



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

DRAFT SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATIVE TO THE PROCEDURES GENERATION PACKAGE FOR
PILGRIM NUCLEAR POWER STATION, (PNPS)
DOCKET NO. 50-293

1.0 Introduction

Following the Three Mile Island (TMI) accident, the Office of Nuclear Reactor Regulation developed the "TMI Action Plan" (NUREG-0660 and NUREG-0737. Item I.C.1 of the plan required licensees of operating reactors to reanalyze transients and accidents and upgrade emergency operating procedures (EOPs). 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 Preparation of Emergency Operating Procedures," represents the 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 "Supplement 1 to NUREG-0737 - Requirements for Emergency Response Capability (Generic Letter 82-33)."

This draft safety evaluation (DSE) describes the staff's review of Boston Edison Company's (BECo/the licensee) response to Generic Letter 82-33. Our review was conducted to determine the adequacy of the licensee's program for preparing and implementing EOPs. Criteria for the review of a PGP are not currently in the Standard Review Plan (SRP). Therefore, this review was based on NUREG-0899, "Guidelines for the Preparation of Emergency Operating Procedures," the reference document for the EOP upgrade portion of Supplement 1 to NUREG-0737 (Generic Letter 82-33). Review criteria based on this guidance will be developed for the next SRP revision.

Section 2 of this evaluation briefly discusses the licensee's submittal, the staff review methods, and the acceptability of the submittal. Section 3 contains the conclusions of this review. As indicated, we have determined that the procedure generation program for PNPS is acceptable with the exception of the items identified in Section 2. The licensee should address these items in a revision to the PGP, or justify why such revisions are not necessary. Our review of the licensee's response to these items will be included in a subsequent safety evaluation.

2.0 Evaluation and Findings

The licensee's PGP contains the following sections:

Plant-Specific Emergency Procedure Guidelines (i.e., Plant-Specific Technical Guidelines)

Writer's Guide for EOPs

EOP Implementation Plan, which includes:

Procedures Systems and Materials and Technical Guideline Use (i.e., the program to develop the plant specific technical guidelines)

EOP Verification Program

EOP Validation Program

EOP Training Program

A discussion of these sections, with the Verification Program and Validation Program comments combined, follows:

A. Plant Specific Technical Guidelines

The plant-specific technical guideline (P-STG) program was reviewed to determine if it provided acceptable methods to meet the objectives of NUREG-0899. The licensee described a process that will take the General Electric Boiling Water Reactor Owners Group Emergency Procedure Guidelines (EPGs) for GE-BWR 1 through 6 designs and, with appropriate changes, develops EOPs for PNPS. The licensee identified the following plant-specific technical and source documents for use in generating PNPS's EOPs:

GE/BWR Owners Group EPGs, Revision 2, with Errata and Appendices

Plant Design Change Requests

Field Revision Notices

Vendor Technical Manual

FSAR and Amendments

Technical Specifications and Amendments

Preoperational and Start-up Test Results

Plant Procedures for Operations, Calibration and Maintenance

BECo-Nuclear Energy Department Reports

NUREG-0660, Section I.C.1, and clarified in Item I.C.1 of NUREG-0737.

The EOPs will be developed by following the EPGs in a step-by-step fashion and adding plant-specific information, details, and nomenclature as required. Except for the items listed below, the process described for converting the generic guidelines into EOPs appears adequate. These items should be addressed in the P-STG.

1. Deviations from and additions to the generic technical guidelines that are of safety significance must be identified in the PGP. In addition, analyses or other technical justification supporting these deviations and additions must be provided. (See NUREG-0899, Section 2.5.2.b).
2. When there are deviations from the generic technical guidelines in the P-STG, the operator actions should be validated/verified to confirm their technical adequacy. The method PNPS plans to use to conduct this validation/verification should be described in the PGP.
3. As part of the PGP process, the necessity for and the adequacy of control room instrumentation and controls must be determined. Determination of operator controls and instrumentation needs, as well as determination of whether the controls and instrumentation referred to in the EOPs are actually available is necessary. Evaluation of these needs may be done as part of the Control Room Design Review as indicated in NUREG-0700. The method should be described in the PGP, or it may be described in the Control Room Design Review program and appropriately referenced in the PGP.

With adequate resolution of the above item, the PNPS plant-specific technical guidelines program should provide adequate guidance for translating the PNPS EPGs into plant-specific guidelines, which can serve as the basis for PNPS EOPs. The staff will confirm that the licensee adequately addresses these items and will report its review in a subsequent safety evaluation.

B. Plant-Specific Writer's Guide

The plant-specific writer's guide (P-SWG) was reviewed to determine if it provided acceptable methods to meet the objectives of NUREG-0899. The licensee described a process that will use the P-STGs and the P-SWG to develop emergency procedures. The procedures will use a single column format. Logic sequence diagrams may also be used to facilitate operator actions. Our review of the plant-specific writer's guide identified the following concerns which should be addressed in the guide:

1. Information should be presented in procedures so that interruptions in its flow are minimal. To achieve this, each procedure should be written so that an action step, a warning (caution), or a note should be completed on the page where it began. This guidance should be included in the plant-specific writer's guide.

2. The examples of cautions on page 12 in the Appendix contain action steps. These examples should be changed to agree with the definition in Section IV.C of page 7.
3. For consistency and clarity:
 - a. The list of acceptable action verbs in Table 1, pages 13 - 14 should include "jog" (as in jog open and jog closed) and "synchronize," since both are discussed on page 9 as acceptable action verbs. Table 1 should be expanded to include other acceptable action verbs.
 - b. Abbreviations, acronyms, and symbols are discussed on pages 15 and 16. To ensure that they are recognizable by the operators a list of acceptable abbreviations, acronyms, and symbols should be included in the plant-specific writer's guide.
 - c. Guidance for section and step numbering on pages 3 and 4 is not consistent with the section and step numbering used in the example which is numbered "A.1" rather than "I.A." This discrepancy should be resolved.
 - d. The P-SWG should include guidance for units of measure for use in instructional steps, and they should be the same as the rules for the use of units of measure in tables and figures (page 10 of the P-SWG).
 - e. Guidance should be provided for locating figures, tables, flowcharts, and attachments within the EOPs. In addition, figures in the Appendix (pages 19 and 20) should be consistent with typing format instructions in Section VI.F of the P-SWG.
 - f. Section III, page 2, of the P-SWG specifies that a single column format be used; however, in the Appendix (pages 19 and 20), a double column format is used to provide graphic information. The reason for this difference should be clarified or the difference corrected.
 - g. The P-SWG specifies line spacing on page 17 in Section VI.C. The example in the Appendix should conform to this guidance.
4. Instructions should be written for various types of action steps that an operator may take to cope with different plant situations. Thus, the P-SWG should address the definition and formatting for use 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. (See NUREG-0899, Section 5.7.2).

- b. Steps of a continuous or periodic nature. (See NUREG-0899, Sections 5.7.3, 5.7.5, and 5.7.6).
 - c. Steps for which a number of alternative actions are equally acceptable. (See NUREG-0899, Section 5.7.4).
 - d. Steps performed concurrently with other steps. (See NUREG-0899, Section 5.7.7).
5. The extent of intended use of logic flow graphics in EOPs is not made clear in the P-SWG. The guide should clarify whether the same information is supposed to be presented using both logic flow graphics and textual material or whether some types of information are to be presented in the text while other information is to be provided in logic diagram form. On page 5, the P-SWG states that, "when multiple operator actions and responses are possible, logic sequence diagrams may be used to facilitate operator reaction to system conditions." It is not clear how this guidance was applied, for example, to establish why the action steps on Appendix page 7 should be in sentence form while the action steps on page 10 are in logic graphic form. Guidance needs to be provided in the plant-specific writer's guide on how to make these selections.
 6. The logic diagrams in the Appendix are confusing and hard to interpret. For example: On page 10, an action box states, "when conditions warrant return to this step." That step will probably not be read because the preceding step tells the operator to leave the logic graphic. In addition, it is not clear what "conditions warrant" means. The logic diagrams in the Appendix should be made clear.
 7. To minimize confusion, delay, and errors in execution of EOP steps, the following concerns should be addressed in the P-SWG: (1) EOPs should be structured so that they can be executed by the minimum shift staffing and minimum control room staffing as required by the Technical Specifications, (2) EOPs should be structured so that operator roles specified in the EOPs and in the training program are consistent with preestablished leadership roles and division of responsibilities, (3) action steps should be structured to minimize physical conflicts between personnel and to minimize the amount of movement needed for carrying out the steps, and (4) action steps should be structured to avoid unintentional duplication of tasks. (See NUREG-0899, Section 5.8).

With adequate resolution of the above items, the PNPS plant-specific writer's guide will provide adequate guidance for translating the plant-specific technical guidelines into EOPs that will be usable, accurate, complete, readable, convenient to use and acceptable to control room operators. The staff will confirm that the licensee adequately addresses these items and will report its review in a subsequent safety evaluation.

C. Validation and Verification Programs

The validation and verification programs were reviewed to determine if adequate methods are described for accomplishing the objectives of the NUREG-0899. The verification program described in the PGP has four objectives: 1) the EOPs are technically correct; 2) the EOPs are written correctly; 3) there is a correspondence between the EOPs and the control room/plant hardware; and 4) the EOPs are consistent with the minimum number, qualifications, training and experience of the operating staff. The three objectives of the licensee's validation program are to establish 1) the accuracy of the EOPs; 2) that the EOPs can be accurately and efficiently carried out; 3) that the EOPs are adequate to mitigate transients and accidents at the plant. Our review of the verification and validation programs identified the following concerns:

1. The Implementation Plan states on pages 28 and 32 that "EOP verification (validation) will follow, to the extent applicable to Pilgrim, the INPO guidelines." Since this is to be the plan for what will be done, the plan should be self sufficient and the methods that are to be used at PNPS must be included in the PGP. The plan should describe the verification and validation methodologies to be used.
2. The EOPs are to be exercised on the Dresden Simulator, which is a generic, non plant-specific simulator. PNPS must determine which EOPs, or parts of EOPs, can be validated on the simulator and describe in the program the validation method(s) for the parts of the EOPs that cannot be validated on the simulator.
3. The implementation plan should indicate those involved in the verification and validation processes and what the roles of the participants are to ensure that technical and human engineering adequacy of the EOPs is achieved. As a minimum, those involved should include plant operators, subject matter experts, and procedure writers.
4. The plan should provide criteria for the selection of scenarios that will be used to exercise EOPs. The scenarios should include simultaneous and sequential failures, so that the EOPs are validated on multiple failure events.
5. Section VI, EOP VALIDATION, states that any discrepancies discovered during the validation process will be corrected. The verification and validation program descriptions should be revised to include criteria or methods for determining the need to reverify and revalidate changes to the EOPs.
6. The validation program should address how the EOPs will be validated with the minimum control room staffing.

7. The validation and verification programs should determine if the information and controls needed by the operator to perform procedural actions, as determined by task analysis, are available in the control room. A discussion of how this will be accomplished should be included in the program description. (This task may be done in conjunction with the Control Room Design Review.)

Inclusion of the above items should result in verification and validation programs that meet the objectives and guidance of NUREG-0899 and should provide assurance that the EOPs adequately incorporate the guidance of the writer's guide and generic technical guidelines. The staff will confirm that the licensee adequately addresses these items and will report its review in the final SE.

D. Training Program

The licensee's description of its plan for training operators on the EOPs was reviewed against the objectives of NUREG-0899. The training program, as described in the PGP, consists of the following three parts: classroom instruction, control room walk-throughs, and simulator exercises. Our review of the PNPS training program for EOPs identified the following concerns:

1. All operators must be trained on all EOPs before the EOPs are implemented. This should be explicitly stated in the training program description.
2. The Implementation Plan states on pages 30 and 34 that the process of validation has been coordinated with simulator and plant walk-through training. If major changes are made in the EOPs as a result of the training feedback, the program should describe how PNPS will insure that needed retraining will be controlled and performed.
3. It is not clear from the training program description whether all operators will be trained on all EOPs at the simulator and whether all operators will be trained on all procedures during the control room walk-throughs. The training program should be revised to clarify the extent of operator training on EOPs at the simulator and in control room walk-through.
4. The training program description should be revised to include a wide variety of scenarios, incorporating multiple and sequential failures, to be used for training purposes.
5. The training program should be revised to describe the methods for evaluating operators following the training program and for appropriate followup training for any deficient areas.

Inclusion of the above items should result in a training program that meets the guidance of NUREG-0899 and should provide assurance that the operators

are adequately trained on the EOPs prior to implementation. The staff will confirm that the licensee adequately addresses these items and will report its review in a subsequent safety evaluation.

3.0 Conclusions

Based on our review, we conclude that, with the exceptions noted in Section 2.0, the Boston Edison Company's PGP for PNPS meets the requirements of Supplement 1 to NUREG-0737 and provides acceptable methods for accomplishing the objectives of NUREG-0899. The PGP should be revised to address the items described in Section 2.0 and resubmitted. Future changes to the PGP should be made in accordance with 10 CFR 50.59.

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

Principal Contributor: S. E. Bryan

Dated: February 19, 1985