NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
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January 30, 1985

Docket No. 50-336
A04377

Director of Nuclear Reactor Regulation
Attn: Mr. James R. Miller, Chief
Operating Reactors Branch #3
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

References: (1) J. R. Miller letter to W. G. Counsil, dated September 24, 1984.

(2) W. G. Counsil letter to D. M. Crutchfield/J. R. Miller, dated September 1, 1983.

Gentlemen:

Millstone Nuclear Power Station, Unit No. 2
Supplement 1 to NUREG-0737
Procedures Generation Package
Request for Additional Information

In Reference (1), the NRC Staff requested that additional information be provided to support its review of the Millstone Unit No. 2 Emergency Operating Procedures Generation Package submitted in Reference (2). Although our response was requested to be submitted within sixty (60) days of our receipt of Reference (1), we contacted the Millstone Unit No. 2 Project Manager on October 25, 1984 to request an extension to January 31, 1985. This extension was acceptable to the NRC Staff. As such, Northeast Nuclear Energy Company (NNECO) hereby submits its response to Reference (1).

Responses to the items contained in Reference (1) are included as Attachment No. 1. Revision 1 to the Emergency Operating Procedures Generation Package can be found in Attachment No. 2. Attachment No. 2 includes a proposed revision to the Emergency Operating Procedure Writers' Guide. Subsequent to the receipt of NRC Staff acceptability of this document, the revised writers' guide will become effective and will be used to develop future revisions or additions to the Millstone Unit No. 2 emergency operating procedures.

We trust that this submittal adequately responds to Reference (1).

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

W. G. Counsil
Senior Vice President

A003
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Docket No. 50-336

Attachment No. 1

Millstone Nuclear Power Station, Unit No. 2

Supplement 1 to NUREG-0737
Procedures Generation Package
Response to NRC Staff's
Request for Additional Information

January, 1985

PLANT-SPECIFIC TECHNICAL GUIDELINES (P-STG)

1. The discussion of the P-STG needs to identify deviations and additions with respect to the generic guidelines and to identify their safety significance. More specifically, additional information is needed on:

   a. Those plant-specific items not covered by the generic guidelines, i.e., additional steps, instrumentation values, plant conditions, and equipment identification.

   Response

   The plant specific data needed to complete the bracketed information in the Combustion Engineering Owners Group Emergency Procedure Guidelines is included as Table 1.

   b. Those items which are deviations from the generic guidelines also need to be identified and the technical reason for the deviation included.

   Response

   Millstone Unit 2 is a 2700 MW design class Combustion Engineering plant. This design class was used as the generic plant for the CE Owner's Group Emergency Procedure Guidelines (EPGs). The operating characteristics, design features and equipment are essentially the same. A comparison of Millstone Unit 2 and the EPG generic plant yields no safety significant deviations.

   c. Additions to and deviations from the generic guidelines need to be analyzed to determine their safety significance. The PGP discussion should include an indication that this analysis has been done, and the analysis or technical justification of the safety significance for the deviation should be included in the PGP.

   Response

   As a comparison of Millstone Unit 2 and the EPG reference plant yields no safety deviations, no specific analyses are required. The EOPs themselves were reviewed by NUSCo Safety Analysis Branch as discussed in Section 2.5.f.

2. Control room instrumentation and controls used in operator steps need to be evaluated with respect to their necessity and adequacy. This may be done as a separate effort or as a part of verification/validation of EOPs. Additional information is needed in the PGP with regard to:

a. Description of the method used to determine needed control room instrumentation and controls used in operator steps.

b. Description of the method used to determine the adequacy of the present control room instrumentation and controls used in operator steps.

Response

The upgraded EOPs for Millstone Unit 2 were written for implementation in the January, 1984 control room. Their verification and validation programs were performed with that consideration. The only instrument modification found necessary as part of the EOP upgrade process was the addition of a loop selector switch for the subcooled margin monitor. This was necessary to provide subcooling values of the operating loop when one steam generator was isolated.

The CEOG is currently planning to prepare additional documentation to be included in the EPGs to identify the needed control room instrumentation and controls used in operator steps. When this effort is complete, NNECo will be in a position to compare the identified information and control needs with the actual information and controls present in the Millstone Unit 2 control room. This process will be identified and described in the CRDR program plan. As part of that program, additional EOP revisions will be made to incorporate the appropriate changes.

PLANT-SPECIFIC WRITER'S GUIDE (P-SWG)

1. Exhibits 1-4 show important information which is not discussed or referenced in the P-SWG. If the procedure writers and typists are to use the exhibits to obtain this type of information, there should be a discussion of the details for addressing consistently each item in the text with reference to the four exhibits. This should include procedure title, margins, line spacing and step numbering. (NUREG-0899, Section 5.5.8).

   Response

   Additional discussion has been added to P-SWG section 6.2 to address this concern. Exhibits 3 and 4 have also been improved and Exhibit 5 added as an additional example. Additional detail has been added to section 3.3 with respect to step numbering.

   Exhibits 1 and 2 are added for completeness of the writers guide. They are addressed by the Millstone Station Administrative Control Procedure, ACP-QA-3.02 as the required procedure cover sheet, SF-301 and title page.

2. Section 2.2 of the P-SWG references Exhibit 1 as the sample title page, but it appears that Exhibit 2 should be the reference as the sample title page. This reference should be corrected, or Exhibit 1 and Section 2.2 should be made consistent.

   Response

   Section 2.2 has been corrected.

3. The P-SWG should include instructions, in Section 4.2 on Page 6, that action steps should be wholly contained on a page (similar to the instructions for Cautions and Notes). (NUREG-0899, Subsection 5.5.2).

   Response

   Additional guidance has been added to section 4.2.

4. Item I.A.1.a of the verification checklist asks "Are the corner asterisks visible on procedure pages?". There are no instructions in the P-SWG or examples of the placement of asterisks in the exhibits. This discrepancy should be corrected.

   Response

   This item has been deleted from the checklist. Current automated copying techniques have eliminated the need for corner asterisks. Additional detail has been added to section 7.

5. Fairly detailed instructions for operator aids are provided on Pages 11, 16 and 17. These sections should, however, be expanded to:

   a. Identify the means by which the operators will be able to readily access the tables, figures, and attachments during emergency conditions.

   b. Provide guidance for labeling of graph axes.

   Response

   a. Additional detail has been added as section 4.10.4.

   b. Additional detail has been added as section 4.10.5.

6. The P-SWG discusses a number of specifics on the use of capitalization in the EOPs. Additional instructions need to be provided that discuss capitalization in action steps, cover sheet, figures and tables. The P-SWG should make clear that standard American English usage holds in all other cases. (NUREG-0899, Subsection 5.6.5).

   Response

   Section 5.7 has been added to address capitalization.

7. The P-SWG mentions procedure links (referencing other procedures) in Section 4.7 on Page 9 and provides some of the instructions for the writer. However, an example or a more detailed discussion of a good procedure link would provide the writer with guidance on an acceptable method to accomplish this important task. The example or discussion should include the content and format of a procedure link and the discussion for identifying sections and subsections. (NUREG-0899, Subsection 5.2.2).

   Response

   Additional detail has been added to section 4.7 and an example added as Exhibit 6.

8. Action steps need to be written for a variety of situations that are not currently addressed in the P-SWG. The P-SWG should address the use and formatting for the following types of action steps:

   a. Verification steps which are used to determine whether the objective of a task or a sequence of actions has been achieved. (NUREG-0899, Subsection 5.7.2).

b. Steps of continuous or periodic concern/applicability, which are often needed to repeatedly perform a given action, such as monitoring or controlling some plant parameter or taking an action at a given time interval. The format should include a means to allow operators to note or keep track of the conditions or time interlude. (NUREG-0899, Subsection 5.7.5).

c. Steps for which a number of alternative actions are equally acceptable. (NUREG-0899, Subsection 5.7.5).

d. Steps that are performed concurrently with other steps. (NUREG-0899, Subsection 5.7.7).

Response

Additional detail has been added to section 4.1.

9. To minimize confusion, delay, and errors in execution of the EOP steps, the following concerns should be addressed in the P-SWG:

a. The EOPs should be structured so that they can be executed by the minimum control room crew as specified in the Technical Specifications. (NUREG-0899, Subsection 5.8.1).

b. The EOPs should be structured so that operator roles specified in the EOPs are consistent with pre-established leadership roles and divisions of responsibilities. (NUREG-0899, Subsection 5.8.2).

c. The action steps should be structured so as to minimize physical conflicts between personnel and to minimize the amount of movement needed for carrying out the steps. (NUREG-0899, Subsection 5.8.3).

d. The action steps should be structured to avoid their unintentional duplication by operators. (NUREG-0899, Subsection 5.8.3).

Response

Additional detail has been added to Section 4.1 to include these concepts. Note that the EOPs should be structured to be performed by the minimum required staff with respect to EOP performance in the control room. As appropriate, EOPs should be structured to direct the activities of those personnel that are not the control room staff, but perform necessary emergency functions. These personnel would include Plant Equipment Operators, Chemistry Technicians, Health Physics Technicians and Emergency Plan personnel.

10. It is important that an operator be able to quickly access the relevant EOPs or portions of EOPs. The P-SWG should address the accessibility of various parts and sections of the EOPs. (NUREG-0899, Subsection 6.1.4).

Response

Additional detail has been added to Section 2.

11. The P-SWG discusses a number of important items regarding the reproduction of the EOPs. Additionally, the P-SWG should include requirements for the quality of the reproduced copies of the EOPs to ensure their legibility. (NUREG-0899, Subsection 6.2.2).

Response

Additional detail has been added to Section 7.

12. Section 3.2 of the P-SWG gives a description of the entry conditions for EOPs. The example in Exhibit 3, however, does not appear to be the typical list of entry conditions, such as control room annunciators, indicators, etc. A better example would be more helpful to the procedures writers.

Response

An example from an event oriented (optimal recovery) EOP has been provided as Exhibit 3. This gives a more clear example of entry conditions.

JB:mo

EOP VALIDATION/VERIFICATION PROGRAMS

EOP Verification Program

The Verification Program as outlined in Section 2.5 meets most of the objectives that were identified in NUREG-0899. However, this section of the PGP needs to address:

1. Who will be using the verification checklist.

   Response

   The EOP verification checklist is to be used as an aid to the EOP reviewer, as opposed to the EOP writer. Additional detail has been added to Section 2.5.b.

2. Instructions for its use by the various review groups.

   Response

   Additional detail has been added to the implementation section of the checklist.

3. How discrepancies are to be resolved.

   Response

   Discrepancies are to be resolved by the EOP reviewer discussing any comments he has with the EOP writer/reviser. Additional detail has been added to the implementation section of the checklist.

4. The management position(s) that will be responsible for the resolution of discrepancies.

   Response

   The Operations Supervisor (or his designee) is responsible for resolution of discrepancies that cannot be resolved between the EOP writer and reviewer. Additional detail has been added as Section 2.5.g and on the checklist cover sheet.

5. The formalization of the process and the responsibilities in the "Operation Review" and the "Table Top Review" and the inclusion of a member of Human Factors expertise on the review team.

   Response

   Additional detail has been added to Sections 2.5.a and 2.5.c concerning the process and responsibilities of the "Operations Review" and the "Table Top Review".

5. (Continued)

As stated in Section 2.5:

"EOP verification is the evaluation performed to confirm the written correctness of the procedure and to ensure that applicable generic and plant-specific technical information has been incorporated properly. This evaluation also checks that the human factors aspects presented in the writers guide have been applied".

This is consistent with Section 3.3.5 of NUREG 0899. Although no member of the EOP project team is considered a Human Factors expert, the evaluation that the human factors aspects of the writers guide were applied was effectively performed. The control room design review (CRDR) foı Millstone Unit 2 will address EOPs and their use in the control room. Human Factors expertise will be included in the CRDR program.

EOP Validation Program

The Validation Program as outlined in Section 2.6 defines "validation", states that an operating crew will perform the validation and be observed by a project team, and that the appropriate scenarios will be used. Further, an EOP Validation Form has been prepared for use. These items are essential to meet the objectives stated in NUREG-0899, Subsection 3.3.5, but there are a number of other items which should be addressed.

1. The validation program needs to be formalized with the objectives of the program identified and the methods that will be used to accomplish each objective. Where a plant-specific simulator is not used, the methods should be identified that will be used to validate the portions of the EOPs that cannot be validated on the generic simulator.

   Response

   Additional detail has been added to Section 2.6.

2. The criteria for selection of the EOP validation team should be identified for their roles and responsibilities should be clearly delineated. The size of the operating crew should be determined by technical specifications for minimum staffing.

   Response

   Additional detail has been added to Section 2.6. Note that specific operator roles are specified. These roles are the actual roles present on the control room staff. They do not include Plant Equipment Operators, Chemistry Technicians, HP Technicians or other plant staff not required for the control operations.

3. The discussion on use of scenarios to validate the EOPs on a simulator should be expanded to address the following:

   a. The criteria that is used to select the simulator scenarios should be included. The criteria should ensure that the EOPs are evaluated under multiple failures.

   b. The method that will be used to validate those portions of the EOPs that cannot be validated on the simulator.

   Response

   Additional detail has been added to Section 2.6.

4. The PGP should discuss a feedback system for handling and resolving discrepancies, problems and errors that are found during the validation and verification processes; and a plan should be included for correcting and revising the EOPs. This plan should identify those who will perform the corrections and revisions and the basic procedure to be employed. (NUREG-0899, Subsection 3.3.5.2).

   Response

   Additional detail has been added to Section 2.6 under the heading "Performance and Review" and "Final Operator EOP Evaluation".

5. As revisions occur to EOPs, these revisions may also require validation. The PGP should include criteria for determining when validation and verification of revisions is needed. (NUREG-0899, Subsection 6.2.4).

   Response

   Additional detail has been added as Section 2.6 under the heading "Final EOP Revision".

6. The control room instrumentation and controls referred to in the EOPs need to be evaluated in terms of their adequacy and their correspondence with the actual instrumentation found in the control room. The PGP should be modified to include the following:

   a. A description of the plan for determining the information and control needs for the EOPs. (NUREG-0899, Subsection 3.3.1).

   b. The plan that will be used to determine whether the actual control room instruments and controls meet the information and control needs. [NUREG-0899, Subsection 3.3.5.1 (d)].

   Response

   These comments are addressed by P-STG issue 2 A&B.

7. Millstone 2 PGP includes a Validation Form, but there is no description of its use, who is to use it or how. As a minimum, the PGP should describe how the checklist is to be used as part of the validation process.

Response

During the initial validation exercises the use of the form was found to have little value and has been deleted. The method of redlining the comments directly on the draft upgraded EOPs proved to be more effective method than attempting to record the information on the form. The review held at the end of each scenario provided a forum for additional discussion of the EOP. The Final Operator EOP Evaluation form serves to document that the operator can use the EOPs to effectively manage emergency conditions.

EOP TRAINING PROGRAM

The operator training program for EOPs as described in the Millstone 2 PGP contains some of the necessary items to provide for the training and evaluation of the new EOPs. This information covers the training objectives, indication of the use of lectures, simulators, discussions as training methods, etc., and a commitment to evaluate operators after training. The following areas require additional information for clarification:

1. Although the PGP does mention the use of a simulator for operator training, the training program should:

A. State whether a site-specific or generic simulator is to be used (or was used).

Response

Section 2.7.d. has been expanded to include simulator type.

B. Indicate that all EOPs will be exercised by all operators prior to implementation.

Response

Section 2.7 (1-4) has been revised to include this.

C. Discuss the method to be used to train the operator in areas where the simulator is not like the control room or does not react like the plant. This can be done with the use of mock-ups or a control room walkthrough.

Response

Physical differences and differences in response between the C-E training simulator and Millstone Unit 2 are discussed prior to each simulator portion of the training. This has been added to section 2.7.d.

D. Indicate that operator roles and team work with respect to the EOPs are planned.

Response

Additional detail has been provided in section 2.7.

E. Indicate the use of a wide variety of scenarios to fully exercise the EOPs on the simulator and thus expose the operators to a wide variety of EOP uses.

Response

Additional detail has been provided in section 2.7.d.

TABLE 1

This table contains the plant specific information gathered from the source documents listed in the Procedure Generaton Package section 2.3. The information is provided in this format to be compatible with Figure 12.12 of the Combustion Engineering Owners Group Emergency Procedure Guidelines (EPGs) for ease of review. The information provided represents the plant specific information necessary to use the EPG steps for EOP preparation at Millstone Unit 2. Note that the information is not a deviation from the EPG steps, but the plant specific technical data necessary to use the EPGs generic guidance.

The plant specific material that has replaced the bracketed generic material has been underlined for clarification.

EPG steps requiring
Plant Specific Information

---

a) Rx POWER DECREASING

AND

b) LESS THAN 1 CEA BOTTOM LIGHT NOT LIT

IF NOT

a) MANUALLY TRIP THE REACTOR

OR

b) OPEN THE Rx TRIP BREAKERS

OR

c) DEENERGIZE THE CEA MOTOR GENERATOR

AND

d) IF MORE THAN 1 CEA NOT INSERTED BORATE THE PLANT IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS

---

a) MAINTENANCE OF VITAL AUXILIARIES

- INSTRUMENT AIR PRESSURE GREATER THAN 90 PSIG
- TWO RBCCW PUMPS OPERATING
- TWO SERVICE WATER PUMPS OPERATING

EPG steps requiring
Plant Specific Information

---

a) MAIN TURBINE TRIPPED

AND

b) GENERATOR OUTPUT BREAKER OPEN

AND

c) 6.9 KV AND 4.16 KV BUSES TRANSFER TO RSST

d) 125 VDC LOAD CENTERS ENERGIZED

IF NOT

a) TRIP THE TURBINE

b) OPEN GENERATOR OUTPUT BREAKERS

c) TRANSFER LOADS OFFSITE OR VERIFY DIESEL STARTED

20% < PZR LVL < 65% AND RCS > 20°F SUBCOOLED

CAUTION

DO NOT RUN RCPs IF PRESSURIZER PRESSURE IS < 1600 PSIA FOLLOWING AN SIAS UNTIL RCP RESTART CRITERIA ARE MET.

EPG steps requiring
Plant Specific Information

IF NOT

b) IF PRESSURIZER PRESSURE DECREASES TO 1600 PSIA, OR IF CONTAINMENT PRESSURE INCREASES TO 4.75 PSIG, VERIFY THAT AN SIAS HAS BEEN INITIATED. IF NOT, MANUALLY INITIATE SIS OPERATION.

---

a) 1900 PSIA < PZR PRESS < 2350 PSIA

---

a) S/G LEVEL IS EITHER:
WITHIN THE ZERO POWER LEVEL BAND
WITH FEEDWATER AVAILABLE TO MAINTAIN THE LEVEL
OR
BEING RESTORED BY FEEDWATER FLOW
AND

b) RCS T_{AVE} < 535°F

c) S/G PRESS > 500 PSI

EPG steps requiring
Plant Specific Information

IF NOT

a) VERIFY MAIN OR AUXILIARY FEED IS CONTROLLING S/G LEVEL AND STEAM DUMP SYSTEM OPERATING

OR

b) IF S/G PRESSURE DECREASES TO 500 PSI, VERIFY THE MSIS CLOSES THE MSIVs

---

a) $T_H - T_C < 10°F$

AND

b) SUBCOOLED MARGIN MONITOR > 20°F SUBCOOLING

IF NOT

a) VERIFY PROPER FUNCTIONING OF CONTAINMENT COOLERS

OR

b) IF CONTAINMENT PRESSURE > 27 PSIG, VERIFY CSAS.

IF NOT

b) IF CONTAINMENT PRESS > 4.75 PSIG, VERIFY CIAS.

EPG steps requiring
Plant Specific Information

CONTAINMENT PRESSURE < 2 PSIG

AND

CONTAINMENT TEMPERATURE < 120°F

A REACTOR TRIP WILL ALSO RESULT DUE TO AN AUTOMATIC OR MANUAL TURBINE TRIP AT FULL POWER CONDITIONS. A TURBINE TRIP IS CALLED FOR IF A CONDITION DETRIMENTAL TO CONTINUED TURBINE OPERATION DEVELOPS.

THE MAIN FEEDWATER SYSTEM WILL RAMP DOWN TO 5% FLOW TO PREVENT OVERFILLING THE STEAM GENERATORS.

H_2 < 2%

STEAM GENERATOR LEVEL IS RESTORED AND CONTROLLED USING MAIN OR AUXILIARY FEEDWATER TO PROVIDE FOR RCS HEAT REMOVAL

EPG steps requiring
Plant Specific Information

MINIMIZE THE NUMBER OF CYCLES OF PRESSURIZER AUXILIARY SPRAY WHENEVER THE TEMPERATURE DIFFERENTIAL BETWEEN THE SPRAY WATER AND PRESSURIZER IS GREATER THAN 200°F IN ORDER TO MINIMIZE THE INCREASE IN THE SPRAY NOZZLE THERMAL STRESS ACCUMULATION FACTOR. EVERY SUCH CYCLE MUST BE RECORDED IN ACCORDANCE WITH TECHNICAL SPECIFICATION LIMINATIONS.

---

a) IF PRESSURIZER PRESSURE > 1600 PSIA, EITHER HEATERS AND PRESSURIZER SPRAY OR CHARGING AND SIS PUMPS ARE BEING OPERATED MANUALLY OR AUTOMATICALLY TO MAINTAIN OR RESTORE PRESSURIZER PRESSURE WITH P/T LIMITS FIGURE 5-14.

OR

b) IF PRESSURIZER PRESSURE < 1600 PSIA, AT LEAST ONE CHARGING PUMP AND AT LEAST ONE SIS PUMP ARE OPERATING AND THE SIS PUMP(s) ARE INJECTING WATER INTO THE RCS PER FIGURE 5-15, UNLESS THE SIS TERMINATION CRITERIA ARE MET.

EPG steps requiring
Plant Specific Information

CONTAINMENT PRESSURE < 27 PSIG

OR

CSAS

EPG steps requiring
Plant Specific Information

RCS INVENTORY CONTROL IS INITIALLY LOST SINCE THE BREAK FLOW RATE EXCEEDS THE AVAILABLE CHARGING PUMP CAPACITY OF THE PLANT. FOR SMALL BREAKS, RCS INVENTORY CONTROL IS REGAINED VIA INJECTION FROM THE HIGH PRESSURE SAFETY INJECTION (HPSI) PUMPS AND THE CHARGING PUMPS.

(VOIDS)
IF THEIR PRESENCE IS DETECTED IN THE RCS THE REACTOR VESSEL HEAD VENT MAY BE OPERATED.

IN THE EVENT THAT THE FEEDWATER SUPPLY TO THE STEAM GENERATOR IS EXHAUSTED AND/OR UNAVAILABLE AND THE SCS IS INOPERABLE, THE PORVs ARE OPENED TO ENSURE THAT THE FLOW FROM THE SIS IS AVAILABLE FOR RCS HEAT REMOVAL PURPOSES.

NO ABNORMAL DIFFERENCES BETWEEN T_H RTDs AND CORE EXIT THERMOCOUPLES. HOT LET RTD TEMPERATURE SHOULD BE CONSISTENT WITH THE CORE EXIT THERMOCOUPLES. ADEQUATE NATURAL CIRCULATION FLOW ENSURES THAT CORE EXIT THERMOCOUPLE TEMPERATURES WILL BE APPROXIMATELY EQUAL TO THE HOT LET RTDs TEMPERATURE WITHIN THE BOUNDS OF THE INSTRUMENT'S INACCURACIES. AN ABNORMAL DIFFERENCE BETWEEN T_H AND THE CETs IS GREATER THAN 10°F.

EPG steps requiring
Plant Specific Information

IF THE RCPs WERE STOPPED, ONE RCP IN EACH LOOP MAY BE RESTARTED IF ALL OF THE FOLLOWING CRITERIA ARE SATISFIED:

a) AT LEAST ONE STEAM GENERATOR IS AVAILABLE FOR REMOVING HEAT FROM THE RCS, and

b) PRESSURIZER LEVEL IS GREATER THAN 35% AND CONSTANT OR INCREASING, AND

c) THE RCS IS AT LEAST 20°F SUBCOOLED, AND

d) CRITERIA SATISFIED PER RCP OPERATING INSTRUCTIONS.

MONITOR QUENCH TANK PARAMETERS SINCE ANY SUSTAINED OPERATION OF THE PORVs MAY BURST THE TANK'S RUPTURE DISC.

IF THE SIS IS OPERATING, IT MAY BE THROTTLED OR STOPPED IF ALL OF THE FOLLOWING CONDITIONS ARE SATISFIED:

a) RCS IS AT LEAST 20°F SUBCOOLED, AND

b) PRESSURIZER LEVEL IS GREATER THAN 35% AND CONSTANT OR INCREASING, AND

c) AT LEAST ONE STEAM GENERATOR IS AVAILABLE FOR REMOVING HEAT FROM THE RCS.

EPG steps requiring
Plant Specific Information

IF PLANT CONDITIONS PERMIT, BYPASS
AUTOMATIC INITIATION OF MSIS
AND SIAS.

EPG steps requiring
Plant Specific Information

IF THE CHARGING PUMPS ARE TAKING SUCTION FROM A CONCENTRATED BORON SOURCE, REALIGN SUCTION TO THE RWT WHEN THE CONCENTRATED BORON SOURCE HAS BEEN INJECTED.

IF THE REFUELING WATER TANK LEVELS FALLS TO 9.5%, VERIFY INITIATION OF RECIRCULATION. IF NECESSARY, MANUALLY INITIATE RECIRCULATION AND CLOSE RWT OUTLET VALVES TO THE SAFETY INJECTION SYSTEM.

IF THE HPSI PUMPS ARE DELIVERING LESS THAN 30 GPM PER PUMP DURING RECIRC-ULATION, TURN OFF ONE CHARGING PUMP OR ONE HPSI PUMP (TURN OFF THE HPSI PUMP WITH THE LOWER INDICATED FLOW) AT A TIME UNTIL THE HPSI PUMPS ARE DELIVER-ING MORE THAN 30 GPM PER PUMP.

MONITOR CONTAINMENT RADIATION LEVELS IN ORDER TO EVALUATE ENVIRONMENTAL RELEASES. IT MAY BE DESIRABLE TO REDUCE AIRBORNE RADIATION LEVELS IN THE CONTAINMENT TO MINIMIZE ENVIRONMENTAL RELEASES.

EPG steps requiring
Plant Specific Information

COMMENCE A RAPID COOLDOWN. COOLDOWN TO LESS THAN 297°F AT A RATE WITHIN THE TECHNICAL SPECIFICATION LIMITS BY ONE OF THE FOLLOWING METHODS (LISTED IN ORDER OF REFERENCE):

a) THE TURBINE BYPASS SYSTEM AND MAIN OR AUXILIARY FEEDWATER, OR

b) THE ATMOSPHERIC DUMP VALVES AND MAIN OR AUXILIARY FEEDWATER

IF THE CSAS HAS BEEN ACTUATED AND CONTAINMENT PRESSURE SUBSEQUENTLY FALLS BELOW 10 PSIG, CONTAINMENT SPRAY SHOULD BE TERMINATED. UPON TERMINATION THE CSS MUST BE REALIGNED AND RESET FOR AUTOMATIC ACTUATION. THE CSS MAY BE MANUALLY RESTARTED TO CONTROL IODINE LEVELS IN THE CONTAINMENT.

AT 8-12 HOURS AFTER THE START OF THE LOSS OF COOLANT EVENT, ALIGN THE SIS FOR HOT OR COLD LEG INJECTION.

EPG steps requiring
Plant Specific Information

DETERMINE IF THE CONDITIONS
FOR ENTERING SHUTDOWN
COOLING SYSTEM OPERATION CAN BE
ESTABLISHED BY THE FOLLOWING CRITERIA:

a) PRESSURIZER LEVEL IS GREATER THAN
20% AND CONTROLLED

b) THE RCS IS AT LEAST 20°F SUBCOOLED

c) RCS ACTIVITY LEVEL WITHIN
APPROPRIATE LIMITS

d) OTHER CONDITIONS SATISFIED PER
SHUTDOWN COOLING SYSTEM
OPERATING INSTRUCTIONS.

EPG steps requiring
Plant Specific Information

IF THE CRITERIA IN STEP 37 ARE SATISFIED, SHUTDOWN COOLING OPERATION IS POSSIBLE, AND ALLOWABLE WHEN RCS PRESSURE AND TEMPERATURE ARE LESS THAN 265 PSIA AND 297°F . REALIGN THE SIS FOR COLD LEG INJECTION AND INITIATE SHUTDOWN COOLING PER THE OPERATING INSTRUCTION.

ISOLATE, VENT, OR DRAIN THE SAFETY INJECTION TANKS (SIT) AT 300 PSIA RCS PRESSURE.

INITIATE THE LOW TEMPERATURE OVER-PRESSURIZATION (LTOP) SYSTEMS AT 275°F.

IF PRESSURIZER PRESSURE IS BELOW 2350 PSIA, VERIFY THAT THE PORVs ARE CLOSED. IF NOT, MANUALLY ISOLATE THE PORVs OR CLOSE THE PORV BLOCK VALVES.

OTHER POSSIBLE SOURCES OF LEAKAGE THAT CAN BE RAPIDLY AND REMOTELY ISOLATED:

- LETDOWN LINE.
- RCS SAMPLE LINE.
- SHUTDOWN COOLING SUCTION LINE.

EPG steps requiring
Plant Specific Information

CONTINUALLY OBSERVE THE AUXILIARY BUILDING VENTILATION SYSTEM' RADIATION MONITORS AND ANY OTHER APPLICABLE RADIATION MONITORS. TAKE CORRECTIVE ACTIONS IF NECESSARY, IN ACCORDANCE WITH PLANT TECHNICAL SPECIFICATION LIMITATIONS.

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a) CORE EXIT THERMOCOUPLES < 800°F

AND

b) NOT STEADILY INCREASING

EPG steps requiring
Plant Specific Information

AFTER THE RCS HOT LEG TEMPERATURE HAS BEEN REDUCED TO 520°F, ISOLATE THE STEAM GENERATOR WITH HIGHER ACTIVITY, HIGHER RADIATION LEVELS OR INCREASING WATER LEVEL BY PERFORMING ALL OF THE FOLLOWING:

a) CLOSE THE MAIN STEAM ISOLATION VALVE.

b) CLOSE THE MAIN STEAM ISOLATION VALVE BYPASS VALVE.

c) CLOSE THE ATMOSPHERIC DUMP VALVE.

d) CLOSE THE MAIN FEEDWATER ISOLATION VALVE.

e) ISOLATE STEAM GENERATOR BLOWDOWN.

f) CLOSE THE AUXILIARY FEEDWATER ISOLATION VALVES INCLUDING THE STEAM DRIVEN PUMP STEAM SUPPLY VALVE ASSOCIATED WITH THE STEAM GENERATOR BEING ISOLATED.

g) ISOLATE VENTS, DRAINS, EXHAUSTS, AND BLEEDOFFS FROM THE STEAM SYSTEM AND TURBINE BUILDING SUMPS.

PREVENT OVERFILLING OF THE AFFECTED STEAM GENERATOR THROUGH PERIODIC DRAINING TO THE RADIOACTIVE WASTE SYSTEM OR, IF DRAINING IS NOT POSSIBLE, DUMP STEAM FROM THE AFFECTED STEAM GENERATOR TO THE CONDENSER.

EPG steps requiring
Plant Specific Information

TO PREVENT LIFTING STEAM GENERATOR SAFETIES AFTER ISOLATING A STEAM GENERATOR, COOLDOWN THE RCS UNTIL THE RCS HOT LEG TEMPERATURE IS LESS THAN 520°F.

IF PREVIOUS EFFORTS HAVE NOT ELIMINATED THE VOID, IT IS SUSPECTED TO BE NON-CONDENSIBLE GASES. OPERATE THE REACTOR VESSEL HEAD VENT AS NECESSARY TO ELIMINATE THE GASES.

200°F SUBCOOLING

EPG steps requiring
Plant Specific Information

DURING THE COOLDOWN MAINTAIN THE RCS PRESSURE SLIGHTLY ABOVE (0-100 PSIA) THAT OF THAT AFFECTED S/G AND WITHIN THE ACCEPTABLE POST ACCIDENT PRESSURE/ TEMPERATURE LIMITS (FIGURE 6-10) BY

a) CONTROLLING RCS HEAT REMOVAL VIA THE UNAFFECTED OR LEAST AFFECTED STEAM GENERATOR

AND

b) CONTROLLING RCS PRESSURE USING THE FOLLOWING METHODS

i) PRESSURIZER HEATERS AND MAIN OR AUXILIARY SPRAY

ii) CHARGING AND LETDOWN

iii) HPSI PUMPS

iv) PORVs

EPG steps requiring
Plant Specific Information

STEAM GENERATOR LEVEL < 0%

VERIFY TURBINE BYPASS VALVES ARE
CONTROLLING STEAM GENERATOR PRESSURE
AT 900 PSIG. IF CONDENSER VACUUM
IS LOST, THE TURBINE BYPASS SYSTEM
IS UNAVAILABLE, OR IF THE MSIVs ARE
CLOSED, THE ATMOSPHERIC DUMP VALVES
MUST BE USED TO CONTROL STEAM
GENERATOR PRESSURE.

> 0°F BY CET

LOOP ΔT < 50°F

EPG steps requiring
Plant Specific Information

IF FEEDWATER FLOW HAS BEEN LOST FOR GREATER THAN 5 MINUTES, LIMIT FEEDWATER FLOW TO 600 GPM UNTIL LEVEL IS GREATER THAN 45%.

PLANT SPECIFIC METHODS FOR S/G HEAT REMOVAL

ALTERNATE SOURCES OF FEEDWATER INCLUDE THE FIRE SYSTEM.

EPG steps requiring
Plant Specific Information

IF FEED TO AT LEAST ONE STEAM GENERATOR CANNOT BE RESTORED, ESTABLISH ONCE THROUGH COOLING BY:

a) STOPPING ALL REMAINING OPERATING RCPs

b) STARTING THE HPSI PUMPS

c) OPENING THE PORVs

SOLID WATER OPERATION OF THE PRESSURIZER SHOULD BE AVOIDED UNLESS 20°F OF SUBCOOLING CANNOT BE MAINTAINED IN THE RCS. IF THE RCS IS SOLID, CLOSELY MONITOR ANY MAKEUP OR DRAINING AND ANY SYSTEM HEATUP OR COOLDOWN TO AVOID ANY UNFAVORABLE RAPID PRESSURE EXCURSIONS.

EPG steps requiring
Plant Specific Information

TO AVOID RCS BORON DILUTION AND LOSS OF SHUTDOWN MARGIN BY PRESSURIZER OUTSURGE DURING THE COOLDOWN, PERFORM ONE OF THE FOLLOWING STEPS LISTED IN ORDER OF PREFERENCE:

a) CALCULATE AND ADD SUFFICIENT BORON TO THE RCS TO RAISE THE ENTIRE RCS (INCLUDING THE MASS IN THE PRESSURIZER) TO COLD SHUTDOWN CONDITIONS.

b) IF LETDOWN IS AVAILABLE, USE AUXILIARY SPRAY TO INCREASE AND MAINTAIN PRESSURIZER BORON CONCENTRATION TO WITHIN 50 PPM OF RCS CONCENTRATION USING HEATERS TO CONTROL PRESSURIZER PRESSURE.

c) IF LETDOWN IS NOT AVAILABLE, USE AUXILIARY SPRAY AND PRESSURIZER HEATERS TO CONTROL PRESSURIZER PRESSURE AND INCREASE RCS BORON CONCENTRATION TO 50 PPM GREATER THAN THAT REQUIRED FOR MINIMUM SHUTDOWN MARGIN.

ALL AVAILABLE CHARGING PUMPS

EPG steps requiring
Plant Specific Information

LOW REACTOR COOLANT FLOW TRIP AT
91.7% FLOW.

20°F < RCS SUBCOOLING < 200°F

IF ALL FEEDWATER IS LOST AND PRESSURIZER SPRAYS (MAIN AND AUXILIARY) ARE NOT AVAILABLE, GO TO PC-7, CONTROL OF RCS PRESSURE USING PORVs.

5-15 MIN RCS TEMPERATURE RESPONSE

BORON ADDITION RATE > 40 GPM AND
CORE POWER DECREASING

(HPSI 1192 PSIA, CS PUMP 195 PSIA,
LPSI PUMP 182 PSIA).

EPG steps requiring
Plant Specific Information

IF NECESSARY, THE VCT BORIC ACID
STORAGE TANKS, AND RWT ARE USED.

REACTOR POWER < 5% AND CONSTANT
OR DECREASING.

IF FEEDWATER CANNOT BE REGAINED, GO TO
HR-3, RCS AND CORE HEAT REMOVAL USING
ONCE THROUGH COOLING.

VERIFY AUTOMATIC OPERATION OF THE
CONTAINMENT FAN COOLING SYSTEM. IF
AT LEAST 2 CONTAINMENT FANS ARE NOT
RUNNING IN SLOW THEY SHOULD BE
STARTED MANUALLY.
