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CHARLES CENTER • P. O. BOX 1475 • BALTIMORE, MARYLAND 21203

ARTHUR E. LUNDVALL, JR.
VICE PRESIDENT
SUPPLY

October 23, 1985

Mr. E. Butcher
Operating Reactors Branch #3

~~Mr. A. C. Thadani, Project Director~~
~~PWR Directorate #3~~
~~Division of PWR Licensing-B~~
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Calvert Cliffs Nuclear Power Plant
Units Nos. 1 & 2; Dockets Nos. 50-317 and 50-318
Procedure Generation Package Request for Additional Information

References: A. Letter from Mr. A. E. Lundvall, Jr. to Mr. J. R. Miller, dated March 14, 1984, same subject.

B. Letter from Mr. E. J. Butcher, to Mr. A. E. Lundvall, Jr. dated August 7, 1985, same subject.

Gentlemen:

Reference (A) submitted our implementation schedule for the new function-oriented emergency operating procedures and forwarded the Calvert Cliffs EOP Procedures Generation Package (PGP) for your review. Following your review of our PGP additional information was requested via Reference (B). The enclosed information is submitted in response to the questions enclosed with Reference (B). The format of our enclosure is identical to the format to which you presented your questions.

Should you have further questions regarding this reply, please do not hesitate to contact us.

Very truly yours,

for S. A. Tiernan

A. E. Lundvall, Jr.
Vice President - Supply

AEL/SRC/WPM/vd

Enclosure

cc: D. A. Brune, Esq.
G. F. Trowbridge, Esq.
Mr. D. H. Jaffe, NRC
Mr. T. Foley, NRC

A001
1/1

bcc: Messrs. J. A. Tiernan
V. F. Stricklin (3)
C. H. Cruse
R. M. Douglass
G. C. Creel
L. B. Russell
R. E. Denton
R. F. Ash
J. T. Carroll
R. C. L. Olson/B. S. Montgomery
M. J. Miernicki/S. R. Cowne
M. A. Canova
P. A. Pieringer
J. R. Hill
G. S. Pavis
S. W. Stultz
W. P. McCaughey, Jr.

EOP TRAINING PLAN

I. INTRODUCTION

This document identifies the methods to be used by the Baltimore Gas and Electric Company in compliance with NRC regulation, for the training of Operations Personnel on the philosophy and use of Emergency Operating Procedures (EOPs) at Calvert Cliffs Units I and II.

II. EOP PHILOSOPHY

The objective of this portion of the training program is two fold and will incorporate as its objectives, 1) an overview of the revised procedures, and 2) safety function concepts as applied to the EOPs.

A. The overview will consist of the following items:

1. Format and content level
2. Relationship of EOPs to existing plant procedures
3. Principles of Standard Post Trip Actions
4. Principcles of Optional Recovery Guidelines
5. Relationship to the Functional Recovery Guidelines

B. Safety function concepts portion will consist of the following items:

1. Safety Function Definitions
2. Accomplishing Safety Functions
3. Use of Safety Functions

III. PROCEDURE USE

Operator training associated with the revised procedures will be completed in two phases. The initial training phase will be completed in a classroom atmosphere and the second phase will be completed using the plant specific simulator.

ENCLOSURE

A. Translation of Emergency Guidelines to Plant-Specific Emergency Operating Procedures (Plant-Specific Technical Guidelines - P-STG).

1. No safety-significant deviations from the generic guidelines were identified while writing the procedures. However, because of extensive simulator validation most of the procedures were changed to include improved operator responses. Because of the number of changes, the verification process was postponed for some procedures and is being repeated for others. This process accomplished a one-for-one check of guideline step against EOP content. While no safety-significant deviation is expected, the verification must be completed before this item can be completely addressed.

2. As mentioned in the first response, no safety-signficant deviations or additions were found while drafting the EOPs. Any deviations or additions found now will be the type required to make the procedure work on our plant-specific simulator. Since this type of deviation or addition develops as a result of trying to make the procedure useable and operationally correct during validation, a second validation of the change is not required. Every change is verified using a verification checkoff sheet which will be added as an attachment to the Writer's Guide.

3. BG&E particpated in the CEOG task which developed a generic information and control characteristic review document (CEN 307). This generic material will be made plant-specific as part of our control room design review project and will address the concerns above. Further details concerning this program are available in our letter of September 20, 1985, to Mr. E. J. Butcher, Jr., Chief, Operating Reactors Branch #3, from Mr. A. E. Lundvall, Jr.

B. Emergency Operating Procedure Writer's Guide

1. A statement was added in Section D.2.h of the Writer's Guide directing that action steps be completed on one page if possible. Practical experience has shown that this directive cannot be accmomplished 100% of the time. Word processing software automatically make page breaks without recognizing actions steps. Where only one line is carried over, manual commands are used to reposition the line. This results in repositioning the remaining procedure which then must be reviewed again. The time requirement for accomplishing this for every change is prohibitive; therefore, only those steps which cause confusion during validation or show a potential for introducting confusion as identified during verification, are repositioned.

2. Major functions the operator must accomplish during an event are placed in boxes. These boxes are designed to help act as placekeeping aids and to identify actions which give the operator an overall perspective of the procedure. A line has been added to the Writer's Guide in Section D.2.C to identify these functions. During validation, no other placekeeping aid has been found necessary.

3. Items a, c and d have been included in Section A.5 of the Writer's Guide. Item b was omitted because we could not ascertain what the EOP structure had to do with operator responsibility. NUREG-0899, Section 5.8 did not provide additional guidance. If this item refers to verifying the EOP actions are within the operator's scope of responsibility, then this is included in the validation process and is not considered necessary in the Writer's Guide.

4a. Verification of automatic actions is addressed in Section B.1.e of the Writer's Guide. Additional guidance was provided on the type of verification desired. One of the major advantages of the safety function approach is that it provides a periodic check of the plant response to operator actions via the safety function status checks contained in each procedure. This feature is considered to be the best possible type of verification during an emergency because it is done by a dedicated operator, is repeated frequently throughout the event, and maintains a constant tie between safety function status and operator actions. Proper response of the safety functions in turn ensures core safety.

4b. Repetitious steps are typically placed in the safety function status check. Direction has been added in Section B.10 of the Writer's Guide to specify this.

4c. A two column format is used to provide a space opposite every recovery action for an alternate action. Verification and validation checklists verify that all appropriate alternate success paths are identified. It is our experience that there are very few "equally" acceptable paths. In any case, the operators are trained to attempt the alternate actions in the order presented. A statement has been added in Section B.2 of the Writer's Guide stating that alternate actions should be prioritized and presented in order of expected reliability.

4d. No suitable method has been identified for denoting concurrent steps within a procedure. The large variation in initial conditions for any single event and the changes in event progression caused by variations in the operator's time response from one scenario to the next have made even initial identification of concurrent steps difficult. In one scenario, two steps can be done concurrently while in a second scenario a slight change in an initial condition such as break size makes the same two steps sequential. In general, our validation experience has confirmed our initial belief that the procedures can only be operator guidelines, and that operations personnel must use them as such rather than attempting to resolve a complex event with verbatim compliance to a procedure. This philosophy has been instrumental in our use of boxed functions within the procedure. These boxed functions provide the operator with the "big picture" requirements of a procedure so actions can be applied as the nature of the accident warrants. Much work has been done in constructing the procedure in as sequential an order as possible and in providing direction which controls the operator's progress through the procedure. We feel that the current philosophy used is adequate and that stricter control is inappropriate.

5. A statement was added to Section A.5 of the Writer's Guide requiring each procedure to be tabbed. Event based procedures are not intended to be used in sections, therefore, further indexing is not required. The functional recovery procedure will be indexed by title and by safety function. A separate binder of safety function status sheets will be maintained to provde easy access to these checklists. Per section B.9.c, attachments are tabbed separately so they can be easily extracted when required.

6. Legibility and completeness are examined on the verification checklists. This checklist if required to be completed before each change and prior to signing the verification signature on the cover page. The checklist will be added as an attachment to the Writer's Guide by October 31, 1985. Step B.1.g of the Writer's Guide has been added to reflect this requirement.

7. As described earlier, the boxed functions are designed to provide the operator with a good perspective of the procedure. Operator training has emphasized the necessity of maintaining the boxed functions in mind while the procedure is being applied. No further action is considered necessary on this item.

8. The inconsistencies identified in this item have been corrected. In one example, an antecedent phrase and consequent phrase are separated by a colon. This was a special case and was done purposely to provide a better human-factors presentation.

C. EOP Verification/Validation

The BG&E verification and validation (V&V) program is based on criteria contained in NUREG-0899 and the INPO guidelines on V&V (83-004, 83-006). Section C of your letter identifies numerous concerns that are not included in these documents. BG&E has addressed these issues but does not consider it necessary to include them in the PGP. The material below is submitted for your information. It describes how the program has actually been implemented with how it addresses the concerns of item C. Each concern is addressed individually following this description.

The following is an outline of the validation work that has been accomplished to support EOP implementation.

December 84	The CE simulator was used in place of a control room mockup to validate the first drafts of the EOPs. A select group of experienced operators exercised the procedures. The observation team consisted of one RO licensed BG&E engineer responsible for procedure writing, one CE engineer contracted for procedure writing and one CE engineer familiar with the generic guidelines and FSAR safety analysis work on natural circulation, LOCA and S/G Tube Rupture Events.
February-March 85	The CE simulator was used by each section of operators during annual simulator requalification training. The EOPs, with changes from the December 1984 work, were used. The exercise was designed to familiarize operators with the new EOPs. Each section was asked to record comments and problems to support procedure validation.
April-June 85	The procedure writer talked through each procedure providing each Operating Section with a discussion of the sequence of actions and the basis for each step. Numerous operator recommendations were received during this period.

August 85	A select group of experienced operators validated the EOPs on the new plant specific simulator. The team consisted of the procedure writer, an engineer from the Control Room Design Review (CRDR) project, and a staff SRO (ex-operator) with human-factors training.
September-December 85	The plant specific simulator is being used to exercise each EOP. Operators, divided in groups of four and organized to mimic actual minimum shift manning, are being given final familiarization of the procedures prior to implementation. Several scenarios for each event are used during each four hour period to ensure the operators understand the procedure application under a variety of initial conditions. The simulator instructors record any procedural problems that are identified during the exercise.

Scenario selection for simulator validation was based on the following criteria:

1. Exercises all the EOPs.

2. Exercises as broad a range of initial conditions as possible.

3. Exercises the worst case accident (with respect to operator required action.)

4. Includes equipment/indication failures where required to exercise alternate actions or to maintain operator involvement during parts of the accident recovery.

It should be noted that validation on the plant specific simulator utilized new state-of-the-art computer models. As such, some "bugs" still exist in the programs. These "bugs" introduce very realistic operating problems such as indication abnormalities and improper or inconsistent equipment operation.

Verification was initially started in parallel with the validation effort but was postponed because of the extent of validation. The current program requires procedure verification just prior to their implementation. The group review described in the PGP was found to be impractical and redundant to the individual review and was deleted.

BG&E RESPONSE

1 & 2. The criteria used to select scenarios is provided above. Multiple failures are addressed by criteria #4. Validation is completed every time the procedure is used regardless of whether it is required. The V&V section of the PGP describes this process in the section entitled "Feedback from Actual Performance." Once the simulator familiarization currently in progress is completed, further validation will use this feedback mechanism.

3. Validation will occur as described for the items above. The procedures are reverified before implementing such change. See response for Section B, sixth item.

4. The differences between Unit 1 and 2 are not significant enough to warrant a separate V&V process for the Unit 2 procedures.

5. This task will be done in conjunction with the Control Room Design Review.

6. The people involved with the validation and verification effort are responsible for ensuring the checklist requirements are implemented. Checklists were used to ensure requirements from all areas of expertise were checked, thus minimizing the need for direct involvement of people from all areas. As indicated earlier, a human factors trained person was included on the first plant specific simulator validation. This was done to provide a better interface between the EOP and CRDR project.

D. Training Program

1. Part II of page 1 of the EOP Training Plan (attached) outlines the training objectives for this program and briefly describes how they will be implemented. Training on all objectives will be completed by December 31, 1985.

2. We agree with the conclusion that the abbreviated training in the classroom did not provide an adequate level of preparation for the use of a completely new set of procedures. The classroom training was basically an extensive review of the draft procedures, for the purpose of obtaining feedback from experienced operators.

   The training program was augmented with the addition of 20 hours of simulator training at the C-E Generic Simulator in Windsor, CT. In addition to the 20 hours of Generic Simulator time, each licensed operator received 20 hours of instruction in the basis of the generic guidelines and procedures. This was in the form of additional classroom training conducted at Combustion Engineering, Windsor, CT.

   While the Generic Simulator training was adequate with respect to major actions required by the new procedures, the quality of training suffered from the simulator's inability to accurately respond in the manner of the reference plant. Therefore, it was decided to utilize the newly acquired Calvert Cliffs plant-reference simulator to perform additional practice exercises. This training started on September 9, 1985, and will continue throughout the remainder of 1985. This will provide an additional 20 hours of Plant Reference Simulator exercises with which the licensed operators can practice using the new procedures. This training stresses proper interpretation and implementation of the new procedures, as well as "team" training to improve communication between members of an operating crew.

   It must also be noted that prior to exposing the licensed operators to the practice exercises on the plant-reference simulator, an extensive review and task analysis was performed on each procedure. This was accomplished by individuals responsible for the development of the procedures with the support of staff licensed operators and the Simulator Training staff. Based on this experience, the new procedures were revised to a more final form.

3. The new procedures provide both normal and alternate actions to be taken. Classroom training was used to discuss each of these actions and the alternatives to be used in the event a normal action cannot be carried out. However, the generic simulator did not allow much flexibility in implementing alternative actions, and this was one of the major reasons for using the new plant-reference simulator as the final step in preparing the operators for the use of the new procedures. Scenarios and lesson plans used on the plant-reference simulator was based on the required steps and actions which the operator would be expected to take during the

casualty. Additional equipment malfunctions were included in the scenario which allowed the operators to exercise the alternative actions when the normal action fails to produce the desired response.

To date, this program has been successful in gaining the confidence of the operating staff and promoting their acceptance of the new procedures. However, due to manpower and time limitations, it is not possible to provide scenarios which exercise all of the possible success paths in each procedure prior to implementation. The plant-reference simulator is flexible enough to ensure that, each time the operator is exposed to the procedure, a different success path can be taken. This is a part of our training program goals.

4. All of the Operations Unit licensed operators will receive 20 hours of practice exercises using the new procedure. This program will be completed on December 16, 1985.

5. There are five separate operating sections at Calvert Cliffs. Each section is trained as a team on the simulator, with the operators playing a role commensurate with their positions in the Control Room. (The sections are usually divided into two groups, each capable of manning a shift on a single unit.) Overall teamwork, with particular emphasis on coordination and good communication practices, is stressed. Critiques of each exercise provide for comment on teamwork, and recommendations for future improvement. Whereas personnel within a section may alternate between training groups, personnel do not alternate between sections. Each person has an opportunity to work with all of his teammates, thus promoting a more homogenous crew within the operating section.