2) are written using the format and structure defined in the WNP2 writer's guide; (3) reflect the plant labeling used in the WNP2 control room and plant; (4) can be understood and used by operators to mitigate potential plant events; and (5) can successfully be used to bring the plant to a safe shutdown condition.

Verification and Validation Program Design

The team concluded that the verification and validation program design was generally sound, with the following weaknesses.

PPM 5.0.4 (Emergency Operating Procedures Flowchart Validation) indicated that validation of revisions to the procedures "... need only encompass the changes made to the previously approved procedures." Depending on the nature of the changes, and the magnitude of the changes, the impact on procedure usability may extend beyond the discrete changes. For example, an engineering change to relief setpoints on the safety relief valves could have broad impact on the EOPs.

Verification and Validation Implementation

Despite the general adequacy of the verification and validation program design, the WNP2 EOPs/ESPs contain numerous indications that verification and validation implementation was inadequate.

Section 2, 3.1, and Attachment A, section A.2, of this report, detail the specific findings in this area.

In addition, simulator exercises yielded several operator errors due to complex and inconsistent procedure decision steps (see section 4 of this report). The failure of the WNP2 validation process to identify these problems suggests that the validation program was weak.

Despite the difficulty in use of the procedures experienced by operators during the simulator exercises, mitigation of the simulated events was accomplished (see Section 4).

(Open) Open Item 50-397/90-20-04, Development and Verification & Validation of EOPs and EOP support procedures

The team concluded that the writer's guide design for decision steps and also for transitions contained human factors deficiencies that had a high potential for causing operator difficulty and error in the use of the procedures. The number of errors in the developmental process for EOPs, and the large number of verification and validation weakness identified in EOP walkdowns (see section 3) indicated weak program implementation.

The team concluded that the verification and validation program design was generally adequate, but that implementation of this program was deficient. Again, the result of this inadequate verification and validation of the EOPs/ESPs was procedures that did not thoroughly reflect the writer's guide or the plant, and that were in places difficult for operators to use with a potential for causing safety significant error.

4. Functional EOP Evaluation (using the simulator) and an Evaluation of EOP Operator Training (Task 4)

4.1 Simulator Evaluations

The team conducted simulator exercises using the EOPs. The licensee provided an operating crew to participate in five simulator exercises (see Attachment B). Use of the simulator enabled a dynamic evaluation of the capability of the EOPs to guide successful mitigation of accident consequences. The team evaluated EOP use including entry into and exit from EOP and EOP support procedures, transitioning between procedures, placekeeping, ability of EOPs to direct operator mitigative action, adequacy of training on procedures, and the interface between personnel, procedures and the control room.

During the scenarios, situations required implementation of multiple enclosures to the EOPs. Execution of enclosures was not evaluated during the scenarios.

During post-scenario discussions, operators indicated that the wording of EOP 5.1.2, "Failure to Scram," Revision 6 was confusing on the step "Is more than one rod not fully inserted?" The phrase "is more than one rod not" was confusing as it implied verifying what "was not" rather than "what was." The wording should be evaluated.

On EOP flowchart 5.1.1, RPV Control, Revision 7, two similar step blocks caused confusion in two separate exercise scenarios. The block step that starts with "Line up for injection, start pumps and increase RPV injection flow to maximum with all of the following... ," confused operators. In Scenario #5, the CRS proceeded past this block to the block "Terminate sources external to the primary containment," then realizing his mistake, returned to this block, and then proceeded to the Primary Containment Flooding EOP. In Scenario #6, a different CRS misinterpreted the same steps and waited at those blocks, failing to make a decision whether or not to go to the Primary Containment Flooding EOP, as required. The EOP steps and training on the steps should be evaluated. Example 4a, of Attachment B, is the flowchart of concern.

On EOP flowchart 5.2.1, "Primary Containment Control," Revision 5, (Example 8a of Attachment B) the spraying and venting initiation logic and philosophy as the PCPL is approached should be evaluated. When containment pressure is increasing towards the PCPL and pressure mitigation action has been or is unlikely to recover containment pressure control, delaying spray initiation until PCPL is reached may not be prudent. EOP 5.2.1 stated, "If wetwell pressure cannot be maintained below the PCPL," which conflicts with the BWROG intent (see Example 7, of Attachment B). The BWROG, EPG, Revision 4 wording indicates that sprays are initiated "before reaching" the maximum limit. The distinction between the EOPs and the EPG phraselogy is that the EOPs permit operators to wait to make a decision (to spray) until the PCPL has been reached or exceeded, rather then making this decision prior to reaching the PCPL. This structure actually delayed operator action during the scenario. Consideration should be given to revising the step to meet the intent of the BWROG guideline.

On EOP Flowchart 5.5.1, "RPV Control," Revision 7, the operating crew in the simulator took an incorrect path on a decision block which resulted in a decision to depressurize the RPV when it was not required. The decision block read: "Is any injection system, or alternate injection system other than RCIC, CRD, SLC, or ECCS... running?" During the third scenario the operators miss-read this block as a "yes" answer and did not depressurize the RPV as required. This is another example of the complicated structure of the EOP flowcharts. Consideration should be given to restructuring them, as noted elsewhere in the report, incorporating accepted human factors guidelines.

The team concluded that the EOP flow charts could be used to mitigate the accident scenarios demonstrated in the simulator. Occasional errors in the flow charts were made by the Control Operations Supervisor (CRS) during the demonstration; however, the required major mitigation action was demonstrated in all cases, in that no safety significant further degradation of the event would have occurred because of the operating crew's actions.

4.2 Training

Initial and periodic training for all licensed and non-licensed operator who execute or interface with the EOPs during accident conditions was evaluated. The evaluation included review of lesson plans, interviews with operators and training instructors, and a review of tests, critiques, and documentation of training.

The team reviewed the WNP-2 Hot License/Requalification program for EOP training for licensed operators and shift technical advisors. The program is contained in Lesson Plan 82-RMD-0901-LP, "Licensed Operator/STA Training, EOP Training," revision 1. The team found that training program for the operators interviewed appeared adequate.

5. Ongoing Evaluation of EOPs (Task 5)

Section 6.2.3 of NUREG-0899 establishes a criteria that licensees establish a program for the ongoing evaluation of EOPs. NUREG-0899 further specifies that the ongoing evaluation program should include the evaluation of the technical adequacy of the EOPs on the basis of operational experience and use, training experience, simulator exercises, and control room walkthroughs. Section 6.2.4 of NUREG-0899 specifies that processes should be established to ensure timely revision of EOPs based on input from these evaluations and assessment of the EOP effects of design modifications and changes to technical specifications, technical guidelines, and the writer's guide.

The inspection team assessed the WNP-2 program's provisions for ongoing evaluation of EOPs. The procedures that defined program elements and other documentation was reviewed and interviews were conducted.

Although EOP evaluation at WNP-2 was not addressed by a single program, the essential elements were adequately addressed within the Plant Procedure Manual (PPM). The programs described in EOP 5.0.2, "Symptomatic Emergency Operating Procedures Writers Guide," Revision 0 and EOP 5.0.3, "Emergency Operating Procedure Verification," Revision 0 provided that EOP and support procedure revisions were to be addressed in the same manner as initially developed procedures. The procedures required the same verification and validation for revisions as for new procedures.

Procedural requirements for changes to plant equipment described in PPM 1.4.1, "Plant Modifications," Revision 11 required a plant procedure checklist and plant procedure revision list to be used. PPM 1.3.51, "Plant Labeling Program," Revision 1 required the Plant Labeling Coordinator to ensure label changes were coordinated with the procedures control group to ensure procedures were updated. PPM 1.4.3, Revision of Master Data Sheets and Setpoints," Revision 9 included provisions to review and update plant procedures when setpoints changes were necessary. PPM 1.2.4, "Plant Procedure Review, Approval, and Distribution," Revision 12 required a bi-annual review of all procedures. The team concluded, that except the deficiencies identified below, the program for ongoing evaluation of EOPs was adequate.

The team noted the following deficiencies:

PPM 1.2.3, "Use of Control Plant Procedures," Revision 14, Section 1.2.5.F described the procedure for making deviations to procedures. The deviation procedure appeared to apply to EOPs. The team concluded that deviations were not appropriate for EOPs. Deviations procedures did not provide for the same level of preparation, review, approval and verification and validation. The deviation procedure did not include provisions that would contain a review of associated procedures. The review of associated procedures would be important for EOPs where numerous cross-ties and interfaces exist. The licensee should consider upgrading the provisions for implementing deviations to their EOP's, such that a review of associated EOPs is incorporated.

PPM 1.3.51, "Plant Labeling Program," Revision 1 did not provide for any independent verification of label attachment on safety-related systems. The plant labeling program interfaces with activities affecting safety and should have independent verification that the label changes are correct. Also, the procedure does not appear to provide for integration of the plant labeling program with the Control Room Design Review (CRDR) effort. The lack of integration could cause degradation of the Control Room Design Review Effort over time. Labeling replacements and changes may invalidate portions of the verification and validation for the particular component/ procedure. The licensee should review the plant labeling program procedure to ensure that standardization and quality of labels is maintained.

6. <u>Exit Meeting and Persons Contacted</u>

On September 13, 1990, the team and other NRC representatives held an exit meeting with licensee personnel and discussed the scope and findings of the inspection. Persons contacted by the team and attendees at the exit meeting are identified in Attachment C.

The licensee did not identify as proprietary any of the material provided to the team during this inspection.

The licensee representatives acknowledged the inspection findings presented.

ATTACHMENT A

DEFICIENCY DETAILS

A1. EOP Development

PPM 3.3.1, "Reactor Scram," Revision 12:

The note preceding step 3 actually refers to step 2 actions. It is incorrectly placed after the step.

PPM 3.3.1, "Reactor Scram," Revision 12:

Step 34 includes incorrect punctuation (e.g., ARM's and IRM's) and the use of and/or.

EOP 5.1.2, "Failure To Scram," Revision 6:

The acronym "ATWS/ARI" violates writer's guide requirements for use of a "slant line." This item is a reflection of inadequate verification against the writer's guide.

The acronym "ATWS/ARI" fails to match the related control board label, which uses the acronym "ATWS-ARI." This item is a reflection of inadequate verification against plant labeling.

The writer's guide directs that periods should be omitted in abbreviations "except in cases where the omission would result in confusion. The procedures contain examples of abbreviations that violate this guidance (e.g., "chg. hdr. isol. valve"). This item is a reflection of inadequate verification against the writer's guide.

The writer's guide describes use of a unique flowchart structure for conditional statements followed by additional criteria which must be met before the associated action can be performed. The EOPs include examples of the use of this structure that are not preceded by a conditional step. This item is a reflection of inadequate verification against the writer's guide.

The RPV level control path includes a step written with four qualifying terms: if necessary, irrespective, except, and until. The use of even one qualifier adds decisions and complicates a step; this step is unnecessarily complex and difficult to perform.

EOP 5.1.3, "Emergency RPV Depressurization," Revision 11:

A step in this procedure includes use of the complicated logic sequence beginning "until..." when it could be simply reworded as "Ensure a total of 7 SRVs are open.). This is an example of inadequate verification against the writer's guide.

A2. Verification and Validation

PPM 3.3.1, "Reactor Scram," Revision 12:

Step 4.c incorrectly indicates "printout" when in fact operators would merely look at the screen.

Step 3.a.6 is found at the bottom of page 4 of 14, as well as at the top of page 5 of 13.

Step 3.b references section B of PPM 2.4.6. No section B exists.

Step 3.d references section D of PPM 2.4.4. This section does not exist.

The note prior to step 4 uses the unit identifier psi/sec. This should read psig/sec.

Step 9 directs that valves will indicate "CLOSED." The use of all capital letter indicates exact label representation per the writer's guide. There is no label written as such. Operators use the green light to verify valves closed.

Step 11 references "Panel C." The board labeling indicates "Board C."

Step 14 is an example of inconsistency in spelling out vs. acronyms (e.g., graphic display system vs. GDS).

Step 23 appears to include an implicit reference to PPM 4.12.4.6 according to a licensed senior operator.

Step 17 included a series of STA actions within a procedure intended to direct operator actions. This series of STA actions would appear to more appropriately be included in PPM 1.3.5.

Procedure 2.3.1, "Primary Containment Venting, Purging, and Inerting," Revision 15:

Section 5.1, step 2 requires a noble gas activity reading from recorder BD-RAD-22(23). The recorder was a two-pen recorder with one pen reading noble gas and the other particulate. The pens had no identification as to which pen was which other than "NG" and "particulate" written in pencil on the instrument nameplate. The recorder nameplate should have permanent approved labeling for the pens specifying which pen is noble gas.

Section 5.1, step 11 requires a controller setting at "5% above" which was confusing to operators. The valve being controlled was 100% open when the controller indicator was a 0%. The value "5% above" was used elsewhere in the procedure but included an example illustrating what "5% above" means. The step should be made clearer or examples of how to properly use it added to the step.

PPM 3.3.1, "Reactor Scram," Revision 12:

Pagination for this procedure is incorrect. For example, the procedure page number block at the bottom of each page alternates between page "1 of 13," "2 of 14," and "3 of 13."

Step 3.3.1.5.A contains a reference to PPM 1.1.8. This procedure essentially directs operators to follow the requirements of Radiation Work Permits (RWPs). This step appears to be unnecessary.

Attachment A includes a listing of valves, sometimes according to board position, sometimes not, making the verification task awkward and time consuming (e.g., SGT-V-4A-1 follows SGT-V-3B-2 on the list, however they are found on different panels in the control room.

Attachment A includes RHR-V-123A and RHR-V-123B. These valves cannot be closed from the control room.

Procedure 2.10.1, "Reactor Building HVAC," Revision 13:

Procedural steps required operation of the HVAC condensate return valves in the northeast corner of the reactor building, elevation 572 feet. There was no platform from which to operate the valves. An operator could possibly fall to the 501 or 471 foot level. A platform or special precaution should be evaluated.

The thumbwheel setting in step 8 should be -0.6 rather than +0.6 as the procedure specifies.

The face/bypass damper control temperature switch ROA-TIC-3 identified in step 15e had no identification label.

EOP 5.06, "EOP Tool and Equipment List," Revision 0:

Under procedure 5.5.3, the gate valve that is installed on the fire hydrant is not listed as being required. Only two 2-1/2 inch hoses are specified as being required for connecting condensate pump A suction to the fire hydrant. The hoses in the fire locker (as specified by EOP 5.06) are 50 foot hoses and the distance to one hydrant is about 140 feet and would require 3 hoses. The procedure specified the spanner wrenches attaching hoses but did not specify hydrant wrenches for removing hydrant caps or operating the hydrant.

EOP 5.06 did not list the station blackout procedure 5.6.1.

Under procedure 5.5.8, the hose adapter that is attached between the hose and the Standby Liquid Control relief valve flange was not specified.

EOP 5.1.2, "Failure To Scram," Revision 6:

The note indicating that the RPV level section of the procedure provides guidance for RPV level control is unnecessary. Basic use of the procedure entails that the user be in all paths, including the RPV level path.

The contingency condition callout for emergency RPV depressurization is not used prior to every transition to PPM 5.1.3. The contingency condition callout for emergency RPV flooding is not used prior to every transition to PPM 5.1.4. These inconsistencies are the result of inadequate verification against the writer's guide.

Abbreviations and acronyms are found in the procedure that conflict with those listed in the writer's guide (e.g., SP vs. S.P.). This is a reflection of inadequate verification against the writer's guide.

EOP 5.1.3, "Emergency RPV Depressurization," Revision 11:

The "wait until" symbol is inconsistently structured within this procedure (e.g., some of these symbols include the direction "then proceed."). This is an example of inadequate verification.

EOP 5.2.1, "Primary Containment Control," Revision 5:

Note: See Attachment C, example 7:

The writer's guide describes use of a unique flowchart structure for conditional statements followed by additional criteria which must be met before the associated action can be performed. The EOPs include examples of the use of this structure that are not preceded by a conditional step, but rather use qualifying clauses prior to the "additional criteria." This procedure also includes the use of dotted lines in this symbol, which is not addressed in the writer's guide. This item is a reflection of poor verification against the writer's guide.

The writer's guide defines the use of the term "per" to indicate references to other procedures. This procedures also uses "refer to" to indicate references. This item is a reflection of poor verification against the writer's guide.

This procedure uses the symbols "N" superscript 2, "N" subscript 2, and the word "nitrogen." This inconsistency is a reflection of poor verification.

This procedure uses the acronym "DSIP." This acronym should be "DSIL." This is a reflection of poor verification.

Brackets are used in this procedure, in conflict with writer's guide directions that brackets are not to be used in procedures. This item is a reflection of poor verification against the writer's guide.

ESP 5.5.9 Boron Injection Via RWCU, Revision 0:

This procedure alternates between use of the term "RWCU Demineralizer Control Panel" and "Graver control panel." According to a plant operator, there are multiple Graver control panels, and therefore, the consistent use of the term "RWCU Demineralizer Control Panel" is important to the use of this procedure. This item reflects inadequate verification.

A dymotape label was found on TWCU-MX-5. Dymotape is temporary and uncontrolled. It should not be found on any plant equipment. If additional labeling is necessary, official controlled plant labels should be used.

The valve operators for the manual valves listed in step 11.b of this procedure are on the floor at the valves, however, they are not dedicated for EOP/ESP use.

In step 10.e., the word "FILTER" is shown in all capital letters, suggesting per the writer's guide that it is an exact representation of plant labeling. In fact the label is "LOW FLOW RESET VESSEL A." This is an example of inadequate verification against plant labeling.

Step 13.e. is a similar operator action to step 11.e, however, it is structured in a very different manner. This is an example of inadequate verification.

Step 14.g directs the operator to "Confirm the PRECOAT COMPLETE alarm is illuminated. Because the writer's guide definition of the term "confirm" directs the operator to take action, it is unclear how an operator could take action to make the PRECOAT COMPLETE alarm illuminate if it were not illuminated.

The note preceding step 16 of this procedure appears to be inappropriate at this point in the sequence of actions.

ESP 5.5.3, "Firewater to Condensate Crosstie," Revision 0:

During the execution of this procedure, the Turbine Building rollup door has to opened to connect the fire hose.The inspector identified that the procedure did not contain a note or caution concerning adverse conditions prior to the step which would require opening the turbine building rollup. Radiological conditions during an emergency may require special precautions to exit the building.

ESP 5.5.5, "Defeating RCIC Low RPV Pressure Isolation Interlock," Revision 0:

The format in step 2 is different from identical steps in other ESP procedures such as ESP 5.5.1, steps 1, 2, 3 and 4. Operators should be presented with consistent formats for similar actions as required by the writers guide.

ESP 5.5.8, "Boron Injection Via RCIC," Revision 0:

The procedure specifies the uses of crescent wrenches (adjustable wrenches) on safety-related equipment. Although an emergency may dictate using any available tools, prestaged tools should be of the proper type for the job. A ratchet drive and socket or proper size box end wrenches would expedite the action and prevent damage to equipment.

ESP 5.5.8, "Boron Injection Via RCIC," Revision 0:

The procedure uses valve numbers without using a noun name for the valve, contrary to the requirements of the writer's guide.

ESP 5.5.11, "Bypassing RSCS Rod Blocks," Revision 0:

This procedure includes a note prior to step 2 that attributes the human cognitive process of thinking to the RSCS.

ESP 5.5.17, "Primary Containment Flooding," Revision 0:

Panel H13-622 had penciled terminal layout markings on the inside of the panel door. Unapproved operator aids should be removed from panels.

ESP 5.5.18, "Control Rod Insertion by Overpiston Venting," Revision 0:

Step 3 is not a separate action from Step 4, but rather directions to accomplish Step 4. It would more appropriately be integrated into Step 4, rather than separately numbered, suggesting to the operator that two distinct tasks are involved.

ESP 5.5.19, "RPV Draining To Restore RPV Level Indication," Revision 0:

Procedure steps 4h. and 4i. specified valve numbers without using noun names for the valves contrary to the requirements of the writers guide.

ESP 5.6.1, "Station Blackout," Revision 0:

Dymotape is used to indicate open/close for PI-VX-262, PI-VX-263, PI-VX-264, and PI-VX-265. Dymotape is temporary and uncontrolled. If the information is necessary, the tape should be replaced with officially controlled labels.

Control panel E-CP-DG-RP/3 as referenced out of this procedure uses dymotape to label position of the droop switch. No label is present for the switch name.

Step 5.13 fails to indicate which HPCS and RCIC room doors to open. This is an example of inadequate verification.

Step 5.19.g requires operator to move upstairs to read pressure on gauge H2-PI-1/1. Operator believed that he could also read this information on H2-PI-3 and H2-DPIT-1, which are convenience to valves manipulated, rather than move upstairs.

Step 5.22 contains a second action that should be located after 5.23. This is an example of inadequate validation.

Step 5.22 leads to action of valving in the DG building corridor CIA bottles. The JPA for these actions is located in the reactor building truck lock. An operator had difficulty with the corridor actions. This is an example of inadequate validation.

EOP 5.1.1 RPV Control, Revision 0:

The contingency condition callout for emergency RPV depressurization is not used prior to every transition to PPM 5.1.3. The contingency condition callout for emergency RPV flooding is not used prior to every transition to PPM 5.1.4. These inconsistencies are the result of inadequate verification against the writer's guide.

References to ESPs are formatted with the procedure number alone in parentheses following a list of the related systems, for examples "RHR SW Crosstie (5.5.2)." This deviates from writer's guide directions on the format of references and is a reflection of inadequate verification against the writer's guide.

The writer's guide defines the use of "EXCEPT" as a qualifying term. This procedure also uses the term "other than" in lieu of "EXCEPT." This item is a reflection of inadequate verification against the writer's guide.

In procedure steps directing the operator to accomplish a high level task through specific means, the procedure does not use directives in active voice to direct the action (e.g., "Stabilize RPV pressure. . . using . . . . RWCU . . . bypassing filter/demineralizers . . . .") Specific actions that an operator is to perform should be stated directly, as indicated in the writer's guide (e.g., "Stabilize RPV pressure. Use RWCU. Bypass filter/demineralizers."). This item is a reflection of inadequate verification against the writer's guide.

This procedure includes the step "IF the continuous SRV nitrogen supply is or becomes unavailable..." This step is actually an override step structured as a conditional logic step. This inconsistency is a reflection of inadequate verification against the writer's guide.

ESP 5.5.1, "Overriding ECCS Valve Logic To Allow Throttling RPV Injection, Revision 0:

The procedure did not fully meet the requirements of the writers guide. If the entire procedure is performed, the step sequence of steps 1, 2, 3, 4, and 5 requires operators to alternate back and forth between division I and division II control room back panels. During discussions, licensee staff did not indicate any reason for the specified sequence.

Additionally, the procedure specified relay numbers in steps 1, 2, 3, 4, and 5 and did not use noun names of the relays.

Procedure 2.3.1, Primary Containment Venting, Purging, and Inerting," Revision 15:

Section 5.2, step 45f requires operation of valve CSP-V-800-5, and 6. Revision 15 added the steps to operate the valves. The operator found that the valves were not listed in the Master Equipment List (MEL). The valves should be added to the MEL as the valves are not routinely operated and the MEL is used to locate the valves.

Section 5.2 of the procedure had several steps that were not easily usable by the operators. For example:

Step 2 caused operator confusion. The step called for containment pressure but did not specify wetwell or drywell.

In the execution of step 3, the operator confused "manual set" with "tape strip set."

In step 5, operator confusion resulted from inconsistent labeling on control room controller CAC-RMC-5A. The control room labeling was different than the procedure.

Section 5.8, steps 3 and 4 required operation of keylock switches, CAC-FCV-1A(1B) and CAC-FCV-4A(4B). The installed switches were not keylock switches. The procedure and equipment should be evaluated and changes as appropriate.

EOP 5.1.2, "Failure To Scram," Revision 6:

The step "Terminate boron injection if initiated" is a conditional step structured in a manner that violates writer's guide requirements for conditional statements. This item is a reflection of inadequate verification against the writer's guide.

In contrast to writer's guide directions that state "location information should be given in parentheses following the identification," the procedures include inconsistent structuring of location information. For example, "At P609 and P611, remove..." "At P603, depress..." and "Are all scram valves open? (blue lights on P603)." Conversely, parentheses following the step are also used for information other than locations For example, "Maintain RPV water level above -161 in. (TAF). This item is a reflection of inadequate verification against the writer's guide.

ESP 5.5.3, "Firewater to Condensate Crosstie," Revision 0:

Step 2 required condensate discharge valves COND-V-107A, B, and C be closed. Operators stated they would use a pneumatic tool and a 2 inch socket to close the valves. Prestaged dedicated tools were not available to perform the action. The valves could be closed using the manual handwheel; however, the pneumatic tool would save about 15 minutes. The valves required 150 - 200 turns to close each valve. The inspector noted the handwheel nuts on 2 of the 3 valves were damaged from previous operations with pneumatic tools. Deficiencies tags for the damages were attached.

Step 3 of the procedure required running firehoses from the A condensate pump suction to fire hydrants outside the turbine building rollup door. Step 3 did not contain instructions to install a gate valve on the second hydrant outlet to allow hydrant use for fire protection with the hoses to condensate connected. The licensee found that the step was in the procedure approved by the Plant Operations Committee (POC) but was inadvertently omitted in typing. The deficiency was corrected prior to the end of the inspection.

ESP 5.5.8, "Boron Injection Via RCIC," Revision 0:

The procedure requires routing of several hundred feet of rubber hose from the SLC tank relief valves to the suction of the RCIC pump. The route take the hose down two levels through an equipment hatch and through a floor penetration above the RCIC room. The job would be difficult for a single operator under normal conditions. Consideration should be given to installing the hose on a hose reel or specify additional operators to assist with the task.

ESP 5.5.17, "Primary Containment Flooding," Revision 0:

Step 5a is not clear on instructions to flood containment. Step 5 states "flood the primary containment as follows." Step 5a. states "if not already aligned for RPV injection, lineup the following systems for RPV injection." Step 5a should be clear that once systems are lined up, flooding should commence.

A3. Other Inspection Deficiency Findings

Procedure 2.10.1, "Reactor Building HVAC," Revision 13:

Step 5 required the controller be set at 0.25 inches W.G. The inspector and operator found the controller was set differently than the procedure required. The procedure and "as found" setting should be evaluated to determine which is correct.

ESP 5.5.3, "Firewater to Condensate Crosstie," Revision 0:

The inspector noted that the fire lockers near hydrant FP-HT-1F containing the prestaged tools were in poor condition. The top was off one locker, the tops and sides were bent, one locker had a tamper seal - one did not, door hinges were rusty and frozen, some hoses were not faked down and the lockers were dirty. Surveillance procedures on these lockers should be evaluated for adequacy.

ESP 5.5.19, "RPV Draining To Restore RPV Level Indication," Revision 0:

There was a white tag dated 1983 attached to the valve noting the valve had a packing leak. The operator thought the leak had been fixed, but someone had not removed the tag. The item was turned over to the licensee for action.

ATTACHMENT B

FLOWCHART DEFICIENCY EXAMPLES

(see attached EOP flowcharts)

maximum safe operating temperature (Table 1),

Enter PPM 5.1.1, RPV Control and execute concurrently.

IF an area temperature EXCEEDS its maximum safe operating temperature in more than one area (Table 1),

EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

Enter PPM 5.1.3, Emergency RPV Depressurization and execute concurrently.

its maximum safe operating temperature in more than one area (Table 1),

REACTOR SHUTDOWN IS REQUIRED.

Enter PPM 3.2.1, Normal Shutdown to Cold Shutdown and execute concurrently.

Enter PPM 5.1.1, RPV Control and execute concurrently.

IF an area radiation level EXCEEDS the maximum safe operating level in more than one area, (Table 3),

EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

Enter PPM 5.1.3, Emergency RPV Depressurization and execute concurrently.

EXAMPLE 1

5.3.1

TABLE 1
SECONDARY CONTAINMENT TEMPERATURES

LOCATION	PANEL	INSTRUMENT	ALARM (°F)	MAXIMUM SAFE OPERATING VALUE (°F)
RWCU Pump (1A) Room	P632/642	LD-TE-3A (3B)	160	245
RCIC Pump Room	P632/642	LD-TE-4A (4B)	160	150
RWCU Pipe Routing Area - R511	P632/642	LD-TE-24C (24D)	160	180
RWCU/RCIC Room 313	P632/642	LD-TE-24J (24K)	160	140
RWCU Pump (1B) Room	P632/642	LD-TE-3C (3D)	160	245
RWCU Pipe Routing Area - R408	P632/642	LD-TE-24E (24F)	160	200
RWCU Pipe Routing Area - R509	P632/642	LD-TE-24A (24B)	160	165
RWCU Pipe Routing Area - R409	P632/642	LD-TE-24G (24H)	160	200
Steam Tunnel	P632/642	LD-TE-31A,B, (31C,D)	164	200
RHR B Pump Room	P632/642	~~RRA-TI-4 (18D)~~ LD-TE-18C (18D)	140	200
RHR B H.X. Room	P632/642	LD-TE-18J,L (18K,M)	140/130	200
RHR A H.X. Room	P632/642	LD-TE-18E,G (18F,H)	130/150	212
RHR A Pump Room	P632/642	LD-TE-18A (18B)	140	200
H_2 Rec. Room A	Bd J	RRA-TI-13	104	106
H_2 Rec. Room B	Bd J	RRA-TI-14	104	106
DC MCC Room	Bd J	RRA-TI-12	104	106
Analyzer Room A	Bd J	RRA-TI-15	104	128
Analyzer Room B	Bd J	RRA-TI-17	104	128
Div. 1 MCC Room	Bd J	RRA-TI-11	104	200
Div. 2 MCC Room	Bd J	RRA-TI-10	104	106
LPCS Pump Room	Bd J	RRA-TI-20	104	128
FPC Equipment Room	Bd J	RRA-TI-1	104	200
HPCS Pump Room	Bd J	RRA-TI-2	104	150
CRD Pump Room	Bd J	RRA-TI-18	104	128

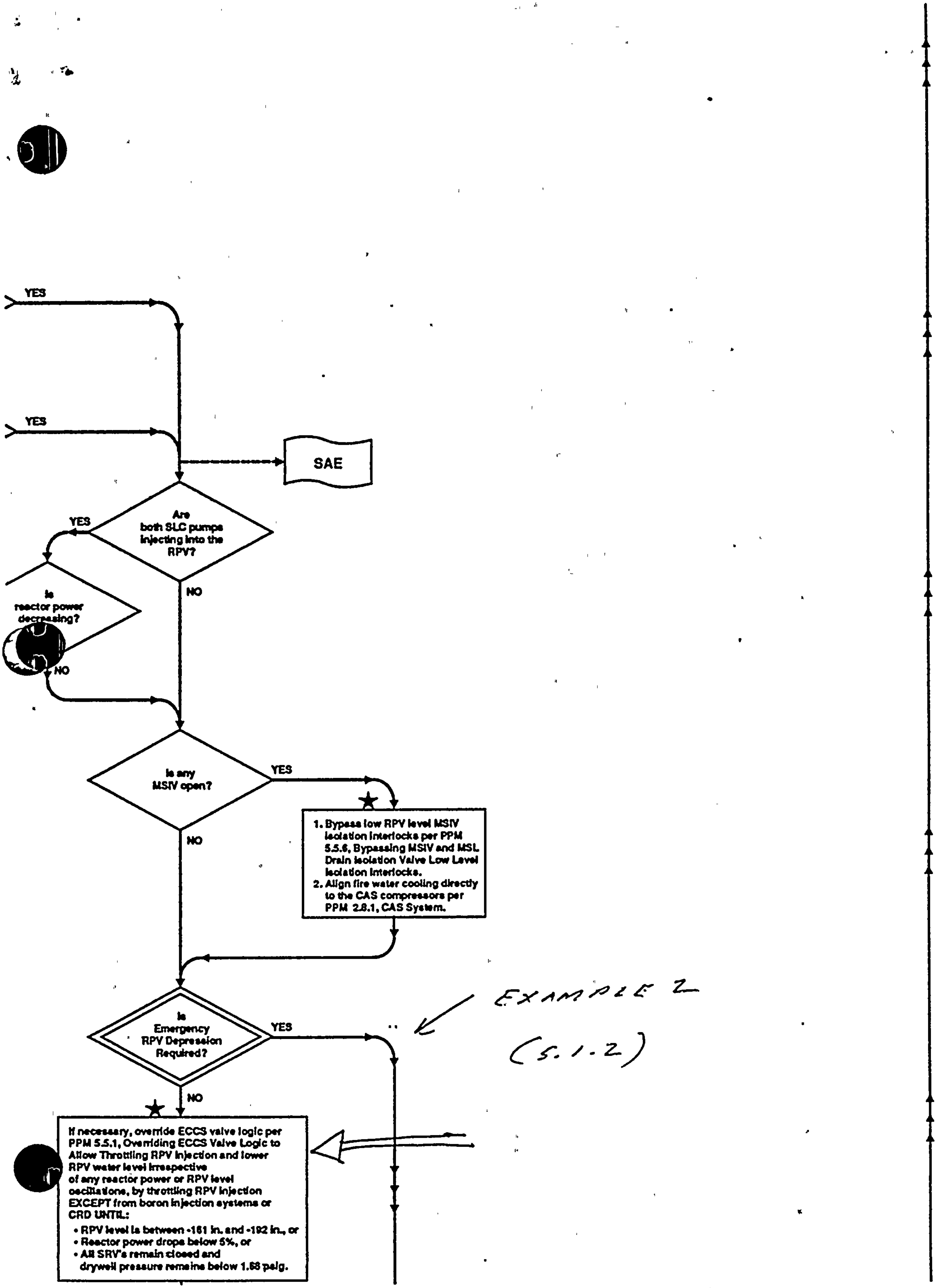
TABLE 2
SECONDARY CONTA
DIFFERENTIAL TEMPE

LOCATION	PANEL	I
RWCU Pump 1A Room	P632/642	LD-TI
RWCU Pump 1B Room	P632/642	LD-TI
RCIC Pump Room	P632/642	LD-TI
RWCU H.X. Room	P632/642	LD-TI
RHR B Pump Room	P632/642	LD-TI
M.S. Tunnel	P632/642	LD-TI
RHR A Pump Room	P632/642	LD-TI

TA
SECONDARY CONT

LOCATION	ALARM I (ELEVA
FDR-R-1 (RHR A Pump Room)	419'(
FDR-R-2 (RHR B Pump Room)	418'
FDR-R-3 (HPCS Pump Room)	418'
FDR-R-4 (RHR C Pump Room)	417'
LPCS Pump Room	—
HPCS Pump Room	—
RHR Pump Room A	—
RHR Pump Room B	—
RHR Pump Room C	—
RCIC Pump Room	—
CRD Pump Room	—

* EDR-5 alarm level is 420'9"; floor level is 422'3



EXAMPLE 2

(5.1.2)

②③④⑦ ★

Maintain RPV level at the level to which it was deliberately lowered above, with the following systems:

- Condensate/Feedwater (via RFW-FCV-10A/B)
- CRD
- RCIC, defeating low RPV pressure isolation interlocks if necessary, per PPM 5.5.5, Defeating RCIC Low Pressure Isolation Interlock.
- HPCS, only if boron is being injected via the SLC system.

As necessary, reduce RPV pressure within the allowed 100°/hr. cooldown rate to allow available RPV injection system to recover RPV level.

Can RPV level be maintained above -192 in.?

YES

NO

EMERGENCY RPV DEPRESSURIZATION IS REQUIRED.

EXAMPLE 3 (5.1.2)

Enter PPM 5.1.3, Emergency RPV Depressurization and execute concurrently.

Terminate and prevent all injection into the RPV EXCEPT from boron injection systems, CRD, and RCIC.

IF no SRV can be opened,	WHEN RPV pressure is below the MARFP,

MINIMUM ALTERNATE RPV FLOODING PRESSURE (MARFP)

NUMBER OF OPEN SRV's	RPV PRESSURE (psig)
7 or more	139
6	165
5	200
4	254
3	344
2	523
1	1,061

②③④⑦ ★

Commence and slowly increase RPV injection to restore and maintain RPV level above -161 in. (TAF) with the following systems:

- Condensate/Feedwater (via RFW-FCV-10A/B)
- CRD
- RCIC, defeating low RPV pressure isolation interlocks if necessary, per PPM 5.5.5, Defeating RCIC Low Pressure Isolation Interlock,
- HPCS, only if boron is being injected via the SLC system.

IF RPV water level cannot be maintained above -161 in (TAF),

Restore and maintain RPV level above -192 in.

IF RPV level cannot be restored and maintained above -192 in.,

★

If necessary, override ECCS valve logic per PPM 5.5.1, Overriding ECCS Valve Logic to Allow Throttling RPV Injection and commence and slowly increase injection into the RPV with the following systems:

- HPCS

Maintain RPV level above -192 in.

IF more than one control rod is not fully inserted, and	THEN
While executing the following step, reactor power commences and continues to increase,	Return to above.

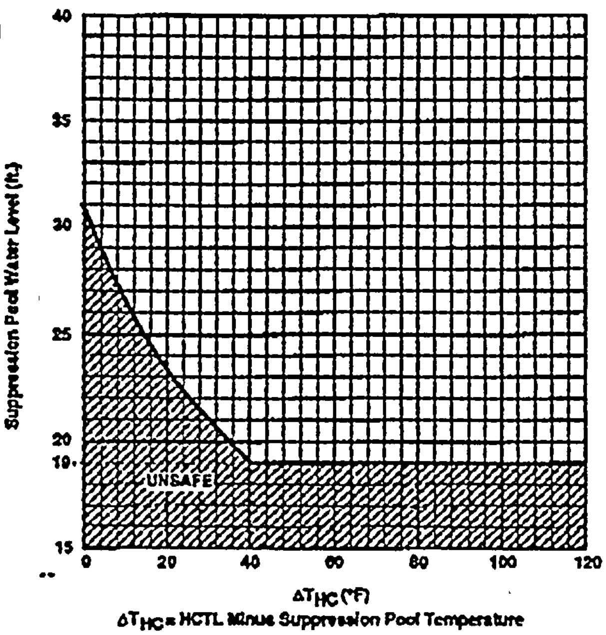
NOTE: A drop in SLC tank level to 2,250 gallons will ensure the injection of this amount of boron and boric acid.

WHEN 509 lb. of boron have been injected,

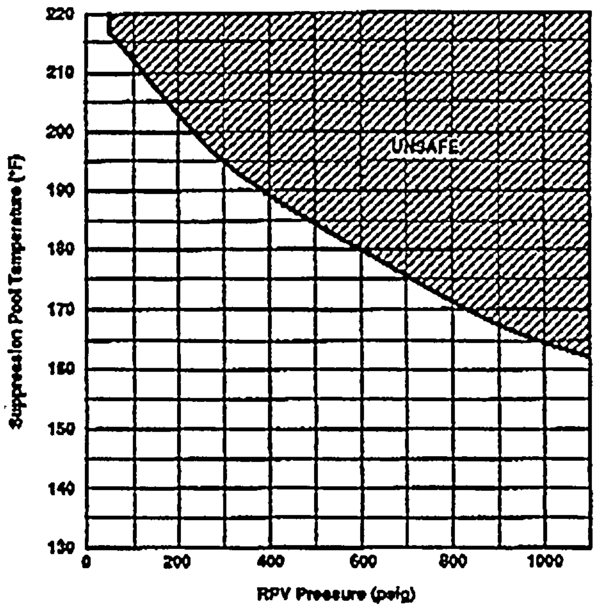
EOP GRAPHS, 5.0.1

EXAMPLE #4

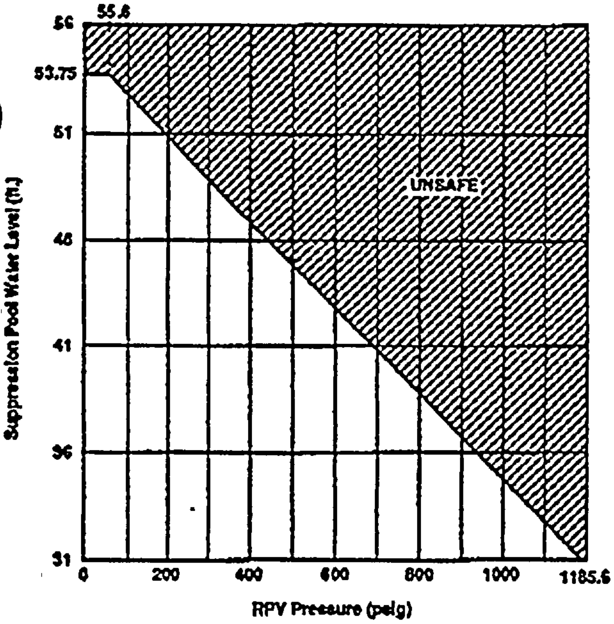
HEAT CAPACITY LEVEL LIMIT (HCLL)



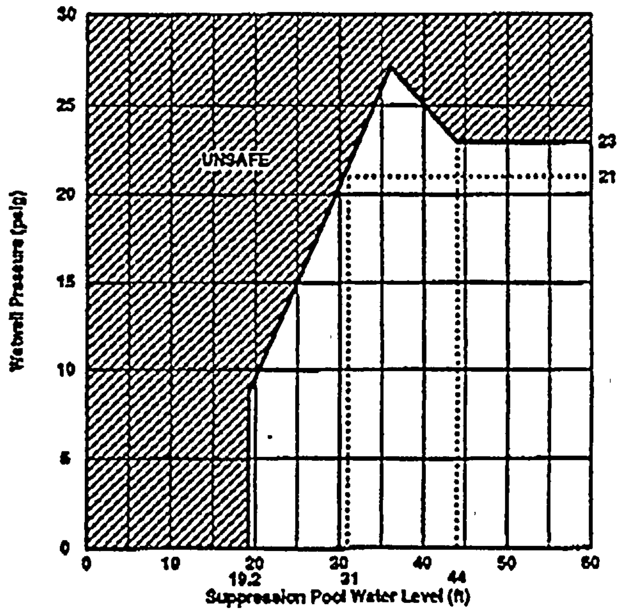
HEAT CAPACITY TEMPERATURE LIMIT (HCTL)



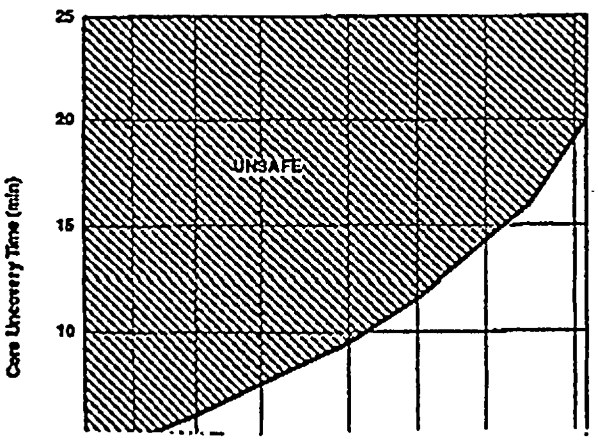
SRV TAIL PIPE LEVEL LIMIT (SRVTPLL)



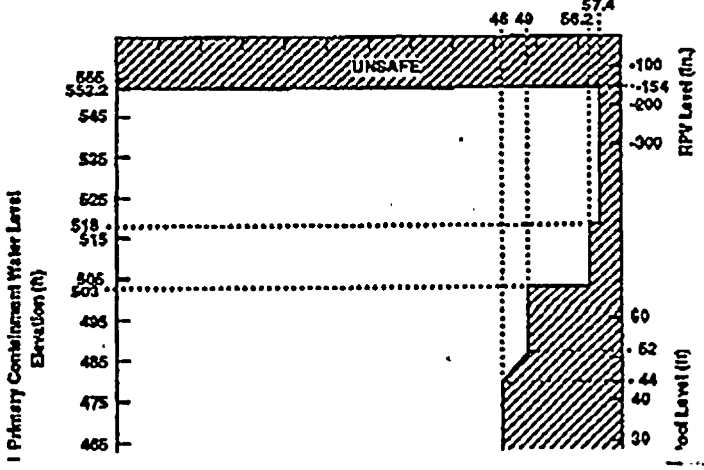
PRESSURE SUPPRESSION PRESSURE LIMIT (PSPL)



MAXIMUM CORE UNCOVERY TIME LIMIT (MCUTL)



PRIMARY CONTAINMENT PRESSURE LIMIT (PCPL)



• RHR-B
• RHR-C

Are at least 2 injection systems lined up for RPV injection?

NO

★ Line up (but do not start pumps in) as many of the following alternate injection systems as possible:
- SLC (boron tank)
- RHR SW Crosstie (5.5.2)
- Fire Water to Condensate Crosstie (5.5.3)
- ECCS keep-full pumps

YES

Is at least one injection system lined up with a pump running?

NO

Start pumps in all alternate injection systems that are lined up for RPV injection.

YES

IF RPV level drops to -161 in. (TAF),

EXAMPLE 4a

Is any injection system, or alternate injection system other than RCIC, CRD, SLC or ECCS keep-full pumps lined up for RPV injection with a pump running?

YES

EMERGENCY DEPRESSURIZATION IS REQUIRED.

Enter PPM 5.1.3, Emergency RPV Depressurization and execute concurrently.

NO

STEAM COOLING IS REQUIRED.

Exit the RPV level control section of this procedure and enter the RPV pressure control section of this procedure.

Is RPV level increasing?

YES

NO

Line up for injection, start pumps and increase RPV injection flow to maximum with all of the following systems:
- Condensate - Condensate Booster
- HPCS
- LPCS
- RHR-A
- RHR-B
- RHR-C

If either of the following conditions exist:
- RPV level cannot be maintained at or above -210 in.
- HPCS or LPCS is not injecting at rated flow,

★ Line up for injection, start pumps and increase RPV injection flow to maximum with all of the following systems:
- SLC (boron tank)
- RHR SW Crosstie (5.5.2)
- Fire Water to Condensate Tie (5.5.3)
- ECCS keep-full pumps

If either of the following conditions exist:
- RPV level cannot be maintained at or above -210 in.
- HPCS or LPCS is not injecting at rated flow,

(PPM 5.1.1)

EXAMPLE #4a

Line up for RPV injection and operate HPCS and LPCS with a suction from the SP.

Is either HPCS or LPCS injecting into the RPV with a suction from the SP?

NO

YES

Is HPCS or LPCS RPV injection flowrate above 6000 gpm?

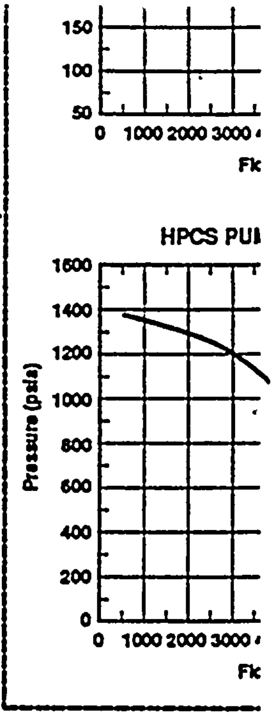
NO

YES

Terminate RPV injection from sources external to the primary containment.

PRIMARY CONTAINMENT FLOODING IS REQUIRED.

Exit the RP\ of this proc perform PPI Containmen



Stabilize RPV pressure below 1037 psig with the main turbine bypass valves.

IF SP level is above 17 ft. THEN Stabilize RPV pressure below 1037 psig with SRV's.

IF the continuous SRV nitrogen supply is or becomes unavailable THEN Place all SRV control switches in the AUTO position.

Can RPV pressure be stabilized below 1037 psig with SRV's?

NO

YES

② ③ ④ ⑤ ⑥ ★

Stabilize RPV pressure below 1037 psig using one or more of the following systems:

- RCIC
- Main Condenser via:
  - Main Steam Line Drains
  - SJAE's
  - Sealing Steam System
  - RFW Turbines
  - Off-gas Preheaters
- RWCU (recirculation mode), bypassing filter/demineralizers and if necessary RWCU isolation interlocks per PPM 5.5.4, Overriding RWCU Isolation Interlocks.
- RWCU (blowdown mode), only if both of the following conditions are met:
  - no boron has been injected into the RPV
  - no core damage is indicated as determined by reactor coolant sample results.

WAIT UNTIL any one of the following conditions exist:

- All control rods are fully inserted.
- SLC-TK-1 has been injected into the RPV.
- 2787 lb. of boric acid and 2865 lb. of borax in solution has been injected into the RPV.
- It has been determined that the reactor will remain shutdown under all conditions without boron,

then proceed.

EXAMPLE 4/6

Depressurize the RPV and maintain cooldown rate below 100°F/hr.

IF SRV's are being used to depressurize the RPV AND The continuous SRV nitrogen supply is or becomes unavailable. THEN Depressurize with sustained SRV opening to conserve nitrogen.

WHEN both of the following conditions are met:

- The RHR shutdown cooling interlocks can be reset.
- RPV level can be maintained above +13 in..

★

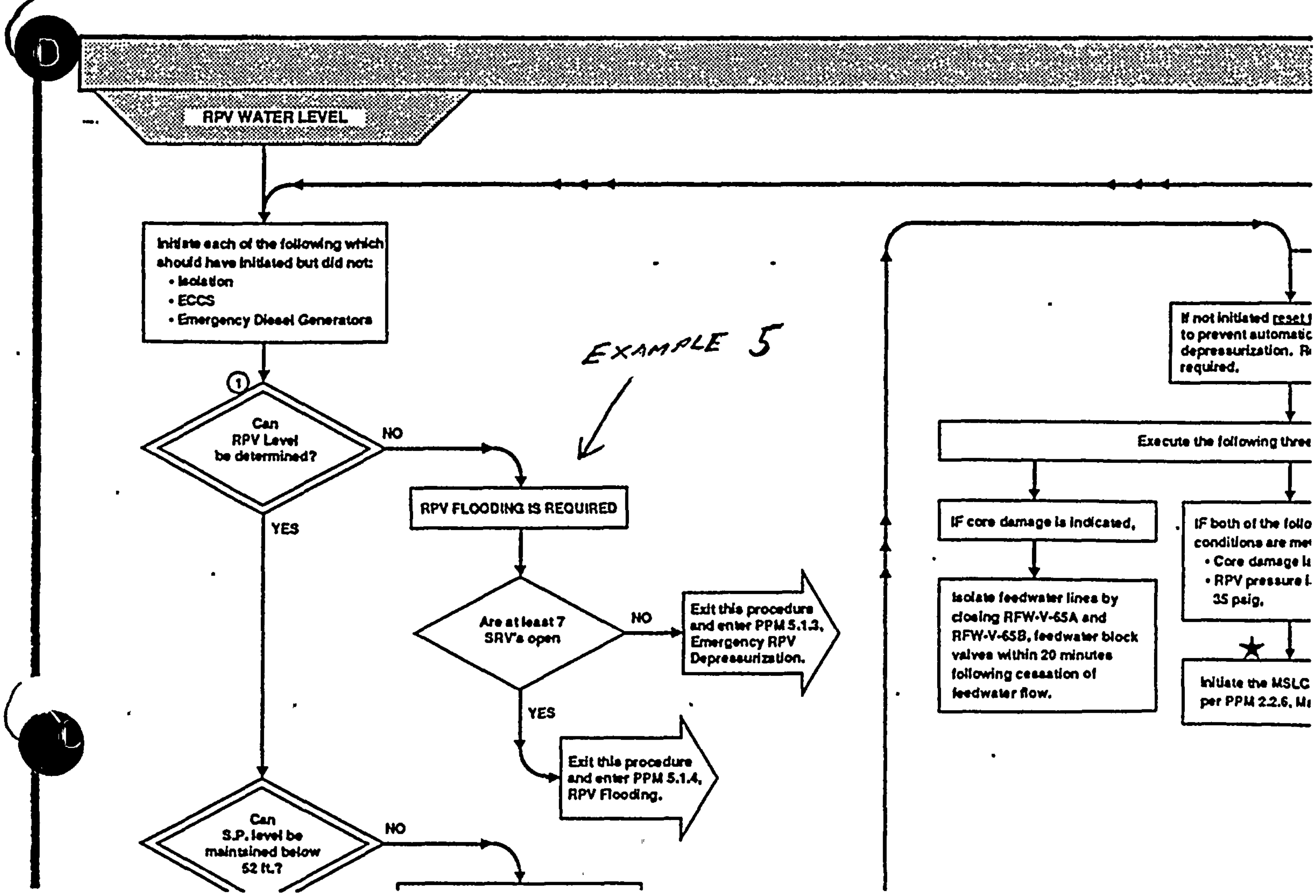
Initiate RHR shutdown cooling per PPM 2.4.2, RHR.

WHEN RHR Shutdown Cooling is established,	IF RHR Shutdown Cooling cannot be established,

COMMENT COPY

RPV CONTROL, 5.1.1

"A" (-50 in. RPV water level) Signal Auto Actions
1. Reactor Scram. 2. MSIV Isolation. 3. HPCS Pump Start. 4. HPCS D/G Start. 5. RCIC Start. 6. RWCU System Isolation. 7. RRC Sample Line Isolation. 8. RHR Shutdown Cooling Isolation. 9. TIP Withdrawal and Isolation. 10. Drywell EDR and FDR Sump Discharge Header Isolation. 11. CW-P-1C Trip. 12. TSW-P-1B Trips If Both TSW Pumps were Running. 13. RCC Pumps Trip. 14. RCC Containment Isolation. 15. Breakers 75-72 and 85-82 Trip. 16. RRC Hydraulic Lines Isolate. 17. Drywell Atmosphere Sample Lines Isolate. 18. RRC Pumps Trip. 19. MC-7C, MC-7E, MC-8C and MC-8E De-energize. 20. R.B. HVAC Isolation and Fans trip. 21. SGT System Start. 22. CEP and CSP Containment Isolation. 23. CN Containment Isolation. 24. Control Room HVAC and TSC HVAC Systems Start and Align to Remote Air Intakes. 25. R.B. Emergency Room Coolers (Except ECCS Pump Rooms) Start. 26. R.B. Lighting QUENCH. 27. R.B. EDR and FDR Sump Discharge Header Isolation.



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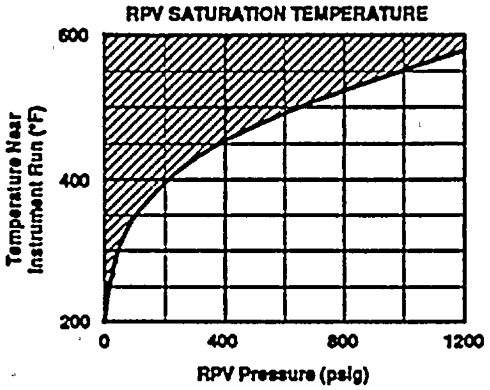
EOP CAUTIONS, 5.0.0

EXAMPLE 6

① To prevent taking action based on erroneous RPV level indication, an RPV water level instrument may not be used to determine RPV water level if either of the following conditions exist for that instrument:

a. The temperature near the instrument run is above the RPV Saturation Temperature.



b. For any of the instruments in the following table, the instrument reads below the Minimum Usable Level.

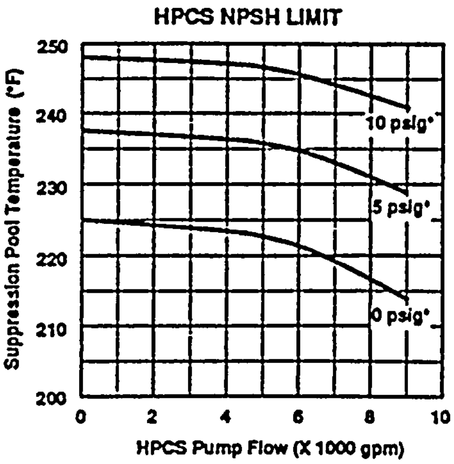
INSTRUMENT	RANGE (in.)	MINIMUM USABLE LEVEL (in.)
Wide Range	-150 to +60	-147
Fuel Zone Range	-310 to -110	-285
Upset Range	0 to +180	+82
Shutdown Range	0 to +400	+86

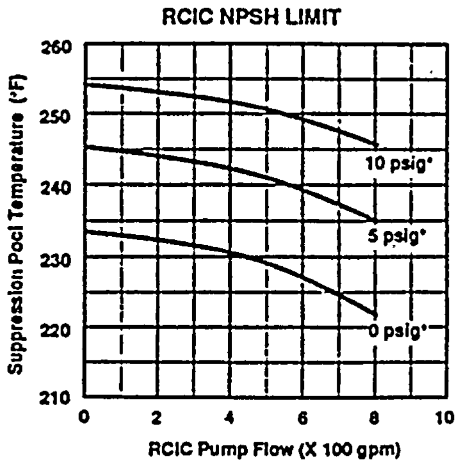
② RCIC operation with pump suction aligned to the SP, when SP temperature is above 140°F, may result in high turbine lube oil and bearing temperatures.

③ Operating the RCIC turbine below 1000 rpm may result in unstable governor operation and equipment damage.

④ Elevated wetwell pressure may trip the RCIC turbine on high exhaust pressure.

⑤ If an ECCS pump is taking suction from the SP and SP temperature exceeds the NPSH Limit, the pump may be damaged and become inoperable.





[illegible] DATE: [illegible] (RUN TWICE)

LEVEL RECOVERY WITH ALTERNATE SYSTEMS

SCENARIOS 1 AND 2

SIMULATOR OPERATOR CUES	PLANT RESPONSE & PARAMETERS	OBJECTIVE	OPERATOR ACTION	COMMENTS
Initiate R-1 (Loss of TR-S) (Loss of SM-7)	N/A	N/A	No EOP action required	
Initiate R-2 (TR-N Lockout) (Loss Cond Vac)	RPV/L < +13"	I.A.a	Direct a manual scram	1ST w/ ALT INJECT 2ND w/o ALT INJECT
		aa	Depress all 4 Pb's Mode Switch to S/D Verify all rods full in Verify APRMs downscale Exit to PPM 3.3.1	
		III.A.b	Direct RPV/P below 1037 w/ BPVs	
		bb	Verify BPVs in AUTO @ 930#	
		II.B.a	Direct RPV/L between +13 & +54.5"	
		aa	Initiate: RCIC HPCS RHR A	
Initiate R-3 (HPCS Trips) (RCIC Trips) (RHR-2B/C Trip)	RPV/L < -50 MSIVs close	II.A	Verify Isolations	
	RPV/P > 1076#	III.A.a	Direct RPV/P reduced to 930# w/ SRVs	
		aa	Operate SRVS to reduce RPV/P to 930#	
		b	Direct RPV/P < 1037# w/ SRVs	
		bb	Operate SRVs to maintain RPV/P < 1037#	

SIMULATOR OPERATOR CUES	PLANT RESPONSE & PARAMETERS	OBJECTIVE	OPERATOR ACTION	COMMENTS
	RPV/L < -129"	III.C.a	Direct resetting ADS timers	1ST RUN: W/ALT INJECTION
		aa	Reset ADS timers, ADS does not initiate	2ND RUN: WO/ALT INJECTION
		II.B.e	Direct Alternate Injection system alignment (SLC, RHR/SW X-tie, Fire Water/Cond)	
		ee	Align RHR/SW X-tie for injection	
	No normal injection system is aligned	II.B.f	Direct starting Alternate injection pumps	
		ff	Verify SW- P-2B operating	
	RPV/L = -161"	II.C.a	Direct Emer. Dep. per PPM 5.1.3	
		aa	Open all 7 ADS SRVs	
	RPV/P < SW-P head	II.B.a	Direct RPV/L between +13 & +54.5"	
	NOTE: 2ND RUN: FAILED ALT INJ: (SERVICE WATER)			
	RPV/L > +13"	II.B.aa	Throttle injection to maintain RPV/L between +13" and +54.5"	
	RPV/L is stable between +13" & +54.5"	III.D.a	Direct cooldown @ < 100°F/hr	
		aa	Initiate cooldown	

Freeze Simulator

SPRAY COOLING

Scenario # 3

SIMULATOR OPERATOR CUES	PLANT RESPONSE & PARAMETERS	OBJECTIVE	OPERATOR ACTION	COMMENTS
Initiate R-1 (100% LOCA) (RCIC Fails) (HPCS Fails) (RHR-V-42A (fails shut) (Loss SM-8)	DW/P > 1.68#	I.A.a	Direct a manual scram	
		aa	Depress all 4 Pb's Mode Switch to S/D Verify all rods full in Verify APRMs downscale	
			Exit to PPM 3.3.1	
Initiate R-2 (CPs trip)		IV.D.c	Direct WW Spray	
		cc	Cannot Spray (No RHR-Ps)	
		II.A	Verify Isolations/EDG/ECCS	
	WW/P > 8#	IV.D.d	Direct DW Spray	
		dd	Cannot Spray DW (No RHR-P)	
	RPV/L < -161"	II.C.a	Direct Emer Dep per PPM 5.1.3	
		aa	Open all 7 ADS SRVs	
		II.D.c	Direct LPCS injection w/ S.P. suction	
		cc	Inject w/ LPCS at rated flow	
CUE:	WW/P @ 24#	IV.D.e	Direct Emer Dep	
		ee	No action required, already depressurized	
Cue:	WW/P > 45#	IV.D.a	Direct WW Venting	
		aa	Vent WW per PPM 5.5.14	NOTE: The simulator will not support jumper installation. Freeze the simultor at this point.

Freeze Simulator

Take a snapshot and store for use with Scenarios:

82-RHD-0901-S16/S17

CONTAINMENT FLOODING

Scenario # 4

SIMULATOR OPERATOR CUES	PLANT RESPONSE & PARAMETERS	OBJECTIVE	OPERATOR ACTION	COMMENTS
Initiate R-1 (100% LOCA) (RCIC Fails) (HPCS Fails) (RHR-P-2A/B trip) (Loss SM-7) (CPs Trip)	DW/P > 1.68#	I.A.a	Direct a manual scram	
		aa	Depress all 4 Pb's Mode Switch to S/D Verify all rods full in Verify APRMs downscale Exit to PPM 3.3.1	
		IV.D.c	Direct WW Spray	
		cc	Cannot Spray (No RHR-Ps)	
		II.A	Verify Isolations/EDG/ECCS	
		II.B.e	Direct Alternate injection system alignment	
		ee	Align RHR/SW X-tie	
		II.B.f	Direct Alternate Injection Pumps started	
		ff	Ensure SW-P-2B is running	
	WW/P > 8#	IV.D.d	Direct DW Spray	
		dd	Cannot Spray DW (No RHR-P)	
	RPV/L < -161"	II.C.a	Direct Emer Dep per PPM 5.1.3	
		aa	Open all 7 ADS SRVs	
	RPV/L < -210" NO Spray System @ rated flow	II.F.a	Direct Containment Flooding per PPM 5.5.17	
		aa	Execute PPM 5.5.17	NOTE: The MSIVs cannot be reopened after closure. Freeze the simulator and walkthrough PPM 5.5.17

Freeze Simulator

SCENARIO # 82-RAD-0301-515 DATE: 6/15/90

HYDRAULIC ATWS, RPV FLOODING

Scenario # 5 Page 1 of 2

SIMULATOR OPERATOR CUES	PLANT RESPONSE & PARAMETERS	OBJECTIVE	OPERATOR ACTION	COMMENTS
Initiate R-1 (Hyd ATWS)	No Change	N/A	None	
Initiate R-2 (Turb Trip)	Scram Signal	I.A.a	Direct a manual scram	
EMA,1 (Floodup indication upscale)		aa	Depress all 4 Pb's Mode Switch to S/D Verify all rods full in Verify APRMs downscale	
		I.E.a	Direct ARI initiation	
		aa	Place both ATWS/ARI Switches to TRIP	
		I.C.a	Direct RRC-FCVs be placed to minimum and X-ferred to LFMG	
		aa	Inform CRS that RRC-Ps are operating on the LFMGs	NOTE: The ATWS logic trips the RRC-Ps to the LFMGs on high RPV/P
		I.C.b	Direct RRC-Ps tripped	
		bb	Trip RRC-Ps	
	RPV/P > 1076# SRVs cycle open	III.A.a	Direct RPV/P reduced to 930#	
		aa	Operate SRVs to reduce RPV/P to 930#	
		III.A.b	Direct RPV/P < 1037# w/ BPVs and SRVs	
		bb	Verify SP/L > 17' Operate SRVs and monitor BPVs	
	Rods still out RPPs Trip RPV/L < +13"	I.F.a	Direct ADS inhibited	
		aa	Place both ADS Inhibit Switches in INHIBIT	
		II.B.c	Direct RPV/L between -161" and +54.5"	
		II.B.b	Direct RPV/P reduction to 5-600#	

SIMULATOR OPERATOR CUES	PLANT RESPONSE & PARAMETERS	OBJECTIVE	OPERATOR ACTION	COMMENTS
		bb	Reduce RPV/P to 5-600# w/ SRVs and BPVs @ < 100°F/hr	
		cc	Align CBPs	
			Maintain RPV/L between -161" and +54.5" w/ CBPs and RCIC	
	SP/T > 90°F	IV.A.a	Direct SP Cooling	
		aa	Initiate SP Cooling	
	RPV/L < -50"	II.A	Verify Isolations	
	Scram cannot be reset	I.B.a	Direct ARI be reset	
		aa	Place both ATWS/ARI Switches in AUTO Depress both Pushbuttons @ P650	
		I.E.e	Direct control rod insertion from P603	
Activate LOA-R-1		ee	Start 2nd CRD pump Direct CRD-V-34 shut Drive rods via RMC @ P603	
		I.B.c	Direct RWM bypassed	
		cc	Bypass RWM	
Initiate R-3 (CRD-Ps Fail)		I.B.d	Direct RSCS bypassed	NOTE: The Simulator will not support jumper installation
		dd	Bypass RSCS	
	SP/T = 110°F	I.D.a	Direct SLC injection	
		aa	Verify ADS Inhibited Initiate both SLC pumps Verify RWCU isolates	
ctivate R-4 oss of all V/L indication)	Loss of RPV/L indication	II.E	Direct RPV Flooding Per PPM 5.1.4	
		I.F.b	Direct all injection terminated w/e SLC	

EXAMPLE 7

5.2.1

core damage been determined to be ~~above~~ below 10% per PPM 9.3.22, Core Damage Evaluation?

YES ~~NO~~ →

NO ↓

IF wetwell pressure cannot be maintained below the PCPL,

(10)

Irrespective of whether adequate core cooling is assured:

IF	THEN
IF SP level is below 52 feet	Initiate SP sprays.
IF SP level is below 52 ft. and drywell temperature and pressure are within the DSIL	Initiate drywell sprays.

IF wetwell pressure exceeds the PCPL,

★

Irrespective of the offsite radioactivity release rate or whether adequate core cooling is assured:

IF	THEN
IF SP level is below 52 feet	Vent the wetwell per PPM 5.5.14, Emergency Wetwell Venting.
IF SP level is above 52 feet or the wetwell cannot be vented,	Vent the drywell per PPM 5.5.15, Emergency Drywell Venting.

YES ↓

IF wetwell pressure cannot be maintained below the PCPL,

★

Irrespective of the offsite radioactivity release rate or whether adequate core cooling is assured:

IF	THEN
IF SP level is below 52 feet	Vent the wetwell per PPM 5.5.14, Emergency Wetwell Venting.
IF SP level is above 52 feet or the wetwell cannot be vented	Vent the drywell per PPM 5.5.15, Emergency Drywell Venting.

IF wetwell pressure exceeds the PCPL,

(10)

Irrespective of whether adequate core cooling is assured:

IF	THEN
IF SP level is below 52 feet	Initiate suppression pool sprays.
IF SP level is below 52 ft. and drywell temperature and pressure are within the DSIP limit	Initiate drywell sprays.

ATTACHMENT C

NRC PERSONNEL AND PERSONS CONTACTED

NRC PERSONNEL

Name	Title
*L. Miller	Chief, Operations Section, RV
#*P. Eng	WNP-2 Project Manager
+# C. Sorensen	Resident Inspector
+#*T. Meadows	Team Leader, RV
+# D. McNeil	Systems Specialist, RIII
+#*M. Good	COMEX, Systems Specialist
+#*A. Sutthoff	SAIC, Human Factors Specialist

WNP-2 PERSONNEL CONTACTED

Name	Title
*A. Oxsen	Deputy Managing Director
*C. Powers	Director of Engineering
+J. Backer	Plant Manager
+#*S. McKay	Operations Manager
+#*S. Kirkendall	Supervisor, Nuclear Systems and Analysis
+#*B. Barmettlor	Manager, Technical Training
+#*T. Messersmith	Operations Engineer
*B. Mazurkeiwicz	BPA, Operations Branch
*D. Merhar	Operations Procedures
#*D. Kobus	Manager, Technical Training
+#*S. Washington	Supervisor, Compliance
*J. Vause	Principal Engineering Tech. Assessment
*L. Sharp	Principal Nuclear/Mech. Engineering
*L. Harrold	Manager, General Engineering
*A. Hosler	Licensing Manager
M. Baird	Control Room Supervisor
E. Villaruell	Reactor Operator
M. Comstock	Equipment Operator
S. Jenkins	Equipment Operator
M. Naulty	Equipment Operator
L. Rowden	Equipment Operator
R. Tingley	Equipment Operator
R. Gumm	Equipment Operator
M. Kappl	Shift Manager
G. Bishop	Control Room Supervisor
D. Moore	Reactor Operator
M. Gallager	Reactor Operator
A. langdon	Shift Manager
G. Hendrick	Control Room supervisor
M. Woods	Reactor Operator

WNP-2 OPERATING CREW E

Name	Title
G. Kozlick	Shift Manager
N. Zimmerman	Control Room Supervisor
D. Strote	Shift Support Supervisor
A. Herrington	Reactor Operator
J. Rueckert	Reactor Operator
R. Nelson	Reactor Operator
A. Woods	Shift Technical Advisor

*Attended Exit Meeting on 9/13/90
+Attended Entrance Meeting 9/4/90
#Attended Pre-Exit Meeting on 9/12/90

ATTACHMENT D

DOCUMENTS REVIEWED

Note: Procedures 13.1.1, 9.3.22, 82-RMD-0901-LP, and the licensee's EOP developmental procedures were reviewed by the team during the "table top" preparation phase of the inspection. This review also included on-site interviews with selected plant staff. The 5.0 - 5.4 EOP flowcharts (Top Line procedures) were studied in detail by the inspectors. The majority of these procedures were functionally tested by observing an operating crew respond to five event scenarios, using the licensee's simulator. The 5.5.x series procedures were inspected in detail by in plant walkdowns with plant operators. The other EOP support procedures (1.x.x, 2.x.x, and 3.x.x series) were sampled by the team via plant walkdowns and operator interviews.

13.1.1, "Classifying The Emergency," Revision 11
9.3.22, "Core Damage Evaluation," Revision 5
82-RMD-0901-LP, EOP Training, Revision 1
WNP-2 Emergency Procedures Guidelines, Revision 0
NEDO-31331, Emergency Procedures Guidelines, Revision 4
WNP-2 Deviations to Revision 4 of the Emergency Procedures Guidelines
Flowchart 5.0.0, EOP Cautions, Revision 0
Flowchart 5.0.1, EOP Graphs, Revision 0
Flowchart 5.1.1, RPV Control (non-atws), Revision 7
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