DRAFT SAFETY EVALUATION REPORT

PROCEDURES GENERATION PACKAGE

DONALD C. COOK NUCLEAR PLANT

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 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)." 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 Indiana & Michigan Electric Company (I&MEC) response to the Generic Letter related to development and implementation of EOPs for the D. C. Cook Nuclear Plant (DCCNP) (Section 7 of Generic Letter 82-33).

Our review was conducted to determine the adequacy of the I&MEC's program for preparing and implementing upgraded EOPs. Criteria for the review of a PGP were not in the Standard Review Plan (SRP) when this review was begun. Therefore, this review was based on NUREG-0899, the reference document for the EOP upgrade portion of Supplement 1 to NUREG-0737 (Generic Letter 82-33). Review criteria based on the guidance of NUREG-0899 has now been included in the SRP. Section 2 of this report briefly discusses I&MEC's submittal, the staff review, and the acceptability of the submittal. Section 3 contains the conclusions of this review.

As indicated in the following section, our review determined that the procedure generation program for DCCNP has several items that should be satisfactorily addressed before the PGP is acceptable. I&MEC should address these items in a revision to the PGP, or provide justification for why such revisions are not necessary. Our review of I&MEC's response to these items will be included in a subsequent safety evaluation report. The revision of the PGP, and subsequently of the EOPs, should not impact the schedule for the use of the EOPs. The revision should be made in accordance with I&MEC administrative procedures and 10 CFR 50.59.

2. EVALUATION AND FINDINGS

In a letter dated September 28, 1984, from M. P. Alexich (I&MEC) to H. R. Denton (NRC), I&MEC submitted its PGP for DCCNP.

A discussion of each section of the PGP follows:

A. Plant Specific Technical Guidelines (P-STG)

The P-STG program description was reviewed to determine if it provided acceptable methods to meet the objectives of NUREG-0899. I&MEC described a process that will take the Westinghouse Owners Group (WOG) generic emergency response guidelines (ERGs), Revision 1, that were developed for a Westinghouse standard 4-loop plant design and, with appropriate changes, develop EOPs for DCCNP. The P-STG identified the following source documents for use in generating their EOPs:

° Westinghouse generic ERGs and background documents

° D. C. Cook Writers Guide for EOPs

° Technical Specifications

° Setpoints

° Engineering Flow Drawings

° System Descriptions

° Existing EOPs

° Calculated Mathematical Values used in EOPs

I&MEC provided in their PGP a comparison of the system design differences between the WOG generic plant and DCCNP. Our review of I&MEC's P-STG identified the following concerns:

1. Appendix A of the PGP provides a comparison of the DCCNP systems designs with those of a reference Westinghouse plant. However, I&MEC's description of the reference plant does not correspond to the description of the Westinghouse reference plant presented in Revision 1 of the Westinghouse emergency Response Guidelines (ERGs). Please provide a comparison of the DCCNP design with the reference plant presented in Revision 1 of the ERGs.

2. On page 11 of the P-STG, I&MEC states that the DCCNP design has been reviewed with respect to the reference plant analyses which were performed to support the development of the generic ERGs. I&MEC also states that for those cases where the analysis (for the reference plant) is not directly applicable to the DCCNP, a comparison of the system design and plant parameters demonstrates that the reference analyses are bounding for the DCCNP and that the conclusions are applicable to DCCNP. Please clarify how the analysis for the reference plant can be bounding for DCCNP if it is not directly applicable to DCCNP.

3. The footnotes to Appendix A of the PGP, pp. 28 and 29, identify where deviations from the generic guidelines are to be made as a result of design differences between DCCNP and the Westinghouse reference plant. In addition, provide a description of all other safety significant deviations from and additions to the generic guidelines, and provide analyses or other supporting technical justification for each deviation and addition.

4. All additions to and deviations from the generic guidelines should be verified/validated. This verification/validation step can be accomplished separately or as a part of the EOP verification/validation program. The PGP should discuss how the additions and deviations are to be verified/validated.

5. A meeting was held between the staff and the WOG Procedures Subcommittee on March 29, 1984, to discuss the task analysis requirements of Supplement 1 to NUREG-0737. The summary of the meeting is contained in a NRC memorandum from H. Brent Clayton to Dennis L. Ziemann dated April 5, 1984. At the meeting the owners group made a presentation on the background of the ERG development program as it relates to the issue of task analysis. The presentation included a description of the (1) ERG background documents, (2) development of Revision 1 to the ERG, (3) interactions with NRC requirements, Supplement 1 to NUREG-0737, and (4) an overview of how the WOG had responded to the requirements.

Based on the presentations, the staff commented that Revision 1 of the ERG and background documents provide an adequate basis for generically identifying information and control needs. As a result of the above meeting the staff made the following additional comments that should be acted upon by I&MEC and submitted as part of the PGP:

a. I&MEC should describe the process for using the generic guidelines and background documentation to identify the characteristics of needed instrumentation and controls. For the information of this type that is not available from the ERG and background documentation, I&MEC should describe the process to be used to generate this information (e.g., from transient and accident analyses) to derive instrumentation and control characteristics. I&MEC states that this process is being developed for the Detailed Control Room Design Review (DCRDR). The results of this process can be described in either the PGP or the DCRDR program plan with appropriate cross-referencing.

b. For potentially safety-significant plant-specific deviations from the ERG instrumentation and controls, I&MEC should provide in the PGP a list of the deviations and their justification. These should be submitted in the plant-specific technical guideline portion of the PGP, along with other technical deviations.

c. For each instrument and control used to implement the EOPs, there should be an auditable record of how the needed characteristics of the instruments and controls were determined. These needed characteristics should be derived from the information and control needs identified in the background documentation of Revision 1 of the ERGs or from plant-specific information.

With adequate resolution of the above items, I&MEC's plant-specific technical guidelines program should meet the objectives of NUREG-0899 and should provide adequate guidance for translating the ERGs into DCCNP's EOPs. The staff will confirm that I&MEC adequately addresses these items and will report its review in a subsequent safety evaluation report.

B. Writer's Guide

The writer's guide was reviewed to determine if it provided acceptable methods to meet the objectives of NUREG-0899. I&MEC described a process that will use the technical guidelines and the writer's guide to develop three types of emergency operating procedures--Optimal Recovery Procedures, Function Restoration Procedures, and Critical Safety Function Status Trees. The first two types of procedures will use a two-column format, except for the single foldout page, which will use a single-column format. The Critical Function Status Trees will use a "branch" format. These basic formats are consistent with those of the generic technical guidelines. Our review of I&MEC's writer's guide identified the following concerns:

1. Placekeeping aids can assist the operators in keeping track of their position within a procedure. They are of particular importance when performing concurrent steps or procedures and in the situations where the user's attention may be diverted. The writer's guide should specify the use of some type of placekeeping aid.

2. The relationship of how the EOPs are written with regard to control room staffing considerations is very important. Thus, the writer's guide should address the following issues:

   a. EOPs should be structured so that they can be executed by the minimum shift staffing and minimum control room staffing required by the Technical Specifications.

   b. Instructions for structuring EOPs should be consistent with the roles and responsibilities of the operators.

   c. Action steps should be structured to minimize the movement of personnel around the control room while carrying out procedural steps.

   d. Action steps should be structures to avoid their unintentional duplication by different operators.

3. Instructions should be written for various types of action steps that an operator may take to cope with different plant situations. Thus, the writer's guide should address the definition and format of the following types of action steps:

   a. Steps for which a number of alternative actions are equally acceptable.

   b. Steps performed concurrently with other steps.

4. Transitions to other procedures or steps in a procedure are discussed in Section I.4.2.5 (pages 20-21).

   a. In addition to transitioning to other procedures or procedure steps, it may be necessary to reference other procedures that may be used for additional information. Thus, this section should include information on the content of the reference, the format of the reference, and criteria for when to reference a procedure as opposed to when to include the referenced steps in the EOPs.

   b. This section should state that transitions to a step which is preceded by a CAUTION or a NOTE will include special wording to emphasize that the CAUTION or NOTE is to be observed.

5. Component identification is discussed in Section I.4.2.6 (page 21). In addition to component identification information, the writer's guide should also include criteria for when to include component location information and the format that should be used for providing location information.

6. It is important that an operator be able to quickly access the relevant EOPs or portions of EOPs. Accessibility can be markedly improved by using methods such as tabbing and color-coding. The writer's guide should be revised to describe the methods that will be used to enhance the availability and accessibility of the EOPs and their various parts and sections.

7. When major changes occur in the plant design, the Technical Specifications, the technical guidelines, the writer's guide, or the plant procedures, then the EOPs may need to be revised. These revisions should be subject to the PGP process. A statement of intent to do this should be included in the writer's guide or elsewhere in the PGP.

8. Instructions regarding type size and line spacing for instruction steps should be included in the writers guide.

9. The procedure organization is discussed in Section I.3.1 (page 6) and the procedure elements are identified in Table 2 (page 7). The headings for only one of these procedure elements--the cover sheet--is discussed in the writers guide (Section I.4.1, page 12). The headings for pages containing the remainder of the procedure elements should also be specified in the writer's guide.

10. Conditional statements and logic statements will need to be used in the EOPs to describe a set of conditions or a sequence of actions. These statements have the possibility of being confusing, depending on the conditions that need to be observed. Thus, in addition to the information presented in Section I.4.2.3 (pages 19-20), the following items should be addressed in the writer's guide:

    a. The format and style of the logic statements should be included.

    b. Some combinations of logic statements have significant potential for misinterpretation. Thus, to make it more clear to the procedures writer, examples of ambiguous logic statements that should be avoided should be included (i.e. combinations of AND and OR).

11. Section I.6.5 (pages 36-37) discusses numerical values. One additional instruction should be included in this section. If a numerical value is used that includes decimal information (as opposed to fractions), and the numerical value is less than 1 and greater than -1, then the decimal point should be preceded by a 0 (e.g., 0.25 or -0.25 rather than .25 or -.25).

12. The writers guide appears to present inconsistent information regarding the way the operator is expected to move through the EOPs. In Section I.4.2 (pages 12-15) it is stated that, "Actions required in a particular step should not be expected to be complete before the next step is begun.... If a particular task must be completed prior to continuation, this condition must be stated clearly in that step or substep." However, in Section I.4.2.1 (pages 15-17) it is stated that, "The user would normally move down the left hand column when the expected response to a particular step is obtained." These statements are somewhat contradictory, depending upon the definition of "expected response to a particular step." The criteria for moving through the action steps should be stated more clearly in the writer's guide.

13. Page identification information is discussed in Section I.2.4 (page 5). Page identification information should also include a facility designation and a unit designation (if the problems are not common to both units).

14. The instructional step numbering system discussed in Section I.3.3 (page 10) requires operators to review the document to obtain the entire step identifier, and does not provide the operators with a good perspective of where they are in relation to the entire document. This section should be revised to specify a numbering system that allows the complete step identifier to precede each step, (i.e. substep "a" of step 2 would be written 2.a).

15. Sections I.6.3 (page 35) and I.6.6 (page 37) state that abbreviations and acronyms are to be capitalized. Table 3 (pages 22-23) identifies abbreviations used in procedures. Some of the abbreviations identified in this table are not capitalized. The writers guide should be revised to correct this discrepancy. The writer's guide should clarify whether a "capitalized" abbreviation requires all letter in the abbreviation to be capital letters or merely the first letter.

16. Section 6.3 (page 35) "Capitalization" states: "Operator action steps may be capitalized for emphasis." The staff notes that Figure 5 (page 16) provides an example of judicious use of capitalization in operator action steps. Conversely, if all the operator action steps were capitalized, as allowed by Section 6.3, this could negate the advantages of emphasis gained by occasional and judicious use of capitalization. Because sentences or large portions of text comprised entirely of capital letters are harder to read, Section 6.3 should be modified to include guidance for avoiding over-use of capitalization.

With adequate resolution of the above items, I&MEC's writer's guide should meet the objectives of NUREG-0899 and should provide adequate guidance for translating the P-STG into EOPs that will be usable, accurate, complete, readable, convenient to use and acceptable to control room operators. The staff will confirm that I&MEC adequately addresses these items and will report its review in a subsequent safety evaluation report.

C. Verification/Validation

The verification and validation program description was reviewed to determine if adequate methods are described for accomplishing the objectives of NUREG-0899. The verification and validation program described in the PGP identifies the following six objectives: (1) that the EOPs are technically correct, (2) that the EOPs are written correctly, (3) that the EOPs are usable, (4) that there is a correspondence between the procedures and the control room/plant hardware, (5) that the language and level of information presented in the EOPs is compatible with minimum number, qualifications, training and experience level of the operating staff, and (6) that there is a high level of assurance that the procedures will work. The licensee stated that the verification/validation program will include table-top reviews, control room walk-throughs, and generic simulator exercises on the SNUPPS simulator at Zion, Illinois. Our review of I&MEC's verification/validation program identified the following concerns:

1. The types of personnel involved in the verification and validation process (i.e., engineers, procedure writers, operations personnel, human factors experts), and the roles and responsibilities of these individuals, should be specified.

2. The EOPs will require a certain number of operators to carry out the various activities and steps as specified. Subsection III.3 (pages 2-3) should indicate that the EOPs will be exercised, during simulator exercises or control room walk-throughs, with the minimum control room staff size required by the facility Technical Specifications.

3. To assure verification/validation of all EOPs, the program description should include an indication that the full complement of EOPs will be exercised, including the use of multiple (simultaneous and sequential) failure scenarios.

4. 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, 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 generic simulator. For the parts of the EOPs that cannot be validated on the generic 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.

5. A description should be provided of the method by which multiple units will by handled in the verification/validation process to account for any significant differences between the units.

6. Section III.6 (page 4) discusses resolution of discrepancies detected during the verification/validation program. This section should include the criteria or methods that will be used for determining the need to reverify and revalidate any resultant changes in the EOPs.

With adequate resolution of the above items, I&MEC's verification and validation program should meet the objectives of NUREG-0899 and should provide assurance that the EOPs adequately incorporate the guidance of the writer's guide and the generic technical guidelines and will guide the operator in mitigating emergency conditions. The staff will confirm that I&MEC adequately addresses these items and will report its review in a subsequent safety evaluation report.

D. Training Program

I&MEC'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 three phases. Phase I occurs before EOP implementation and involves classroom instruction. Phase II also occurs before EOP implementation and involves classroom instruction and control room walk-throughs. Phase III occurs after EOP implementation and is an extension of requalification training involving classroom instruction and simulator instruction on the SNUPPS simulator at Zion, Illinois. Our review of I&MEC's training program for EOPs identified the following concerns:

1. One of the important objectives of the EOP training program is to show that the operators are capable of executing the EOPs under operational conditions before the EOPs are implemented. Since DCCNP

does not have a plant-reference simulator, and does not plan on using a generic simulator for training prior to EOP implementation, the main training method for demonstrating this will have to be through control room walk-throughs (or use of walk-throughs in a control room mock up). Thus, it is important that the Phase II walk-through discussion be expanded to address the following issues:

a. Discuss how all EOPs will be covered by each operator using control room walk-throughs prior to EOP implementation in the control room.

b. Indicate planned operator roles during walk-throughs.

c. Indicate the use of a wide variety of scenarios to fully exercise the EOPs during the walk-throughs and thus expose the operators to a wide variety of EOP uses.

2. The training program descriptions should be expanded to indicate the use of a wide variety of scenarios, including multiple and sequential failures, to exercise the EOPs as fully as practical on the simulator and thus expose the operators to a wide variety of EOP uses.

3. The SNUPPS simulator, which will be used for operator training in Phase III, differs significantly from DCCNP. Therefore, it is important that the training program description be expanded to describe how the operators will be trained in areas where the simulator is not like DCCNP or does not react like DCCNP and in parts of the EOPs that cannot be run on the simulator.

4. The PGP should state that the operators' knowledge and performance of EOPs will be evaluated after training and that appropriate follow-up training will be conducted, if necessary.

With adequate resolution of the above items, I&MEC's training program should meet the objectives of NUREG-0899 and should provide assurance that the operators are adequately trained on the EOPs prior to implementation. the staff will confirm that I&MEC adequately addresses these items and will report its review in a subsequent safety evaluation report.

3. CONCLUSIONS

Based on our review, we conclude that, with the exceptions noted in Section 2 of this DSER, the Indiana & Michigan Electric Company PGP for D. C. Cook Nuclear Plant 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 and resubmitted.

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