

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT UNITS 1, 2, AND 3

TECHNICAL EVALUATION REPORT

PGP REVIEW

OPERATING REACTORS

JUNE 1986

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BROWNS FERRY NUCLEAR PLANT UNITS 1, 2, AND 3

1. INTRODUCTION

Following the Three Mile Island (TMI) accident, the Office of Nuclear Reactor Regulation developed the "TMI Action Plan" (NUREG-0660 and NUREG-0737) which required licensees of operating reactors to reanalyze transients and accidents and to upgrade emergency operating procedures (EOPs) (Item I.C.1). The plan also required the NRC staff to develop a long-term plan that integrated and expanded efforts in the writing, reviewing, and monitoring of plant procedures (Item I.C.9). NUREG-0899, "Guidelines for the Preparation of Emergency Operating Procedures," represents the NRC staff's long-term program for upgrading EOPs, and describes the use of a "Procedures Generation Package" (PGP) to prepare EOPs. Submittal of the PGP was made a requirement by Generic Letter 82-33, "Supplement 1 to NUREG-0737 - Requirements for Emergency Response Capability." The generic letter requires each licensee to submit to the NRC a PGP which includes:

- (i) Plant-specific technical guidelines
- (ii) A writer's guide
- (iii) A description of the program to be used for the validation of EOPs
- (iv) A description of the training program for the upgraded EOPs.

This report describes the review of the Tennessee Valley Authority (TVA) response to the generic letter related to development and implementation of EOPs (Section 7 of Generic Letter 82-33) for the Browns Ferry Nuclear Plant Units 1, 2, and 3 (BFN).

Our review was conducted to determine the adequacy of the TVA program for preparing and implementing upgraded EOPs for BFN. This review was based on NUREG-0899 (formerly NUREG-75/087), Subsection 13.5.2, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants. Section 2 of this report briefly discusses the TVA submittal, the NRC staff review, and the acceptability of the submittal. Section 3 contains the conclusions of this review.

As indicated in the following sections, our review determined that the procedure generation program for BFN has several items that must be satisfactorily addressed before the PGP is acceptable. TVA should address these items in a revision to the PGP, or provide justification for why such revisions are not necessary. Our review of the TVA response to these items will be included in a subsequent safety evaluation report (SER). The revision of the PGP, and subsequently of the Emergency Operating Instructions (EOIs), as EOPS are entitled at BFN, should not impact the schedule for the use of the EOIs. The revision should be made in accordance with the BFN administrative procedures and 10 CFR 50.59.

2. EVALUATION AND FINDINGS

In a letter dated June 22, 1984, from L. M. Mills (TVA) to H. R. Denton (NRC), TVA submitted its PGP for BFN. The PGP contained an introduction and the following sections:

- . Plant Specific Technical Guidelines
- . Writer's Guide for Emergency Operating Instructions
- . Validation/Verification Program for Emergency Operating Instructions
- . Training Outline for Emergency Operating Instructions

The NRC staff review of the BFN PGP is documented in the following subsections.

A. Plant-Specific Technical Guidelines (P-STG)

The P-STG program description was reviewed to determine if it described acceptable methods for accomplishing the objectives stated in NUREG-0899. The P-STG consists of two emergency procedure guidelines (EPGs) based on the BWR Owner's Group EPGs, Revision 3, namely, RPV Control and Primary Containment Control. Within these two guidelines plant specific aspects are noted along with changes to the generic cautions. Our review of the BFN P-STG identified the following concerns:

1. The process to translate the generic BWR Owner's Group EPGs into the P-STG needs to be described. This description needs to contain the types of people performing the translation, the methodology used, and a serial order of activities.
2. Deviations from and additions to the generic technical guidelines that are of safety significance should be identified in the PGP. In addition, analyses or other technical justification supporting these deviations and additions should be provided. Typical examples of these are as follows:

The second sentence of the first paragraph on page I-1 reads "... requires MSIV isolation has occurred,". The BWROG Rev. 3 has this same sentence but continues with "or whenever a condition which requires reactor scram exists and reactor

power is above the APRM downscale trip or cannot be determined." Not including the portion contained in the BWROG Rev. 3 is a significant deviation which requires justification for its elimination along with an assessment of its safety significance.

Justification for deletion of Cautions should be provided (e.g., #19,#20,#25,#26, etc.).

Justification is needed for the elimination of the BWROG's fifth entry condition for the RPV control guideline (page RC-1).

In some locations changes/deletions from the BWROG's Rev. 3 are identified with a vertical line on the right-hand side of the page, while at other locations no such indication is given (e.g., page RC-6, RC-7, etc.).

3. A meeting was held between the staff and the Boiling Water Reactor Owners Group Emergency Procedure Guidelines and Control Room Design Review (CRDR) Committees on May 4, 1984, to discuss the task analysis requirements of Supplement 1 to NUREG-0737 (Generic Letter 82-33). The summary of the meeting is contained in a NRC memorandum from S. H. Weiss to Voss A. Moore dated May 14, 1984. At the meeting the owners group EPG committee made a presentation on the background of the EPG program, as it relates to the issue of the technical bases and scope of the EPGs. The owners group CRDR committee provided a discussion of the CRDR program as it related to task analysis. Based on the presentations, the staff commented that it appears that Revision 3 of the EPG provides a functional analysis that identifies, on a high level, generic information and control needs. As a result of the above meeting, the staff has made the following additional comments that should be acted upon by TVA and submitted as part of the BFN PGP.
 - a. TVA should explicitly identify the plant-specific information and control needs which are necessary for preparing emergency operating procedures and determining the adequacy of existing instrumentation and controls.
 - b. Because detailed plant-specific information and control needs cannot be extracted directly from the EPGs, plant-specific analysis is required and should be provided.
 - c. TVA should describe the process used to identify plant-specific parameters and other plant-specific information and control capability needs and should describe how the characteristics of needed instruments and controls will be determined. These processes may be described in either the PGP or in the detailed CRDR Program Plan with appropriate cross-referencing.

- d. For each instrument and control used to implement the EOIs, there should be an auditable record that defines the necessary characteristics of the instrument or control and the bases for that determination. The necessary characteristics should be derived from analysis of the information and control needs identified in the background documentation of Revision 3 of the generic EPGs and from analysis of plant-specific information.
4. The following items in the BFN P-STG should be revised such that they are plant specific:
- a. Statements such as "... or BWR/6 as appropriate." as given at the end of the first paragraph on page I-2 are not appropriate for the BFN P-STG.
 - b. Table I, page I-4 provides a listing of acceptable abbreviations, some of which are not applicable to the BFN. This table should contain only those abbreviations which apply to the BFN.
 - c. The list of cautions on page I-5 through I-10 need to be made plant specific. That is, the plant specific information is required to make these cautions apply to the BFN.
 - d. The RPV Control Guideline and the Primary Containment Control Guideline require BFN specific values to make them plant specific.

With adequate resolution of the above items, the BFN plant-specific technical guidelines program should accomplish the objectives stated in NUREG-0899 and should provide adequate guidance for translating BWR Owner's Group EPGs, Revision 3, into BFN EOIs. The NRC staff will confirm that TVA adequately addresses these items and will report its review in a subsequent SER.

B. Writer's Guide

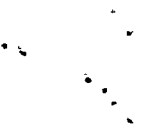
The writer's guide was reviewed to determine if it described acceptable methods for accomplishing the objectives stated in NUREG-0899. The BFN writer's guide is intended to provide administrative and technical guidance on the preparation and maintenance of all EOIs. Our review of the BFN writer's guide identified the following concerns:

1. Page identification is discussed in Section II.B. The writer's guide should also state that each page should contain procedure title, revision number, and Unit number.

2. The content and format of simple action steps are described in Section III.A.2. Instructions should be written for various types of action steps that an operator may take to cope with different plant situations. The writer's guide should therefore address the format of the following types of action steps.
 - a. Steps that are used to verify whether the objective of a task or sequence of actions has been achieved.
 - b. Steps for which a number of alternative actions are equally acceptable.
 - c. Steps of a continuous or periodic nature.
 - d. Steps performed concurrently with other steps.

See NUREG-0899, Section 5.7, for additional guidance.

3. Vocabulary is discussed in Section IV.B. To ensure that the vocabulary used in the EOIs are understandable, are usable by the operators, and are used consistently, a list of words to use, their definition, and words to avoid should be included in the writer's guide.
4. Abbreviations, acronyms and symbols are discussed in Section IV.C. To ensure that the abbreviations, acronyms and symbols are used consistently and are recognizable by the operators, a list of acceptable abbreviations, acronyms and symbols should be included in the writer's guide. (For the abbreviations, the writer could be referred to the list provided in the P-STG.)
5. Section IV.D.5 of the writer's guide should not only ensure that punctuation remains consistent throughout a procedure, but that punctuation is consistent between procedures.
6. Numerical values are discussed in Section IV.E. This discussion should also include how decimals and significant figures are to be handled.
7. The need for consistency between numerals and units of measure and those used on instrumentation and panels is discussed in Section IV.E. This need for consistency is also true for terminology and nomenclature. A requirement for consistency between terminology and nomenclature on the instrumentation, controls and panels and the EOIs should be included in the writer's guide.
8. Section IV.E.5 should direct the writer to use tables or graphs in lieu of calculations whenever possible.



9. Conditional and logic statements are very important and widely used in EOIs. Procedure writers understand the meaning of logic terms, and how they are used and combined to make logic statements. Section IV.F of the writer's guide should be expanded to include definitions of logic terms, examples of acceptable combinations and examples of combinations to avoid. See NUREG-0899, Appendix B, for additional guidance.
10. A good point is made that concurrent steps should not go beyond the capability of the control room staff in Section IV.B. The writer's guide should make a similar point with respect to concurrent procedures.
11. The referencing of another procedure or section of a procedure is discussed in Section V.C. This section should also contain a specific guideline on the content and format of the reference phrase. Further, the method of identifying sections or subsections (e.g., tabs) should be described.
12. The use of initials in the EOIs should be avoided (e.g., Section VI.A.1) as it could cause confusion.
13. Because they will be used in stressful conditions and under time constraints, EOIs must be easily accessible to operators and should be easily identifiable. The writer's guide should address availability and accessibility of the EOIs and the techniques used to distinguish them from other plant procedures.
14. TVA should explicitly state in the PGP that the writer's guide will be precisely followed by the EOI writers and used in developing and revising the EOIs.

With adequate resolution of the above items, the BFN writer's guide should accomplish the objectives stated in NUREG-0899 and should provide adequate guidance for translating the technical guidelines into EOIs that will be usable, accurate, complete, readable, convenient to use and acceptable to control room operators. The NRC staff will confirm that TVA adequately addresses these items and will report its review in a subsequent SER.

C. Verification and Validation Program

The description of the verification and validation program was reviewed to determine if it described acceptable methods for accomplishing the objectives stated in NUREG-0899. The verification/validation program is intended to ensure the adequacy of the new symptom-based EOIs from both a technical and human engineering standpoint. BFN will use a series of desk top reviews, simulator exercises and control room walk-throughs, prior to implementation, to achieve the following objectives:

- . That EOIs are technically correct.
- . That EOIs are written correctly.



- . That EOIs are usable.
- . That there is continuity between the procedures and the control room/plant hardware.
- . That the language and level of information presented in the EOIs are compatible with the minimum number, qualification, training, and experience of the operating staff.
- . That there is a high level of assurance that the procedures will work.

Our review of the BFN verification and validation program identified the following concerns:

1. The verification and validation program should be revised to discuss the process that will be used to ensure the adequacy of the EOI, based on Revision 3 of the EPGs. As written, it describes the process that was used on Revisions 1 and 2.
2. To assure verification and validation of all of the EOIs, the program description should include an indication that the full complement of EOIs will be exercised.
3. The validation program should be expanded to include a description of the criteria that will be used to select the scenarios to be run during the validation process. The criteria should be developed on the basis of what is needed to validate the procedures and should ensure that single and multiple failures including sequential and concurrent failures are included. A review of the capabilities and the limitations of the simulator will then identify what can be validated on the simulator. For the parts of the EOIs that cannot be validated on the simulator, the criteria for selecting any additional validation that may be needed and the methods to be used, such as a control room walk-through or a mock-up walk-through, should be described.
4. The verification and validation program does not indicate the methods by which differences between Units 1, 2, and 3 will be handled. The PGP should specify how unit differences will be addressed in the validation and verification process.
5. The EOIs will require a certain number of operators to carry out the various activities and steps as specified. The verification and validation program should indicate that the EOIs will be exercised, during simulator exercises or control room walk-throughs, with the minimum control room staff size required by the facility Technical Specifications.

6. The verification and validation program must determine if the instruments and controls that were identified during the task analysis are the ones that are referred to in the EOIs and are available in the control room. A discussion of this should be included in the PGP. (This task may be done in conjunction with the Control Room Design Review.)
7. The verification and validation program should include the criteria or methods that will be used for determining the need to reverify and revalidate any changes in the EOIs, resultant from either the verification and validation program or from subsequent EOI revisions.
8. The PGP should describe the specific items (i.e., provide detailed checklists) that are to be verified and validated. This should include appropriate items from both the P-STG and the writer's guide.
9. Particular attention should be paid to deviations from and additions to the generic technical guidelines that are of safety significance during the verification and validation program. These verification and validation steps can be accomplished separately and then as a part of the verification and validation program. The PGP should discuss how the deviations from and additions to the EPGs are to be verified and validated.

With adequate resolution of the above items, the BFN verification and validation program should accomplish the objectives stated in NUREG-0899 and should provide assurance that the EOIs adequately incorporate the guidance of the writer's guide and the technical guidelines and will guide the operator in mitigating emergency conditions. The NRC staff will confirm that TVA adequately addresses these items and will report its review in a subsequent SER.

D. Training Program

The description of the operators' training program on the BFN EOIs was reviewed to determine if it described acceptable methods for accomplishing the objectives stated in NUREG-0899. The training program outline describes the training as consisting of classroom instruction, simulator scenarios, and control room walk-throughs completed prior to implementation of the procedure in the control room. Training following implementation, and after revisions, is also described. Our review of the BFN training program outline for EOIs identified the following concerns:

1. The training program description should contain the objectives to be achieved by the training of operators to use the EOIs.
2. Although the PGP states that the Browns Ferry Simulator will be used for operator training, the training program description should be expanded to address the following items:

- a. Discuss the method to be used to train the operators in areas where the simulator does not react like the plant and in parts of the EOIs that cannot be run on the simulator.
 - b. Indicate the use of the simulator as team training and for previously planned operator roles.
 - c. Indicate the use of a wide variety of scenarios, including multiple (simultaneous and sequential) failures, to fully exercise the EOIs on the simulator and thus expose the operators to a wide variety of EOI uses.
3. Although the PGP states that control room walk-throughs will be used for operator training, the training program description should be expanded to address the following items:
- a. Discuss the extent that the EOIs will be covered by all operators, particularly if the walk-throughs will be used to train aspects of EOIs not taught in the simulator.
 - b. Indicate the use of walk-throughs as team training and to train previously planned operator roles.
 - c. Indicate the use of a wide variety of scenarios to fully exercise the EOIs during the walk-throughs (e.g. multiple failures, simultaneous and sequential failures).
4. The training program should indicate how Unit 1, 2, and 3 differences will be taken into account in operator training.

With adequate resolution of the above items, the BFN training program should accomplish the objectives stated in NUREG-0899 and should result in appropriate training for the BFN operators on the new EOIs. The NRC staff will confirm that TVA adequately addresses these items and will report its review in a subsequent SER.

3. CONCLUSIONS

Based on our review, we conclude that, with the exceptions noted in Section 2 of this DSER, the PGP as submitted by Tennessee Valley Authority for the Browns Ferry Nuclear Plant Units 1, 2, and 3 adequately addresses the requirements stated in Generic Letter 82-33 (Supplement 1 to NUREG-0737) and provides acceptable methods for accomplishing the objectives stated in NUREG-0899 in accordance with the guidance provided in the Standard Review Plan (NUREG-0800). The PGP should be revised to address the items described in Section 2 and resubmitted along with at least one Emergency Operating Instruction. Future changes to the PGP should be reviewed and brought to the attention of the NRC as specified in accordance with 10 CFR 50.59.

This evaluation was performed with the assistance of Battelle Pacific Northwest Laboratories' personnel.