



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION

OFFICE OF NUCLEAR REACTOR REGULATION

VIRGINIA ELECTRIC & POWER COMPANY

SURRY POWER STATION, UNITS 1 & 2

NORTH ANNA POWER STATION, UNITS 1 & 2

DOCKET NOS. 50-280, 50-281, 50-338, AND 50-339

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 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 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 Guideline
- (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 Use of Upgraded EOPs

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This report describes the review of Virginia Electric and Power Company's (VEPCo) response to the Generic Letter related to development and implementation of EOPs for Surry 1 and 2 and North Anna 1 and 2. (Section 7 of 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), NUREG-0800.

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 this guidance will be developed for an upcoming SRP revision. Section 2 of this SER briefly discusses the five parts of the licensee's submittal, the staff review methods, 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 Surry 1 and 2 and North Anna 1 and 2 is acceptable with the exception of the items identified in these sections.

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 supplement to this SER. 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 the licensee's administrative procedures.

2. EVALUATION AND FINDINGS

In a letter dated July 1, 1983, from W. L. Stewart to Harold R. Denton, the licensee submitted its PGP. The PGP contained the following sections:

- Introduction
- Procedures Development Program
- Writer's Guide
- Procedure Verification Program
- Procedure Validation Program
- Procedure Training Program

The staff conducted a cursory review of the submittal to evaluate completeness of the submittal and determined that additional information was needed from the licensee to complete a detailed review. This additional information was requested in our letter of January 25, 1984.

VEPCo provided an interim reply dated March 2, 1984, with a schedule for providing the information requested. This information was provided by VEPCo in a letter from W. L. Stewart to Harold R. Denton, dated June 29, 1984.

Our review of the above submittals identified the following concerns.

A. Procedures Development Program

The Procedures Development Program was reviewed to determine if it provided adequate methods for accomplishing the objectives of NUREG-0899. The licensee has elected to develop plant-specific procedures using the generic Westinghouse Owners Group (WOG) Emergency Response Guidelines. The licensee will develop the initial set of plant EOPs using the High Pressure, Basic Revision of the generic guidelines dated September 1, 1981. The licensee plans to incorporate Revision 1 to the WOG Guidelines, dated September 1, 1983, into later revisions of the EOPs.

The licensee described the process for converting the generic technical guidelines into plant-specific EOPs. It is the intent of the licensee to follow the guidelines step-by-step when writing the EOPs, except where plant differences dictate changes. Step content and sequence will be changed only to accommodate differences between the reference plant and North Anna and Surry plants.

- (1) The submittal states that a writing team will write the EOPs. The skills needed to write EOPs should include individual(s) knowledgeable in station operations, as stated in the submittal, and should also include individuals with other important skills, e.g., human factors, engineering, and operator training.

- (2) Four safety significant differences from the reference plant were identified in the June 29, 1984 submittal. The deviations from the guidelines made in plant procedures that were based on the differences were not identified in the submittal, nor was an appropriate analysis or evaluation included to allow us to determine acceptability of the deviations. Each procedural step that was changed because of equipment difference need not be described, but how the differences affect the plant procedures, any procedure strategy change, and the analysis or evaluation to determine acceptability of the change should be provided for staff review.

Following resolution of the above items the procedures development program described by the licensee should be adequate to accomplish the objectives stated in NUREG-0899 and should provide assurance that the EOPs adequately incorporate the guidance in the generic technical guidelines. The staff will confirm that the licensee adequately addresses these items and will report its review in a supplement to this SER.

B. Writer's Guide

The writer's guide was reviewed to determine if it provided acceptable methods for accomplishing the objectives of NUREG-0899. The licensee selected a dual column EOP format with the left column designated for user actions and expected responses and with the column on the right for contingency actions to be taken if the preferred actions were not or could not be performed. Our review of the writer's guide identified the following concerns.

- (1) Sections 7.0-7.5 and 7.11-7.12 contain most of the needed instructions to accomplish the objectives for good cautions, notes and action steps. Additional measures should be included to cover the following:
 - (a) Line Spacing - Although shown in Figures 1-3, it should be covered in the text.
 - (b) Placement of "Cautions" - The statement on pg. 32 that cautions should extend "across the entire width of the page" should be made consistent with the example on pg. 33 that shows the caution extending from margin to margin.
 - (c) Step and Note Completion - Steps and notes should be completed on a single page, as specified for cautions (Section 7.11g, p. 33), so that operators do not lose information by missing a continuation. If steps or notes are not to be completed on a page, then the method used to denote a continuation on subsequent pages should be addressed.
- (2) Action steps can be written for a variety of situations. To provide clarity, consistency, and useability, the guide should include the appropriate format for the following types of action steps.
 - (a) Verification steps which are used to determine whether the objective of a task or sequence of actions has been accomplished.

- (b) Steps for conditions that are of a continuing concern or for actions that must be repeated periodically, such as for controlling a plant parameter.
 - (c) Steps that are performed concurrently with other steps.
- (3) Sign-off provisions and checkoff lists are explicitly ruled out in Sections 6.0 and 6.2, but are to be used in special circumstances as indicated in Section 7.14. Since EOPs are used under circumstances which could produce significant stress on the operators, placekeeping aid(s) should be provided for the operators to prevent skipping or repeating steps. Use of placekeeping aids, such as checkoff spaces, is one method that helps to facilitate the placekeeping. If aids are not to be used, describe the method(s) to be used by the operators to keep place as the procedures are used.
- (4) Operators should be able to obtain quick access to relevant EOPs and portions of EOPs. The guide, or other appropriate procedures, should include instructions for making EOPs and their various parts and sections readily available to operators.
- (5) The guide should contain guidance for writers of EOPs so that EOPs will be readily useable by the staff. This guidance should cover the following:
- (a) EOPs should be written in a manner such that they can be executed by the minimum control room crew specified in the technical specifications.

- (b) EOPs should be structured so that operator roles specified in EOPs are consistent with published leadership roles and division of responsibilities.
 - (c) Action steps should be structured to minimize physical interference among personnel and to minimize movement needed for performing procedural actions.
 - (d) Action steps should be performed sequentially or procedural areas of operator responsibility should be assigned to specific operators to avoid unintentional duplication of steps.
- (6) The EOP step numbering system should provide information so that operators can quickly determine where they are in relation to the rest of the document. The step numbering described in Section 6.2 could cause operators to have to review the documents or several pages of the document to obtain the entire step identifier, if a subsection extended over one page. One method of accomplishing this goal would be to use a numbering system that allows the complete step identifier to precede each step or substep. For example, step "a" of Subsection 1.1.1 could be written as 1.1.1.a and Substep (1) could be written as 1.1.1.a(1). This would provide immediate identification of each action step even if the subsection extended over more than one page.

With adequate resolution of the above items, the staff concludes that the VEPCo writer's guide provides adequate guidance for translating the technical guidelines into EOPs that should be useable, accurate, complete, readable, convenient to use and acceptable to the control room operator. The staff will confirm that the licensee adequately addresses these items in the writer's guide, and will report its review in a supplement to this SER.

C. Validation/Verification

The description of the licensee's validation and verification programs were reviewed to determine if they acceptably address the objectives stated in NUREG-0899. The purpose of the verification program described in the PGP is to ensure that the applicable generic and plant-specific technical information has been properly incorporated in the EOPs and of confirming the written correctness of the plant-specific procedures. The licensee's validation program is to be performed to confirm that control room operators can manage emergency situations using the EOPs.

During our review of the validation/verification program, we identified the following deficiencies:

- (1) The described methods for the validation/verification process contained a number of essential items that are needed for a thorough program. However, the following additional items should be incorporated in the revised program to be submitted to the staff.
 - (a) A statement that all EOPS will be thoroughly validated/verified. A combination of the proposed methods rather than just one method should be used since no one of these methods will exercise the EOPs adequately.
 - (b) A clarification of the types of individuals that are involved in each of the validation methods to include individuals, as appropriate, qualified in human factors, operations, and technical aspects of the plant.

- (2) The use of simulation described in Section E.7 (pp. 10-11) is not fully discussed, and proposes a method that is not comprehensive. Site-specific simulation is a very effective tool in validation/verification and training. The revised program should include the following:
- (a) A discussion indicating that the full complement of EOPs will be exercised in scenarios, including multiple failures (simultaneous and sequential).
 - (b) The criteria to be used for selecting scenarios to ensure that the scenarios selected can accomplish their intended purposes in exercising the EOPs.
 - (c) An indication that portions of the EOPs not exercised by site-specific simulation will be identified and tested through some alternative methods. The alternative method should provide a high level of assurance that the procedures effectively guide the operator in mitigating transients and accidents.
- (3) There should be a description of the method by which any differences between multiple units and facilities will be taken into account in the revised validation/verification program so that problems do not occur due to differences not addressed in the procedures.

Upon resolution of the above items the validation/verification program should be adequate to accomplish the validation/verification objectives stated in 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 in the PGP and will report its review in a supplement to the SER.

D. Training Program

The licensee's description of the operator training program for the EOPs was reviewed to determine if it adequately addresses the objectives of NUREG-0899. The training will consist of classroom instruction and simulator exercises and will be completed prior to EOP implementation. The licensee's EOP training includes continuing training in the existing operator license training and retraining programs. Training on major revisions will be conducted using classroom instruction and by use of simulator exercises.

The training program description addresses most of the desired objectives, however, the following areas should be addressed:

- (1) An indication that ALL EOPs will be exercised by ALL operators.
- (2) A description of the methods for training in areas not covered by site-specific simulator exercises. The alternative method should provide a high level of assurance that the procedures effectively guide the operator in mitigating transients and accidents.
- (3) Use of a wide variety of scenarios, including multiple failures (simultaneous and sequential).
- (4) Evaluation of operators after training.

With the inclusion of the above items, the staff concludes that the training program will adequately address the objectives of NUREG-0899 and should provide assurance that the operators are adequately trained on the EOPs prior to implementation of the EOPs. The staff will confirm that the licensee adequately addresses these items and will report its review in a supplement to this SER.

3. CONCLUSIONS

Based on the review, we conclude that, with the exceptions noted in Section 2 of this SER, the VEPCo PGP for Surry 1 and 2 and North Anna 1 and 2 meets the requirements of Supplement 1 to NUREG-0737 and describes acceptable methods for accomplishing the objectives stated in NUREG-0899. The staff therefore has reasonable assurance that EOPS developed and implemented in accordance with the program described in the licensee's PGP should be adequate for control room personnel to effectively mitigate the consequences of a broad range of accidents and multiple failures. Future changes to the PGP having safety significance should be brought to the attention of the NRC and should be reviewed by the licensee in accordance with 10 CFR 50.59.

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