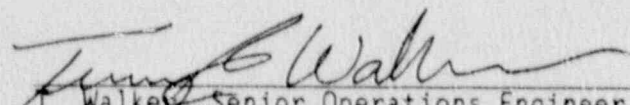


U.S. NUCLEAR REGULATORY COMMISSION
REGION I

HOPE CREEK GENERATING STATION
EMERGENCY OPERATING PROCEDURE INSPECTION

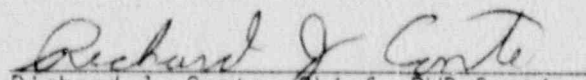
REPORT NO. 90-18
FACILITY DOCKET NO. 50-354
FACILITY LICENSE NO. NPF-57
LICENSEE: Public Service Electric and Gas Company
P. O. Box 236
Hancock Bridge, New Jersey 08038
FACILITY: Hope Creek Generating Station
INSPECTION AT: Hancock Bridge, New Jersey
INSPECTION DATES: October 1 - 4, 1990
INSPECTORS: C. Sisco, Operations Engineer
C. Shiraki, Hope Creek Project Manager, NRR
A. Sutthoff, Human Factor Specialist, SAIC

LEAD INSPECTOR:


T. Walker, Senior Operations Engineer

11/27/90
Date

APPROVED BY:


Richard J. Conte, Chief, BWR Section
Operations Branch, DRS

11/29/90
Date

SUMMARY: See next page.

HOPE CREEK INSPECTION REPORT NO. 50-354/90-18

EXECUTIVE SUMMARY

This was a special announced inspection of the Hope Creek Generating Station Emergency Operating Procedures (EOPs). The objectives of the inspection were to: (1) address the open items associated with the Emergency Operating Procedures (EOPs) identified in Inspection Report No. 50-354/88-200; (2) perform a human factors review of the current revision of the EOPs; and (3) review a sample of the current revision of the EOPs for technical adequacy and usability.

In general, the Hope Creek EOPs and Plant Specific Technical Guidelines (PSTG) were found to be technically adequate. The unresolved item associated with unjustified deviations in the EOPs from the Boiling Water Reactor Owners Group (BWROG) Emergency Procedure Guidelines (EPGs) and the PSTG (354/88-200-01) has been effectively resolved. However, the Hope Creek EOPs do not require entry into "RPV Control" for reactor water level below the scram setpoint as specified in the BWROG EPGs. The justification for the deviation from the BWROG EPGs for entry into "RPV Control" did not appear to be technical adequate. The technical adequacy of the deviation is considered an unresolved item (354/90-18-01) (Section 3). With the exception of the reactor water level entry condition to "RPV Control," the Hope Creek EOPs and PSTG accurately incorporate the BWROG EPGs.

The licensee's administrative controls for ensuring the integrity of the EOP calculations appear to be adequate. The discrepancies in the EOP calculations identified during the previous EOP inspection (unresolved item 354/88-200-03) have been corrected (Section 4). No discrepancies or errors were identified in the Revision 4 EOP calculations that were reviewed which indicates that the licensee's corrective actions have been effective in ensuring the integrity of the calculations.

Based on the sample of procedures that were reviewed and walked down, the inspectors concluded that the EOPs could be implemented successfully in the plant. No significant discrepancies were identified that would prevent the successful performance of the required actions (Section 5).

The previous EOP inspection identified a concern that there was a potential for overpressurization of the reactor building during venting of the primary containment. The inspectors concluded that overpressurization of the reactor building while venting the primary containment in accordance with facility procedures is not a concern. The open item associated with this concern (354/88-200-04) is considered closed (Section 6).

Operator performance during an observed training session was commendable, especially in the areas of teamwork and communications. The inspectors concluded that the licensed operators were able to use the EOPs. The training provided to the operators appeared to be effective (Section 7).

In general, the Hope Creek EOPs meet the established criteria for EOP development from a human factors perspective. The inspectors had several findings related to the usability of the EOPs from a human factors perspective that have a direct relationship to potential error. These findings are related to: (1) the format and structure of transitions within and between procedures, passive steps, and decision steps; and (2) the use of the qualifier "except." Because the incidence of these items was low and the general integrity of the Hope Creek EOPs is high, these items did not have a significant effect on the usability of the EOPs (Section 8).

The previous EOP inspection identified concerns that the licensee's Verification and Validation (V&V) program was not comprehensive and effective (open item 354/88-200-03). The licensee is in the process of developing an administrative procedure to control development and maintenance of the EOPs that includes a revised V&V program. The proposed procedures, when fully implemented, should be effective in correcting the deficiencies identified in the program and should provide an effective process for ongoing evaluation of the EOPs. Quality Assurance involvement in development and review of the EOPs appears to be adequate (Sections 9 and 10).

During the previous EOP inspection in 1988, the inspectors identified a lack of attention to detail in many areas that detracted from the quality of the procedures. Obvious improvements have been made in the licensee's programs to correct these problems. The inspection concluded that the implementation of the current revision of the EOPs was performed in a thorough manner. The programs in place and planned to control the development and maintenance of the EOPs appear to be effective in maintaining procedures of high quality.

DETAILS

1.0 Background

In September 1988, an NRC inspection team evaluated the Hope Creek Generating Station Emergency Operating Procedures (EOPs) as part of the NRC effort to evaluate the EOPs at licensee facilities. The team used the guidelines of Temporary Instruction (TI) 2515/92, "Emergency Operating Procedures Team Inspections," to verify that the EOPs were technically accurate; that the specified actions could be physically carried out in the plant using existing equipment, instrumentation, and controls; and that the plant staff could correctly implement the procedures. The team concluded that the EOPs were technically accurate and able to be performed by the plant staff, but the lack of attention to detail in many areas detracted from the quality of the procedures. The results of the team inspection are documented in Inspection Report No. 50-354/88-200.

The NRC team identified two unresolved items and two open items associated with the Hope Creek EOPs. The licensee responded to these items in a letter dated January 13, 1989. The licensee's response also addressed several areas for program improvements identified during the inspection that they planned to address when implementing Revision 4 of the BWR Owners Group (BWROG) Emergency Procedure Guidelines (EPGs).

The licensee implemented Revision 4 of the BWROG EPGs in December 1989. Justification for the differences between the BWROG EPGs and the licensee's Plant Specific Technical Guidelines (PSTG) are documented in the EOP Conversion Document. The Conversion Document also includes documentation of differences between the PSTG and the Hope Creek EOPs. The licensee is in the process of developing an administrative procedure to control the development and maintenance of the EOPs. The procedure was in draft form at the time of this inspection.

The purpose of this inspection, conducted October 1 - 4, 1990, was to address the unresolved items and open items identified in the September 1988 EOP inspection and to review a sample of the Revision 4 EOPs for technical adequacy; ability to be implemented in the plant; and usability from a human factors perspective.

2.0 Persons Contacted

Public Service Electric and Gas

- *C. Johnson, General Manager - Hope Creek
- *W. O'Malley, Operating Engineer
- *P. Opsal, Senior Operations Technical Supervisor
- *F. W. Berg, EOP Coordinator
- *R. Brown, Principal Engineer, Licensing and Regulation
- *M. Cirelly, Senior Staff Engineer, Licensing and Regulation

2.0 Persons Contacted (Cont'd.):

Public Service Electric and Gas (Cont'd.):

- *G. F. Nayler, Senior Staff Engineer, E&PB Mechanical Engineering
- *M. J. Azzaro, Senior Staff Engineer, Station Quality Assurance
- *W. Gott, Principal Training Supervisor - Operations Training
- *C. Bauer, Operations Instructor
- *C. Buckley, Nuclear Safety Review Engineer
- R. Hawk, Safety Coordinator - Site Protection
- C. Banner, Emergency Preparedness Administrator
- C. Pearce, Engineer, Electrical - Computers
- J. Rosas, Senior Staff Engineer, I&C
- *Allen Ho, Engineering Sciences Technical Consultant - Nuclear
- *V. Chandra, Engineering Sciences Technical Consultant
- *S. Karimian, Engineering Sciences Technical Consultant - Electrical

The inspectors also held discussions with licensed operators and training instructors during the inspection.

Others

- *J. E. Galamback, Director T&TS, General Physics
- J. Joulilian, Manager T&TS, General Physics

Nuclear Regulatory Commission

- *R. Conte, Chief, BWR Section
- *T. Johnson, Senior Resident Inspector
- *K. Lathrop, Resident Inspector

*Denotes those present for the exit meeting on October, 4, 1990.

3.0 Technical Adequacy

Scope

The inspectors reviewed the current Hope Creek EOPs, the EOP Conversion Document, and the licensee's response dated January 13, 1989, to determine if the technical adequacy concerns identified in the EOP team inspection in 1988 had been corrected. The inspectors also reviewed the Hope Creek EOPs and the Conversion Document for selected procedures that were significantly revised between Revision 3 and Revision 4 of the BWROG EPGs to assure that the procedures are technically adequate and accurately incorporate the BWROG EPGs. Several areas of concern identified during previous licensed operator examinations and inspections were also addressed when evaluating the technical adequacy of the Hope Creek EOPs.

Findings

Closed (354/88-200-01): Unjustified deviations in the EOPs from the BWROG EPG and the PSTG. Based on review of the licensee's response to the EOP team inspection findings and review of the current Hope Creek EOPs, this unresolved item is closed. The licensee agreed with most of the NRC concerns and agreed to correct the concerns in future revisions of the EOPs. The licensee's response to the several items that they did not agree with was considered acceptable. The remaining technical adequacy concerns were either corrected in Revision 4 of the EOPs or were no longer applicable.

During the EOP team inspection in 1988, the inspectors noted that the EOP conversion document was incomplete and out of date. This concern has been corrected with the implementation of the Revision 4 EOPs. The inspectors found the current Conversion Document easy to use, up to date, and technically accurate with only minor exceptions. The only generic deficiency identified was a failure to justify the transfers to the Emergency Plan that are contained throughout the EOPs. Revision of the Conversion Document is addressed in the draft EOP maintenance document; therefore, there is no concern that the Conversion Document will not be maintained and updated.

Several cases were identified that appeared to be differences in logic between the PSTG and the EOPs. This type of difference is not appropriate in that the PSTG should clearly describe the logic of the EOPs. Deviations in logic should only occur between the BWROG EPGs and the PSTG. These deviations were not significant and did not adversely effect the technical adequacy of the EOPs. The licensee agreed to review the Conversion Document and consider this concern.

The inspectors questioned the adequacy of the method used to determine the appropriate areas to be monitored for entry into OP-EO.ZZ-103, "Secondary Containment Control." The inspectors were concerned that the licensee had not identified all the possible indications of a problem in the secondary containment, specifically indications of high area temperatures. For example, high area temperature in the RWCU pump room causes a RWCU isolation, but high temperature in the room is not considered an entry condition to OP-EO.ZZ-103. The system isolation would be indicative of high temperature in secondary containment. The licensee agreed to review the areas monitored for entry into OP-EO.ZZ-103 to assure that all appropriate areas are identified.

The BWROG EPGs require entry into "RPV Control" if reactor water level decreases below the low level scram setpoint. The Hope Creek PSTG specifies entry into "RPV Control" at -38 inches rather than at the scram setpoint of +12.5 inches. The justification for this deviation is not technically adequate and appears to conflict with the technical basis for the entry condition in Appendix B of the BWROG EPGs. Appendix B states that "although RPV water level at the low level scram setpoint does not

in and of itself constitute an emergency condition, correct and prompt operator action when this condition occurs may be required to prevent RPV water level from decreasing to the point at which core uncover is threatened." The licensee's justification for the deviation is based on the concept that water level below the scram setpoint does not represent an equipment malfunction or operator error in and of itself and states that prudent operator action is required if water level drops below -38 inches. The justification does not clearly indicate how the Hope Creek EOP actions are equivalent to the BWROG EPGs in requiring concurrent execution of the level, pressure, and power control guidance of "RPV Control." The licensee agreed to review their justification for the deviation from the BWROG EPGs for the RPV water level entry condition. They agreed to address the following items: (1) the disadvantages of entering "RPV Control" at the low level scram setpoint; and (2) how the guidelines of "RPV Control" are met by equivalent direction in other facility procedures. The technical adequacy of justification for the deviation from the BWROG EPGs for the reactor water level entry condition is considered an unresolved item (354/90-18-01).

Conclusion

In general, the Hope Creek EOPs and PSTG were found to be technically adequate. With the exception of the reactor water level entry condition to "RPV Control," the Hope Creek EOPs and PSTG accurately incorporate the BWROG EPGs. Previous concerns related to the technical adequacy and control of the Conversion Document have been effectively resolved.

4.0 EOP Calculations

Scope

The inspectors reviewed several of the calculations used to develop the Hope Creek EOPs and the licensee's response dated January 13, 1989, to address discrepancies identified during the EOP team inspection in 1988. The inspectors also reviewed the licensee's programmatic controls for ensuring the integrity the Appendix C calculations. Several calculations that were not reviewed during the inspection in 1988 were reviewed to determine the effectiveness of the licensee's corrective actions for control of EOP calculations.

Findings

Closed (354/88-200-03): EOP calculation discrepancies. Based on review of the licensee's response and the corrected calculations this unresolved item is closed. The licensee agreed with the team inspection finding that errors had been made in several EOP calculations. All calculations that were impacted were recalculated using the corrected values. In all cases the original calculations were conservative or there was negligible change in the results. General Electric (GE) performed a 100% review of the Hope Creek Appendix C calculations and did not identify any additional significant errors.

The licensee has made improvements in their administrative controls for ensuring the integrity of the EOP calculations. A computer program developed by GE is now available to perform the calculations. The Revision 4 calculations were performed using this computer program. An independent review of the input data was performed and the results of the calculations were compared with the Hope Creek Revision 3 results and the results from other plants. The Appendix C calculations are covered by an administrative procedure which includes controls equivalent to the GE review process. The inspectors identified a potential to omit a review of the output for reasonableness in the licensee's procedures. The licensee agreed to correct the deficiency by incorporating controls into the EOP maintenance document to ensure that the calculation results are reviewed for reasonableness and that the results are accurately incorporated into the PSTG. The EOP calculations have also been entered into the licensee's document control system.

The inspectors questioned the licensee's response to the use of 1108 psig for the calculation input value for P-SRV, RPV dome pressure corresponding to the lowest SRV setpoint. The licensee's response indicated that 1108 psig was the correct value because the first SRV actuation is at 1108 psig, which is before the "low-low set" logic is initiated. In actuality, the "low-low set" logic is initiated at 1047 psig, therefore, the "low-low set" SRVs open before 1108 psig. The licensee had recognized the error in their response and provided documentation from GE that justified the use of 1108 psig for P-SRV. GE had reviewed the Revision 3 calculations to determine the impact of using the "low-low set" value and concluded that the use of 1108 psig was conservative or would unduly restrict the range of the calculations. There was no indication that the Revision 4 calculations had been reviewed to determine the impact of using the higher value for P-SRV. The inspectors independently verified that there was no adverse impact on the Revision 4 calculations by using 1108 psig for the value of P-SRV. The lack of review of the impact on the Revision 4 calculations indicated a weakness in the licensee's administrative controls for ensuring the integrity of the EOP calculations. The licensee agreed to correct this weakness by including additional controls in the EOP maintenance document to ensure that all Appendix C calculations are reviewed when a change is made that could impact the calculations.

Conclusion

The licensee's administrative controls for ensuring the integrity of the EOP calculations appear to be adequate. The licensee agreed to correct the minor weaknesses that were identified in their administrative procedures. No discrepancies or errors were identified in the Revision 4 calculations that were reviewed which indicates that the licensee's corrective actions have been effective in ensuring the integrity of the calculations.

5.0 Walkdown of EOPs

Scope

In order to assure that the EOPs could be accomplished successfully in the plant, the inspectors walked down three flowchart EOPs and four 300 series EOPs in the plant. The inspectors verified that instrument and control designations in the EOPs were consistent with the installed equipment and that indicators, annunciators, and controls referenced by the EOPs were available to the operators. The team verified that controlled copies of the procedures were available to the operators and that activities outside of the Control Room could be physically accomplished during an emergency. The inspectors also reviewed several of the 300 series procedures to verify that discrepancies identified during the walkdowns performed during the team inspection in 1988 had been corrected.

Findings

During the walkdowns a few minor discrepancies were identified. For example, OP-EO.ZZ-304, "Boron Injection Using RWCU," referenced a key number that was not correct. The licensee had previously identified this discrepancy and had provided a cross-reference to ensure that the correct key could be obtained. The licensee promptly initiated procedure changes to correct the identified discrepancies.

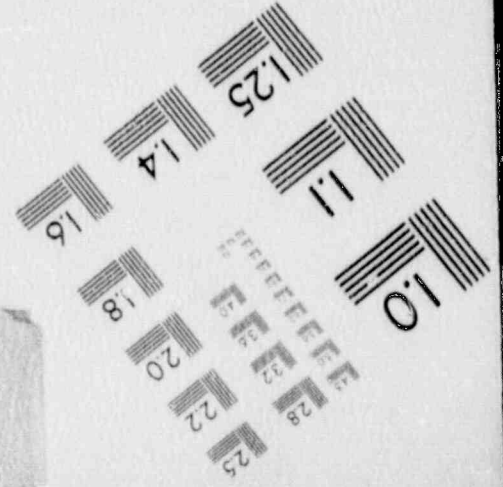
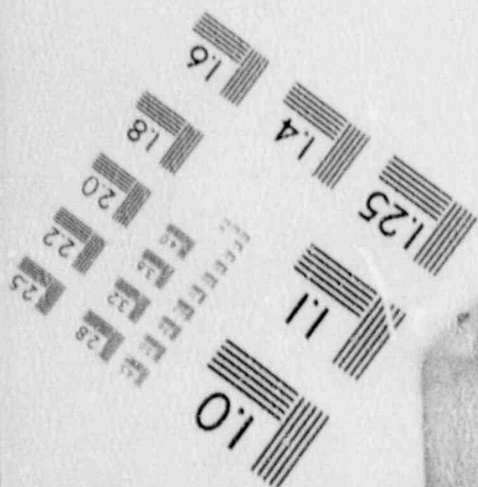
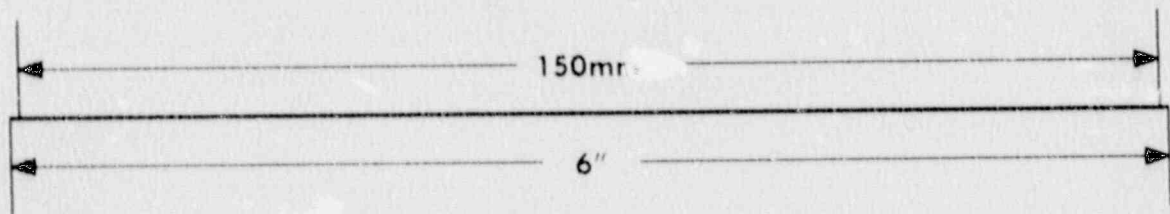
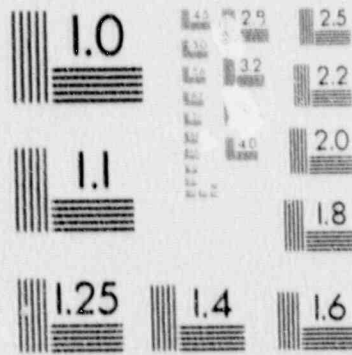
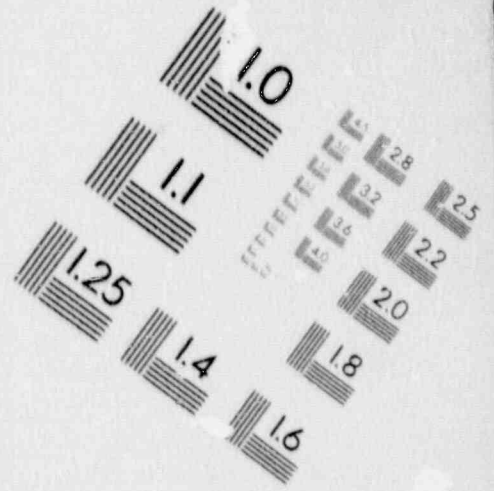
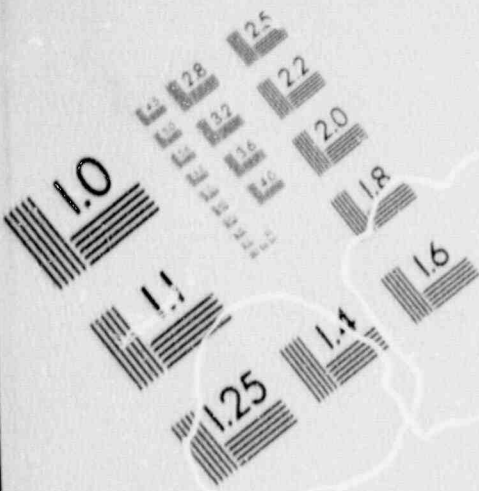
In most cases, the discrepancies identified during the team inspection in 1988 had been corrected, but the inspectors identified two items that had not been corrected effectively. OP-EO.ZZ-318, "Containment Venting," requires rotation of a spectacle flange that is located 15 to 20 feet above the floor with no direct access. Previously, the NRC had identified that the procedure did not indicate the tools that were required for rotation of the flange and that no dedicated ladder or scaffold was available to access the flange. The licensee had corrected the procedure to indicate that wrenches were required, but did not specify the size or type of wrenches required. A ladder had been staged in the vicinity of the flange, but subsequently the ladder storage location had been replaced by a scaffold staging area. The licensee took prompt action to correct these items.

Conclusion

Based on the sample of procedures reviewed, the inspectors concluded that the EOPs could be accomplished successfully in the plant. No significant discrepancies were identified that would prevent the successful performance of the required actions.

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IMAGE EVALUATION TEST TARGET (MT-3)



6.0 Containment Venting

Scope

During the team inspection in 1988, a concern was identified that there was a potential for overpressurization of the reactor building above the 132 foot elevation during venting of the primary containment in accordance with licensee procedures. In order to resolve this item, the inspectors reviewed the licensee's response to the team inspection report and associated calculations.

Findings

Closed (354/88-200-04): Potential overpressurization of the reactor building 132 ft. elevation. Based on NRC staff (Region I and NRR) review of the licensee response and associated calculation this open item is closed. The vent paths for the torus and the drywell is through the Filtration, Recirculation and Ventilation System (FRVS) exhaust. Common ductwork in the vent paths communicate with relief panels located on elevation 132' of the reactor building. If the relief panels were to perform their function, the volume of the secondary containment above the 132' elevation and the FRVS exhaust system would limit the reactor building internal pressure. If FRVS was not available, alternate flowpaths are available to vent and limit the pressurization of the reactor building above the 132' elevation.

Conclusion

The inspectors concluded that overpressurization of the reactor building above the 132' elevation while venting the primary containment in accordance with facility procedures is not a concern. The design of the secondary containment and associated systems is sufficient to limit pressurization of the reactor building.

7.0 EOP Training

Scope

The inspectors observed a licensed operator requalification training session on the plant specific simulator to assess the operators' ability to use the EOPs. The inspectors also interviewed several licensed operators and training personnel to address concerns related to operator training and performance identified during previous inspection and licensed operator examinations.

Findings

The performance of the operators during the observed training session was commendable, especially in the areas of teamwork and communications. No concerns related to operator performance or training were identified.

Discussion with licensed operators effectively resolved the inspectors concerns with the exception of the method used when deliberately lowering reactor water level in order to control reactor power. OP-EO.ZZ-207, "Level/Power Control," directs the user to lower RPV water level by terminating and preventing injection into the RPV. The operators are trained to reduce feedwater flow in a controlled manner so that the level decrease can be terminated when the required conditions are met. If all injection sources are terminated immediately, it is not possible to effectively regain control of water level due to the transient response of the plant. Further discussions with training personnel and exercises on the simulator indicated that the method used by the operators to lower water level does meet the intent of the EOPs.

Conclusion

The inspectors concluded that the licensed operators were able to use the EOPs. The training provided to the operators appeared to be effective.

8.0 Human Factors Review

Scope

The inspectors conducted a desktop review of the current Hope Creek EOPs and the Writer's Guide using the criteria established in Temporary Instruction 2525/72, Revision 1; Supplement 1 to NUREG-0737, "Requirements for Emergency Response Capability;" NUREG-0899, "Guidelines for the Development of Emergency Operating Procedures;" and NUREG-1358, "Lessons Learned from the Special Inspection Program for Emergency Operating Procedures." The inspectors reviewed several administrative procedures, including a draft procedure that when approved will be the governing procedure for development and maintenance of the EOPs. The inspectors also interviewed plant personnel involved in the various aspects of the EOP program to evaluate the EOPs from a human factors perspective. Information was also obtained from the walkdown of the flowcharts and support procedures and observation of licensed operator training discussed previously.

Findings

The Hope Creek EOPs include a number of different methods for directing the user to transition within or between procedures. These methods include the term "enter"; the term "continue in this procedure at"; the term "using"; an exit arrow symbol; and an execute concurrently symbol. The Writer's Guide does not define distinct meanings for these different formats. The inspectors noted that transitions in the Hope Creek EOPs are not structured clearly and consistently. For example, step ALC-11 of OP-EO.ZZ-201, "Alternate Level Control," is followed by an exit arrow symbol that directs the user to step ALC-18 of the same procedure. Above step ALC-18 is an arrow symbol indicating transfer from step ALC-11 and an execute concurrently symbol directing the user to execute OP-EO.ZZ-101 concurrently. This format does not clearly indicate that the user must

transition to OP-EO.ZZ-101 along with continuing in OP-EO.ZZ-201 at step ALC-18. Unclear or inconsistent transitions can lead to unnecessary delays and errors. The licensee agreed to review this area.

Further, in reference to the method used for transition to OP-EO.ZZ-202, "Emergency Depressurization," the inspector noted another problem. In most cases in the EOPs when emergency depressurization is required, the Hope Creek EOPs direct the user to enter OP-EO.ZZ-101, "RPV Control," at step RC-1, then step RC/P-2 of OP-EO.ZZ-101 directs the user to transition to OP-EO.ZZ-202. The licensee indicated that all transitions to OP-EO.ZZ-202 are directed through the pressure control leg (RC/P) of OP-EO.ZZ-101, unless OP-EO.ZZ-101 was entered previously in the leg of the procedure requiring emergency depressurization. This change was made as a result of the V&V process for the Revision 4 EOPs. The inspectors noted that the use of this method for transitioning to "Emergency Depressurization" is not always consistent with the BWRDG EPGs and could result in unnecessary delays while implementing the EOPs. For example, step ALC-13 of OP-EO.ZZ-201, "Alternate Level Control," directs entry into OP-EO.ZZ-101 if emergency depressurization is required, RPV water level cannot be determined, or a source of injection becomes available. This is not consistent with the BWRDG EPGs which direct transition directly to "Emergency Depressurization" for the specified conditions. If an injection source becomes available, the user must transition to OP-EO.ZZ-101, work through the level control leg (RC/L), reenter OP-EO.ZZ-201, work through OP-EO.ZZ-201 to step ALC-11, and reenter OP-EO.ZZ-101 before direction is given to enter OP-EO.ZZ-202. This unnecessary transitioning could result in delays or errors in restoring reactor water level. This issue had been previously identified by licensed operators and training personnel. The licensee agreed to review this area.

Throughout the Hope Creek EOPs, information concerning the need to enter contingency procedures is provided as a passive step contained within an action step symbol. The inspectors noted that the user could misconstrue the intent of these passive steps and directly enter the contingency procedure rather than transition from the correct location in the EOPs. For example, step RC/Q-6 of OP-EO.ZZ-101, "RPV Control," is a passive step indicating that level/power control is required; however, it is contained in an action step symbol. The user could interpret this step to require immediate entry into OP-EO.ZZ-207, "Level/Power Control." As a result, the user might exit the power control leg (RC/Q) of "RPV Control" prior to reading the step that indicates that the remainder of RC/Q should be executed concurrently with OP-EO.ZZ-207. Inconsistent application of step symbols reduces the effectiveness of the format and increases the potential for operator confusion and error. The licensee agreed to review this area.

Decision steps within the Hope Creek EOPs are structured using a decision symbol and as conditional logic steps within an action step symbol. For example, step PC/H-2 of OP-EO.ZZ-102, "Primary Containment Control," requires the user to decide if a primary containment isolation has

occurred and take action accordingly. This step is structured as an action step rather than as a decision step. Inconsistent presentation of decision steps makes the procedure more difficult to use and increases the possibility for error. The licensee agreed to correct the inconsistent structure of decision steps in the next revision of the EOPs.

The Hope Creek EOPs include steps that use the qualifying term "except." The inspectors noted that use of the term "except" could result in errors when implementing the EOPs. When an action step is followed by a clause beginning with the term "except," the position of the qualifier clause may cause it to be read after the action is begun, resulting in incorrect performance of the specified action. In addition, the complexity of the step is greatly increased by the use of such clauses. The licensee agreed to eliminate the use of this structure in the next revision of the EOPs.

The Hope Creek EOP Writer's Guide is incomplete or nonrestrictive in its guidance on several aspects of the EOPs. For example, section 6.7 of the Writer's Guide fails to define specific terminology for different types of references and branches, rather it gives several examples of acceptable terminology. Appendix B allows the use of different verbs for the same action, such as: commence and initiate; perform and execute; shutdown, terminate, and stop; and raise and increase. Sections 6.5.b.2, 6.5.e.1, and 6.6.b show different formats using the qualifier "while executing the following steps." The Writer's Guide also fails to define specific type style, size, line weight and spacing for use in the EOPs. Nonrestrictive or incomplete guidance will result in increasingly inconsistent and complex procedures over time. The licensee agreed to review the Writer's Guide prior to approval for completeness as part of the EOP maintenance document.

Conclusion

In general, the Hope Creek EOPs meet the established criteria for EOP development from a human factors perspective. Several of the inspectors' findings related to the usability of the EOPs from a human factors perspective were considered higher priority items because they have a direct relationship to potential error. The higher priority items include the findings related to the format and structure of transitions within and between procedures; passive steps; and decision steps and the use of the qualifier "except." The findings related to the content of the Writer's Guide were considered lower priority items. Licensee representatives were in general agreement on the need to resolve or address the observations noted in this section of the report. Because the incidence of items falling into the high priority category was low, and because of the general integrity of the Hope Creek EOPs, it was agreed that licensee action on these observations could wait for the next revision to the EOPs.

9.0 Verification and Validation Program

Scope

In order to evaluate the licensee's Verification and Validation (V&V) program for the EOPs, the inspectors reviewed the methods used for verification and validation of the Rev. 4 EOPs and the draft EOP maintenance document that is intended to define the V&V process to be used in the future. The inspectors also discussed the V&V process with licensee personnel that are responsible for the program. The licensee's response to the team inspection findings was reviewed to determine the adequacy of their corrective actions related to the V&V program.

Findings

Open (354/88-200-02): Failure to perform V&V on EOP revisions. The team inspection conducted in 1988 identified several concerns related to the licensee's V&V program. Specifically, the V&V process was not applied to the EOP support (300 series) procedures or to revisions to the EOPs. The licensee acknowledged the failure to perform V&V on the 300 series EOPs and on procedure revisions and committed to perform a full V&V on the Rev. 4 EOPs. They also indicated that the Procedures Generation Package (PGP) would be revised to specifically describe the process for V&V of procedure revisions.

V&V of the Rev. 4 flowchart EOPs was performed by GE using procedures that were developed by GE and reviewed by the licensee. General Physics (GP) used the GE procedures as guidance and incorporated lessons learned during the GE V&V process for performing the V&V of the 300 series EOPs. These processes appear to have been effective based on the minimal number of discrepancies identified during the technical adequacy and human factors reviews.

The licensee plans to incorporate the procedures for V&V into the EOP maintenance document. Review of the draft maintenance document indicated that the proposed controls would not be adequate to correct the previously identified deficiencies in the V&V program. The inspectors were also concerned that the procedures did not specifically identify requirements for the participants in the V&V process. The licensee agreed to consider these concerns when implementing the EOP maintenance program. This issue is considered unresolved pending review of the approved EOP maintenance document (354/88-200-02).

Conclusion

The V&V that was performed for the Rev. 4 EOPs appears to have been effective. The proposed procedures should be effective in correcting the deficiencies identified in the program assuming the inspectors concerns related to the 300 series EOPs and EOP revisions are resolved.

10.0 Ongoing Evaluation of EOPs and QA Involvement

Scope

The inspectors reviewed the draft EOP maintenance document and other administrative procedures to assess the licensee's program for ongoing evaluation of the EOPs. The inspectors also interviewed licensee personnel to determine the extent of Quality Assurance (QA) involvement in the development and maintenance of the EOPs.

Findings

The draft EOP maintenance procedure contains a form that is designed to be used for plant personnel to provide feedback on the EOPs. These forms are reviewed by the EOP coordinator to determine the appropriate disposition. The forms are tracked to ensure that the required actions are completed and a response is provided to the originator. This process when fully implemented should resolve the concerns identified during the team inspection in 1988 related to the effectiveness of the process for ongoing evaluation of the EOPs.

During the team inspection in 1988, the inspectors were concerned that the PSTG and associated appendices, calculations and conversion documentation were not controlled under the licensee's QA program. The PSTG for Rev. 4 was reviewed by the Engineering Department and approved by the Operations Manager. All Rev. 4 procedures were reviewed and approved in accordance with SA-AP.ZZ-032, "Review and Approval of Station Procedures and Procedure Revisions," which included 10 CFR 50.59 evaluations and SORC review. Preparation, review, and approval of the PSTG and associated documents will be covered by the EOP maintenance document. The EOPs, including the 300 series procedures, will be controlled by the maintenance document as well as being subject to the controls of SA-AP.ZZ-032. The EOP maintenance document and SA-AP.ZZ-032 should provide adequate quality assurance controls for the EOPs, PSTG, and associated documents.

In 1988, the inspectors were also concerned that the EOP development process was not subject to routine QA audit. QA will be involved in the V&V process defined by the draft EOP maintenance document and routine QA audits are performed on the 300 series EOPs. Due to the nature of the flowchart EOPs, there are no apparent benefits to be derived from performing QA audits on the flowchart EOPs.

Conclusion

The licensee's procedures, when fully implemented, should provide an effective process for ongoing evaluation of the EOPs. QA involvement in development and review of the EOPs appears to be adequate.

11.0 Licensee Action on Previous Inspection Findings

Closed (354/88-200-01): Unjustified deviations in the EOPs from the BWROG EPG and the PSTG. See Section 3.

Open (354/88-200-02): Failure to perform V&V on EOP revisions. See Section 9.

Closed (354/88-200-03): EOP calculation discrepancies. See Section 4.

Closed (354/88-200-04): Potential overpressurization of the reactor building 132 ft. elevation. See Section 6.

12.0 Exit Meeting

Management was informed of the purpose and scope of the inspection at the entrance interview on October 1, 1990. The findings of the inspection were periodically discussed with station management throughout the inspection period and were summarized at the exit meeting on October 4, 1990.

Attendees at the exit meeting are listed in Section 2.0 of this report.

Attachment: Documents Reviewed

ATTACHMENT 1Documents ReviewedFlowchart EOPs

- OP-EO.ZZ-099 - "Post-Scram Recovery," Rev. 4
- OP-EO.ZZ-100 - "Reactor Scram," Rev. 3
- OP-EO.ZZ-101 - "Reactor/Pressure Vessel (RPV) Control," Rev. 3
- * OP-EO.ZZ-102 - "Primary Containment Control," Rev. 3
- OP-EO.ZZ-103 - "Reactor Building Control," Rev. 2
- * OP-EO.ZZ-201 - "Alternate Level Control," Rev. 2
- OP-EO.ZZ-202 - "Emergency Depressurization," Rev. 3
- OP-EO.ZZ-207 - "Level/Power Control," Rev. 2
- * OP-EO.ZZ-208 - "Primary Containment Flooding," Rev. 0

Emergency Support and Related Procedures

- OP-EO.ZZ-302 - "De-Energization of Scram Solenoids," Rev. 2
- * OP-EO.ZZ-304 - "Boron Injection Using RWCU," Rev. 1
- OP-EO.ZZ-315 - "Suppression Chamber Make-up From Core Spray," Rev. 2
- * OP-EO.ZZ-318 - "Containment Venting," Rev. 1
- * OP-EO.ZZ-320 - "Defeating ARI and RPS Interlocks," Rev. 0
- * OP-EO.ZZ-321 - "Defeating RCIC Low Steam Supply Isolation Interlocks,"
Rev. 0

Administrative Controls

- OP-AP.ZZ- - Draft EOP Maintenance Procedure
- OP-AP.ZZ-002 - "Conduct of Operations," Rev. 8
- OP-AP.ZZ-044 - "Station Aids and Labeling Practices," Rev. 1
- OP-AP.ZZ-102 - "Use of Operations Department Procedures," Rev. 1
- DE-AP.ZZ-002 - "Design Calculations and Analyses"

Calculations

- Primary Containment Pressure Limit
- Maximum Primary Containment Water Level Limit
- Cold Shutdown Boron Weight
- Maximum Core Uncovery Time Limit
- Maximum Run Temperature
- Minimum Indicated Level

Other

- Hope Creek Generating Station Emergency Operating Procedure Conversion Document, Rev. 1

*Denotes those procedures walked down.