



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
101 MARIETTA STREET, N.W.  
ATLANTA, GEORGIA 30323

Reports No.: 50-369/90-16 and 50-370/90-16

Licensee: Duke Power Company  
422 South Church Street  
Charlotte, NC 28242

Docket Nos.: 50-369 and 50-370 License Nos.: NPF-9 and NPF-17

Facility Name: McGuire Nuclear Station

Inspection Conducted: August 12-17, 1990

Inspector: Ron Mills For 9/10/90  
L. Lawyer, Team ~~Leader~~ Date Signed

NRC Team Members:

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SUMMARY

Scope:

This was a special, announced Emergency Operating Procedure (EOP) team inspection. Its purpose was to verify that corrective actions for previous findings in the area of EOPs and related procedures were adequate.

Results:

The NRC team found that the licensee's resolution of comments in NRC Inspection Report 369,370/89-02, in general, was technically adequate and reasonably responsive.

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During the inspection, a deficiency was identified in one additional area. This deficiency involved technical inadequacies in two of the EOPs and two of the AOPs. The inadequacies in the EOPs for S/G tube rupture and loss of all AC power, and in the AOPs for loss of RHR during mid-loop operations and loss of control room are discussed in paragraph 2 and Appendix B of this report. There were no violations or deviations identified during the inspection.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee employees

- \*N. Atherton, Production Specialist, Regulatory Compliance
- L. Abernathey, Shift Supervisor
- \*D. Baxter, Operations Support Manager
- \*D. Franks, QA, Verification Manager
- C. Griggs, Reactor Operator
- \*P. Guill, Regulatory Compliance
- S. Helms, Senior Instructor
- J. Idings, Shift Supervisor
- \*R. Isenhour, Corporate Safety Review Group
- \*L. Kunka, Compliance Engineer
- \*C. LeRoy, Regulatory Compliance
- \*T. McConnell, Plant Manager
- L. Newman, Reactor Operator
- J. Phillips, Reactor Operator
- K. Poovey, Senior Reactor Operator
- \*R. Sharpe, Compliance Manager
- \*B. Travis, Operations Superintendent
- \*C. Tyler, Instrumentation and Electrical
- \*M. Weiner, Operations Engineer

Other licensee employees contacted including instructors, engineers, mechanics, technicians, operators, and office personnel.

#### NRC Representatives

- \*T. Cooper, Resident Inspector
- \*S. Ninh, Resident Inspector
- \*D. Hood, Project Manager

#### \*Attended Exit Interview

Procedures reviewed during this inspection are listed in Appendix A.

References to appendices are noted in parentheses. For example, (B IV 1) refers to Appendix B, item IV.1.

A listing of abbreviations used in this report is contained in Appendix D.

### 2. Review of Additional EOPs and AOPs by Inplant Walkthroughs

The NRC Team reviewed an additional sample of EOPs and AOPs to assess the quality of the licensee's procedure upgrade process. These procedures were reviewed for human factors impact, adherence to the writer's guide,

effectiveness of the verification and validation program and operator usability.

The team determined that the procedures were an improvement over those previously reviewed and that the procedures would adequately mitigate reactor accidents. However, the procedures for loss of all AC power (B III 8), loss of RHR (B II 6), and steam generator tube rupture (B III 7) were noted as having significant technical discrepancies. The procedure for loss of control room (B II 5) was also deficient. These and other discrepancies are described in Appendix B. The technical and human factor discrepancies described in Appendix B are identified as IFI 369,370/90-16-01.

During the inplant review of EOPs, the team noted two OPs that appeared to be delinquent in receiving a formal review within a two year period as required by TS. Further review revealed one had received a formal review 12 months previous, the other received a formal review six months previous. Both had incorporated outstanding procedure changes but had not been issued as of August 17, 1990. Both procedures were in the review process. The licensee had recognized this weakness in its review process and was making improvements.

There were no violations or deviations identified in this area.

### 3. Simulator Observations

The inspection team observed three simulator scenarios performed by the licensee in order to verify the adequacy of several of the EOPs and AOPs. The scenarios involved a S/G tube leak which escalated into a tube rupture with an additional faulted S/G, a cool down while on natural circulation with a steam bubble in the vessel head and an intermediate size main steam line break outside of reactor containment. The inspection team concluded that the EOPs and AOPs utilized in these scenarios were adequate to accomplish accident mitigation.

There were no violations or deviations identified in this area.

### 4. Writer's Guide

The current revision of the McGuire writer's guide was evaluated by the team in terms of NUREG-0899 direction for the content and adequacy of writer's guides. The writer's guide included appropriate topics as indicated by NUREG-0899; however, it did not thoroughly address, nor provide restrictive criteria, for each aspect of the procedure. Details of specific writer's guide inadequacies identified by the team are reported in Appendix C. Except for the items detailed in Appendix C, the writer's guide enhances consistency within and between procedures. The guide also facilitates retention of that consistency over time and through personnel changes.

There were no violations or deviations identified in this area.

## 5. Review of IR 369,370/89-02 Concerns & IFIs

The team reviewed concerns documented in the previous NRC EOP inspection (IR 369,370/89-02) and SER dated December 15, 1987. The team conducted reviews of deviation documents, procedure verification and validation guidelines, the SGTR procedure; and performed walkthroughs in both the control room and the plant, simulator observations and an independent technical review.

### a. Deviation Documents

Differences between McGuire EOPs and WOG guidelines were noted during the inspection documented in IR 369,370/89-02 and subsequently during an assessment of the licensee's response to the SGTR event of March 7, 1989. The licensee was then requested by letter to reevaluate differences between the WOG guidelines and the EOPs and to document justifications for these differences and have them available for review on site by June 30, 1989.

The licensee did not separately address each item contained within attachments six and seven of IR 369,370/89-02 report; only the items they determined to be deviations. The licensee completed their review on June 30, 1989 of the differences between the WOG guidelines and the EOPs. The team's assessment determined that the licensee's review and subsequent revision of the EOPs and AOPs adequately addressed the deficiencies delineated in IR 369,370/89-02.

Prior to the inspection documented in this report the licensee's EOPs had not addressed an accident in which all four S/Gs were faulted. Deviations 93 and 102 justified this deviation based on a PRA evaluation. During this inspection, the licensee recognized that a higher probability existed for four faulted S/Gs than previously calculated due to the previous calculation having neglected common mode failure of the MSIVs. The licensee is reevaluating this event and the associated EOPs and AOPs. These and other items noted during the review of the licensee's corrective actions are noted in Appendix B.

### b. Verification and Validation

The team reviewed the licensee's verification and validation guidelines (OMP 4-2 and OMP 4-3) in response to the concern noted in IR 369,370/89-02. With the exception of several discrepancies presented in Appendix B, the team determined that the V&V guidelines met the objectives of NUREG-0899 for the verification and validation of EOPs.

c. Control Room Walkthroughs

IR 369,370/89-02 noted instances where operators relied on their interpretation of the intent of the EOP step in order to correctly execute the procedural step without additional guidance. Also, operators used the OAC, a non-safety system, to obtain parameter values required in the EOPs instead of plant instrumentation.

The inspection team noted during control room walkthroughs that the operators demonstrated adequate knowledge in the execution of the EOPs. No examples were noted where operators had to rely on their own interpretations to execute the procedural steps. The operators were presented situations in which the OAC was inoperable. The operators were able to execute EOP steps adequately. Furthermore, the operators stated that they use all plant instrumentation to verify the information on the OAC when it is operating.

d. In-plant Walkthroughs

The team conducted several walkthroughs of selected EOPs, AOPs, and OPs. Significant problems were noted with the EOP for Loss of All AC Power (B 1 2). The procedure did not adequately restore cooling water to the reactor coolant pump seals within the time frame that had been analyzed by Westinghouse. There were several examples of other procedural deficiencies. Those deficiencies are delineated in Appendix B.

IR 369,370/89-02 documented several weaknesses identified during inplant walkthroughs. The team reviewed those previously identified weaknesses and the licensee's corrective actions with the following comments:

1. IR 369,370/89-02 stated that the NLOs could not find the correct equipment for performing some local operations. The team walked through a representative sample of EOPs and did not observe the same problem.
2. IR 369,370/89-02 stated that the NLOs did not demonstrate a complete understanding of the depth of execution required for local action (i.e. when throttling a valve, the operator did not know the parameters that determined the final throttle position). The team walked through a representative sample of EOPs and determined that the NLOs and licensed operators appeared to perform their portions of the EOPs satisfactorily.
3. IR 369,370/89-02 stated that some equipment could not be accessed as required by the EOPs. The team walked through a representative sample of EOPs and determined that there were several areas that access to equipment was still difficult; however, there were no instances that access to equipment appeared impossible.

4. IR 369,370/89-02 stated that there were several areas of the turbine building that had accumulated trash behind piping and in hidden corners. The team conducted several plant tours and procedure walkthroughs and noted that this condition had been corrected.

e. Simulator Observations

IR 369,370/89-02 documented several operator deficiencies during the observation of a simulator scenario. Observation of three scenarios during this inspection, as noted in paragraph 3 above, did not disclose any similar deficiencies.

f. Independent Technical Review of the EOPs

IR 369,370/89-02 noted several weaknesses in the EOPs which included rearrangement and addition of steps, combination of ERGs and unimplemented ERGs. These items had been corrected.

g. SGTR Procedure

The team reviewed the licensee's actions in response to the letter from S. D. Ebner to Duke Power, dated March 21, 1989, which delineated the EOP problems during the March 7, 1989, tube rupture event. The letter noted that procedures for recovery from a SGTR did not fully implement and comply with the provisions of the WOG ERG. Additionally, the letter pointed out the potential consequences of the time delays caused by transitions between several different procedures. The team reviewed the current procedures that would be used if a similar event were to take place and found the procedures had been modified to incorporate the WOG guidelines or appropriate justification was given for the changes except for minor deficiencies noted in Appendix B.

There were no violations or deviations identified in this area.

6. Review of SER on PGP

Paragraph A of the SER, dated December 15, 1989, noted that the PSTG was not available for review and would therefore, be reviewed during the EOP inspection performed during mid-1990. The inspection team reviewed selected portions of the PSTG and no deficiencies were noted.

All but two SER items addressing the McGuire writer's guide were resolved. The two unresolved SER writer's guide items were recurrent steps on the foldout page and duplicated step numbers. These are detailed in Appendix C.

The NRC Team reviewed the V&V issues identified in the SER against the licensee's revised V&V Guidelines. The comparison indicated that the licensee has been responsive to NRC comments and that the deficiencies

noted in the SER have been adequately addressed in the revisions made to the V&V guidelines.

Paragraph D of the SER identified that the training program on the McGuire upgraded EOPs had not been provided as a part of the PGP. The SER also stated that this aspect of the EOP program would be reviewed as a part of the EOP inspection performed in mid-1990. The inspection team reviewed administrative training procedures ETQS 2303.0, ETQS 2304.0, and ETQS 2306.0. The inspection team determined that these procedures required classroom and simulator training in the AOPs and EOPs, during both initial training and requalification training, as required by 10 CFR 55.

There were no violations or deviations identified in this area.

7. Previously Identified Items

(Closed) 369,370/89-02-04: Document safety significant step deviations in EOP procedures. The licensee had evaluated the differences between the WOG and the EOPs and addressed the differences in a deviation document. With the exception of the SGTR EOP, the deviation documents were adequate.

(Closed) Safety Information Management System (SIMS) Items I.C.1.1 (B V 1), I.C.1.2.A and I.C.1.2.B (B V 2), I.C.1.3.A and I.C.1.3.B (B V 3), I.D.2.2 and I.D.2.3 (B V 4) and II.B.4.2.A (B V 5).

8. Exit Interview

The inspection scope and findings were summarized on August 17, 1990, with those persons indicated in paragraph 1. The NRC described the areas inspected and discussed in detail the inspection finding listed below. No proprietary material is contained in this report. No dissenting comments were received from the licensee.

<u>Item Number</u>	<u>Description, Paragraph</u>
IFI 369,370/90-16-01	Technically inadequate procedures, paragraph 2 and Appendix B.



APPENDIX A

PROCEDURES REVIEWED

EP-1	Reactor Trip Or Safety Injection	05-02-90
EP-1.1	Natural Circulation Cooldown	05-02-90
EP-1.2	SI Termination Following Spurious SI	05-02-90
EP-2.3	Transfer to Cold Leg Recirculation	08-06-90
EP-3	Steamline Break Outside Containment	08-06-90
EP-4	Steam Generator Tube Rupture	08-06-90
EP-5	SGTR Contingencies	08-06-90
EP-9	Loss of All AC Power	08-06-90
EP-11.2	Response to Loss of Core Shutdown	08-08-90
EP-15.1	Response to High Containment Pressure	08-08-90
AP-1	Steam Leak	05-02-90
AP-9	Natural Circulation	12-01-89
AP-10	NC System Leakage Within Capacity of NV Pumps	04-16-90
AP-13	Boron Dilution	12-01-89
AP-17	Loss of Control Room	04-16-90
AP-19	Loss of Residual Heat Removal System	04-10-90
AP-22	Loss of Instrument Air	06-05-90
AP-24	Loss of Containment Integrity	12-01-89
AP-35	ECCS Actuation During Plant Shutdown	04-25-90
AP-38	Emergency Boration	12-01-89
AP-39	Control Room Hi Temperature	02-22-90
AP-40	Loss of Refueling Canal Level	04-02-90
ARG-1	Loss of RHR While Operating at Mid-Loop Conditions	03-15-90
OP/O/B/6350/04	Standby Shutdown Facility Diesel Operation	02-11-88
OP/1/A/6100/04	Shutdown Outside the Control Room from Hot Standby to Cold Shutdown	05-16-90
OP/O/A/6450/05	Instrument Air System	04-14-90
OP/O/A/6100/17	Operation of the Standby Shutdown Facility	03-06-89
ETQS 2303.0	License Preparatory Reactor Operator Program	10-01-89
ETQS 2304.0	License Preparatory Senior Reactor Operator Program	10-01-89
ETQS 2306.0	Periodic Training Licensed Operator Requalification	10-01-89

## APPENDIX B

### TECHNICAL AND HUMAN FACTORS COMMENTS

This appendix contains technical and human factors comments and observations. Unless specifically stated, these comments are not regulatory requirements. However, the licensee acknowledged that the factual content of each of these comments was correct as stated. The licensee further agreed to evaluate each comment, to take appropriate action and to document that action. These items will be reviewed during a future NRC inspection.

#### I. EOP Comments

1. EP-05 SGTR contingencies

a. No comment

2. EP-09 Loss of all AC power

a. Radio communications between the main control room and remote areas of the plant was unsatisfactory without the repeaters. These repeaters are inoperable following loss of all AC. The main control room radio was AC powered, and there was a prohibition against using hand held radios in the main control room (to prevent inadvertent safeguards equipment operation). For communications with inplant operators or to coordinate remote operator actions, an individual would have to be stationed outside the main control room. Additionally, an operator in the diesel generator room would have to come outside of the diesel generator room to communicate with the main control room. The licensee stated that the communication requirements will be evaluated and the EOP will be revised or the communications system modified.

b. Step 5: This step could not be performed by a typical NLO in the time frame required to protect the reactor coolant pump seals as described in this step. The reactor coolant pump seals have been evaluated to have minimal damage for up to 10 minutes without cooling water. The evolution in this step would have taken about 20 minutes from the time of the loss of all AC power until the cooling water was restored to the reactor coolant pump seals. The extent of damage to the reactor coolant pump seals beyond 10 minutes has not been analyzed. Additionally, the procedure step was not clearly written in that the NLO performing the procedure inadvertently disabled the operating unit (simulated) during this step in the procedure walkthrough. The licensee stated that the procedure would be revised to separate the control manipulations for both units to prevent the inadvertent damage of the unaffected unit.

Additionally, the licensee stated that they would either: (1) evaluate the procedure and attempt to streamline the required actions to provide cooling water to the reactor coolant pump seals within the time frame of the analysis; or, (2) perform an analysis to determine if the time to restore cooling water to the reactor coolant pump seals could be extended.

- c. Step 15b: This step required the operator to locally operate valve 1CA-6 (CA supply from CA storage tank). This valve was 15 feet in the overhead, above portions of the Instrument Air system. The only access to this valve required the operator to use a ladder, then climb across an auxiliary steam pipe, and stand on other piping to operate the valve. This would be accomplished with only emergency lighting available. There were several other examples of valves that were difficult to access in this procedure.
  - d. Step 16a: This step required the alignment of Unit 2 to Auxiliary Control Power Buses DCA and DCB per OP/O/A/6359/01B, 125 VDC - 240/120 VAC AUXILIARY CONTROL POWER. The referenced procedure did not perform this function. It provided guidance to align chargers to their normal power supplies. This step required alignment to the opposite unit's power supply. Procedures to perform this function, if available, were not readily accessible.
3. EP-11.2 Response to loss of core shutdown
    - a. No comment
  4. EP-15.1 Response to high containment pressure
    - a. Step 5b RNO: This RNO applied to substeps printed on three consecutive pages. The RNO was printed only on the beginning page and thus may be overlooked on subsequent pages.
    - b. Step 6b RNO and Step 7a: Step 6b RNO used "2AVS-D-3 and 2AVS-D-8" in reference to two components. Step 7a used "2RAF-D-2 and 4" in reference to two components. This was an inconsistency in the technique of information presentation.
    - c. Step 7b: This step required the operator to perform several actions "Ten minutes after Sp signal". EOPs had no formal method for aiding operators in remembering to do these type of time dependent actions.
    - d. Steps 8a, b, and c RNO: These steps included five branchings, two of which contained "if not, then" logic. The operator on the walkthrough indicated that this series of branchings was awkward and somewhat confusing.

- e. Step 10 Enclosure 2: This step required the operator to allow 45 minutes between two actions. EOPs contained no formal method for aiding operators in remembering to do this type of time dependent actions.

## II. AOP Comments

1. AP-01 Steam leak
  - a. No comment
2. AP-09 Natural circulation
  - a. Step D1a: This step required verification of feed flow to all S/Gs. The RNO required starting of pumps and alignment of valves if feed flow was not established. It was not clear whether this feed flow was from the main feedwater system (CF) or the auxiliary feedwater system (CA). Starting of the CF pumps is much more difficult than starting the CA pumps and requires the use of an operating procedure. Clarification, including reference to the appropriate operating procedures was missing from this step.
3. AP-10 NC system leakage within the capacity of NV pumps
  - a. Case I step 17 RNO, Case II step 26 RNO, Case II step 10c and Case II step 11c: Case I step 17 RNO, and Case II step 26 RNO referred to the same action as Case II step 10c and Case II step 11c; however, the actions were included in the procedure in the first two examples and the procedure referenced the attachment of a different procedure in the last two examples.
4. AP-13 Boron dilution
  - a. When the operators were asked how they would respond to the symptoms listed within the AOP, they indicated that they would go to Emergency Boration, AP-38 rather than use AP-13. Further discussions with the operators indicated uncertainty as to which procedure was relevant given the identical plant symptoms.
5. AP-17 Loss of control room
  - a. Step 12a RNO: This step required the operator to manually manipulate valve 1AS-120. This step should have read open valve 1AS-120.
  - b. The AOP referred to OP/1/A/6100/04, Shutdown Outside the Control Room from Hot Standby to Cold Shutdown. The following comments relate to the referenced OP:

- 1) Various places in the OP procedure: IAE is referred to as I & E, IAE, or I&E.
- 2) Step 3.2.4 Note and all enclosures: This note directed the operator to inform the I & E (sic) technician to retrieve equipment stored in warehouse 5 that was identified as "Loss of Control Room Instrumentation Kit". The equipment was not stored in the location listed in the procedure. Additionally, it was not retrievable as listed on the parts catalog system under "Kit" or under the stock order number 5865 as listed in the procedure. The equipment in the "Kit" was not properly labeled. Various procedural attachments required different pieces of prestaged equipment from the "Kit". It was not clear which pieces of prestaged equipment were required to accomplish each attachment. The IAE technicians did not receive training on the use of this OP and were not sure which equipment was required for each task.
- 3) All attachments: Each of the eight attachments that were referenced in this OP were referenced by the wrong attachment number.

6. AP-19 Loss of residual heat removal system

- a. This AOP did not include all of the mitigation strategy included in the Westinghouse Owners Group Abnormal Response Guideline (WOGARG) ARG-1. The licensee was performing a complete rewrite of the AOP to comply with the ARG. Validation and verification of the existing AOP had never been performed by the licensee. The licensee plans to conduct validation and verification, including simulator validation, once the rewrite is completed. This is scheduled for completion January 1, 1991.

7. AP-22 Loss of instrument air

- a. Step 2a RNO: Substep 4 of this step did not identify the performer of an action performed by someone other than a control room operator as is specified in the writer's guide. Substeps 2 and 3 did identify the performer of actions not performed by control room operators and thus created an inconsistency.
- b. Step 2b RNO: Same as Step 2a RNO above.
- c. Step 8a1 RNO first bullet: This step required operation of a valve 12 to 15 feet above the floor necessitating climbing on equipment. The operator on the walkthrough indicated the use of a chain operated valve for this valve would be helpful.

- d. Step 8a1 RNO second bullet: This step required the operation of a valve in a high radiation area. The procedure did not indicate this and the operator on the walkthrough was not aware of this until arrival at the area.
8. AP-24 Loss of containment integrity
- a. No comment
9. AP-35 ECCS actuation during plant shutdown
- a. Step b: The Symptoms stated "Monitor light panel alarms due to changing equipment status". Since the monitor light panel is a piece of equipment, it should have been capitalized as "Monitor Light Panel" to avoid confusing the word "monitor" with its usage as a verb.
- b. Step 3b RNO: This step called for dispatching an operator to "locally remove Sequencer DC Control Power", but in the substeps did not tell the operator that the breakers were to be opened. The substeps should have been reworded so that the performer knew in which position to place the breakers.
- c. Steps 5, 6, 14a, 14b, 15b RNO: This step required an operator to locally close the valve if the manual action failed. During walkthroughs, however, it was determined that valves 1KV-151A, 1NV-150B, 1NI-9A, 1KC-1A, 1KC2B, 1KC-56A, 1KC-81B, 1NV-244A, and 1NV-245B were located in positions which require a ladder to reach them. No ladders were located close to these valves nor were they readily apparent.
- d. Step 19i: The wording of the actions for this step to align letdown valves to achieve a desired flow rate were ambiguous. The actions to achieve the desired flow rate used the OPEN/CLOSED convention to denote that if one was open then the other should have been closed. However, this was not clear from the instructions of the step.
- e. Step 20: This step required the operator to check that boron concentration in the VCT makeup control system was greater than shutdown boron concentration, but did not give a reference to the procedure for making that determination. Since boron shutdown concentration would vary with core life, the appropriate procedure should have been referenced (e.g., Per OP/X/... ) at this step in the procedure.
- f. Step 25b, 26b, 35b: This step required the operator to dispatch an operator to locally perform an action in the plant following a particular procedure. The procedures for operating the Diesel Generator were not at the local station where the operator actions would be performed.

## 10. AP-38 Emergency boration

- a. As previously noted, this procedure would be entered rather than entering AP-13, given the same plant symptoms.
- b. AP-38 does not direct the operator to check unit status. If the unit is in MODE 6, evacuation is directed by Station Directive 3.8.1, whereas AP-13 does consider the unit's status.
- c. Step 1d: This step stated "IF maximum injection flow is desired, THEN:". Since this was not an action, an RNO is not required.

## 11. AP-39 Control room hi temperature

- a. No comment

## 12. AP-40 Loss of refueling canal level

- a. The team reviewed AP-40 by table top analysis and walkthrough. While no discrepancies were noted, follow-up review by the team is intended.

## III. AOP/EOPs Previously Reviewed

## 1. AP-01 Steam leak

- a. Items noted in IR 369,370/89-02 were adequately addressed in the licensee's procedure upgrade.

## 2. EP-01 Reactor trip or safety injection

- a. The licensee had not fully addressed the identified deviation. The ERG checks auxiliary feedwater pumps running, the EOP step 5 and EPG step 9 only check flow, which may not ensure all required pumps are running.
- b. IR 369,370/89-02 noted that "D.16 - PSTU specifies non-faulted S/G; EOP does not". The licensee had not corrected this item, but correction was scheduled.

## 3. EP-1.1 Natural circulation cooldown

- a. Step 25a: This step correctly specified that T-ave be less than 350 degrees. The intent was to ensure TS mode change requirements were met prior to racking out any safety injection pump and charging pump breakers. However, the EPG did not address this requirement.

4. EP-1.2 SI termination following spurious SI
    - a. Items noted in IR 369,370/89-02 were adequately addressed in the licensee's procedure upgrade.
  5. EP-2.3 Transfer to cold leg recirculation
    - a. Items noted in IR 369,370/89-02 were adequately addressed in the licensee's procedure upgrade.
  6. EP-03 Steamline break outside containment
    - a. Items noted in IP 369,370/89-02 were adequately addressed in the licensee's procedure upgrade.
  7. EP-04 Steam generator tube rupture
    - a. General comments: This procedure was written based on a conclusion of the PRA that determined that the failure of all four S/Gs was not a credible event. The licensee stated that this information had been recently determined to be incorrect and the procedure would be rewritten to include actions to mitigate the results of a simultaneous failure of all four S/Gs.
    - b. Step 12d and 12d RNO: The step following this step should have been labeled 12e for both the AER and RNO.
    - c. Step 14b first bullet: This step required the operator to verify that total feed flow to the S/Gs was greater than 450 GPM. The normal instrumentation for each S/G has a range of 0 to 400 GPM. If only one S/G is available, the use of an alternative instrument would be necessary.
  8. EP-09 Loss of all AC power
    - a. Step 4c: This step verified diesel generators started and loaded. This step was performed earlier in the EOP than in the ERGs. This delayed the verification of NC isolation and CA flow. The licensee stated that the impact of delaying the verification of NC isolation and CA flow would be evaluated.
    - b. Step 11b: This step verified S/G isolation. The ERG addresses CF isolation; the EOP does not. The licensee stated that they will evaluate changing the EOP.
- IV. Detailed resolution of IP 369,370/89-02 V&V comments
1. OMP 4-2 Verification process for emergency procedures



- a. General: The methodology presented in the verification guidelines did not sufficiently detail the activities necessary to ensure the adequacy of a procedure. The methodology presented did not:
- 1) determine if the procedure had identified the correct person to perform the action;
  - 2) verify whether the step was in the right sequence in the task time-line;
  - 3) ensure that the action took place in the right location with the right equipment; confirm that the required action was the right action;
  - 4) ensure the step clearly accomplished the high level task or action step; and,
  - 5) confirm that the step specified the correct actions to take to complete the action.
- b. Section 6.1: Qualifications for the verifier were not required to be considered in the preparation phase. Consideration of the operational experience (e.g., novice versus expert), job position (to match that of the intended user), and the conditions under which the procedure may be used (e.g., degraded environment) were not specified.
- c. Section 6.2.A.1, Item I.A.3.c. of Attachment 1: The referenced material was vague. The term "Required" was not defined clearly or otherwise keyed to the writer's guide to reference the sections which are required to be present in a procedure. This was needed to assist the verifier in ensuring that the necessary sections of the procedure had been prepared and were included in a review copy.
- d. Section 7.2.B Although it may be possible to expedite the verification process for special cases in which a modified procedure is needed quickly, it is still necessary to ensure consistency in the verification process. This section did not identify the situations which would warrant an expedited technical verification.
- e. Attachment 1: The items or criteria in Attachment 1 were not keyed by number to the writer's guide to ensure that the criteria in Attachment 1 were evaluated against the criteria used in the writer's guide.

2. OMP 4-3 Validation of the emergency response capability system
  - a. Section 3.3: This section did not provide a definition of what constituted a major revision to inform the reader of when this guideline would be needed. Such information would be important to ensure the application of validation techniques when necessary.
  - b. Attachment A Section 2.2: In the list of criteria to be addressed during table top validation, there was no item to ensure that the step(s) being validated was operationally correct; that is, it was the right action to take.
  - c. Attachment C Section 2.2: The event validation technique did not explicitly rely on plant data (e.g., logs of control actions, important plant parameter trends, etc.). This information would be available following an event and could also be compared against the EOPs to verify the proper actions and step sequences.

V. SIMS closeout details

1. Item I.C.1.1 - SBLOCA: The team found that detailed emergency operating instructions for handling small break LOCAs had been prepared and they adequately implemented the WOG guidelines.
2. Items I.C.1.2.A and I.C.1.2.B - Inadequate core cooling: The team found that the licensee's procedures to assist the plant operating staff to (a) recognize and prevent impending core uncovering and (b) recover from a condition in which the core has experienced inadequate core cooling were based on WOG analyses and were adequate.
3. Items I.C.1.3.A and I.C.1.3.B - Revise procedures: The team found that emergency procedures had been upgraded consistent with the WOG guidelines in response to NUREG-0737.
4. Items I.D.2.2 and I.D.2.3 - SPDS installation and implementation: The team found that the plant safety parameter display console had been installed and was fully operational.
5. Item II.B.4.2.A - Training on mitigation of core damage: The team found that the licensee had developed and implemented a training program on mitigating core damage.

## APPENDIX C WRITER'S GUIDE COMMENTS

This appendix contains writer's guide comments and observations. Unless specifically stated, these comments were not regulatory requirements. However, the licensee acknowledged the factual content of each of these comments as stated. The licensee agreed to evaluate each comment, to take the appropriate action, and to document that action. These items will be reviewed during a future NRC inspection.

### I. Writer's Guide Comments on Current Revision

1. The writer's guide contained the following inadequacies which may affect consistency within and between procedures and the maintenance of that consistency over time and through personnel changes. These inadequacies may also affect the efficient performance of the procedures by the operator.
  - a. Section 2.4 specified no formal method for placekeeping other than check offs for high level steps in the AER column. Additional placekeeping methods reduce the probability of errors of omission by operators especially under stressful conditions involving procedure transitions and branchings.
  - b. Section 3.1.3 specifies only one main action per procedure step but was nonrestrictive by allowing some compound sentences or clauses. However, sections 3.1.3 and 3.2.2 did provide detailed guidance on the use of compound sentences/clauses and the use of the conjunction "and".
  - c. Section 3.3.4 and 3.3.6 included guidance for writing of nonsequential or recurrent steps (i.e., continuous type actions) but specified that recurrent procedure steps did not require placekeeping aids. Such aids reduce the probability of errors of omission by operators under stressful conditions.
  - d. Section 3.6 provided criteria that was nonspecific and nonrestrictive for inclusion of steps or portions of procedures in a procedure to minimize referencing or branching.
  - e. Section 3.7.3 specified referring to equipment names by using exact control board nomenclature in initial caps but also specified that generic reference can be made to control room gauges or equipment without using exact nomenclature.
  - f. Section 3.8.6 specified providing tolerances "where appropriate" and ranges "if it is important to maintain a parameter within a given band" but provided no guidance or criteria for "appropriate" or "important".

- g. Section 3.9 did not clearly define how to present location information for equipment, controls and displays, and required identifying only that actions are outside the control room unless a very infrequently used component is involved.
  - h. Appendix 3, Dictionary of Acronyms and Abbreviations, contained approved acronyms that were very similar and easily confused, especially phonetically (e.g. NV, ND, NC, VP, CP, VC, VD, VT, VE, VG, VJ, VM, VN,).
  - i. Appendix 4, Constrained Language List and Index, assigned very similar meanings to the words "check" and "verify".
2. The following EOP was evaluated for deviations from the writer's guide. Items of deviations from the writer's guide in this EOP are provided in this section.
- a. EOP-15.1 Response to high pressure containment
    1. Step 3 caution: This caution contained two conditional action statements and thus did not meet writer's guide specifications for caution statements.
    2. Step 8d note: This note referred to a condition that may result in component damage given an interlock failure and thus meets writer's guide specifications to be written as a caution rather than a note.
    3. Step 10 caution: This caution contained an action statement and did not contain a statement of consequence and thus did not meet writer's guide specifications for caution statements.

## II. Resolution of SER Comments on the Writer's Guide

1. SER Section 2 paragraph 5b referred to the writing of active recurrent steps. The licensee responded in part that these steps usually are placed on the foldout page. Definitive criteria for when to include a recurrent step on the foldout page was not provided in the writer's guide.
2. SER section 2 paragraph 6c referred to duplicated step numbers in writer's guide Appendix 1 example procedure sections (i.e. procedure sections C and D begin with step 1). The probability that this may cause an operator to go to the wrong step when branching or referencing from another procedure has not been evaluated by the licensee.

## APPENDIX D

AER	Action/Expected Response
ADP	Abnormal Operating Procedure
AP	Abnormal Procedure
ARG	Abnormal Response Guidelines
CF	Main Feed
EOP	Emergency Operating Procedure
EPG	Emergency Procedure Guidelines
ETQS	Employee Training Qualification and Standard
IAE	Instrumentation and Electrical
NLO	Non-licensed Operator
OAC	Operator Assist Console
OMP	Operations Management Procedure
PGP	Procedure Generation Package
PRA	Probabilistic Risk Assessment
PSTG	Plant Specific Technical Guidelines
RNO	Response Not Obtained
SER	Safety Evaluation Report
SIMS	Safety Information Management System
WOG	Westinghouse Owners Group