

rch 15, 1990

Docket Nos. 50-237
and 50-249

Thomas J. Kovach
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Dear Mr. Kovach:

SUBJECT: SAFETY EVALUATION FOR THE DRESDEN NUCLEAR POWER STATION UNITS 2 AND 3
PROCEDURES GENERATION PACKAGE (TAC NOS. 44297 AND 44298)

The staff has completed its review of your Procedures Generation Package (PGP) for the Dresden plants submitted in a letter dated October 30, 1984 and supplemented by a letter dated December 16, 1985. The enclosed safety evaluation discusses programmatic improvements which will enhance your ability to develop and maintain consistently high quality Emergency Operating Procedures (EOPs). The majority of the findings are related to the writer's guide. The staff concludes that your PGP needs to be reviewed to address these programmatic improvements. For items you deem inappropriate, no longer applicable, or unnecessary for inclusion in your PGP, you should develop and maintain documented justification in an auditable form.

During the period of May 31, 1988 through June 8, 1988, a team of NRC inspectors audited your Emergency Operating Procedures. The staff recommends you consider both the enclosed discussion and the results of the EOP inspection as stated in Inspection Report Numbers 50-237/88-12 and 50-249/88-14 and utilize them as appropriate in the next major revision to your PGP and EOPs.

The staff recognizes that your PGP and EOPs may have been revised since the submittals, and requests that you maintain records of all revisions to your PGP and EOPs in an auditable form. No further submittals are required.

This safety evaluation closes out the staff's review of this issue.

Sincerely,

151

Byron L. Siegel, Project Manager
Project Directorate III-2
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc w/enclosure:

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

March 15, 1990

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and 50-249

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Nuclear Licensing Manager
Commonwealth Edison Company-Suite 300
OPUS West III
1400 OPUS Place
Downers Grove, Illinois 60515

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This safety evaluation closes out the staff's review of this issue.

Sincerely,

A handwritten signature in cursive script, appearing to read "Byron L. Siegel".

Byron L. Siegel, Project Manager
Project Directorate III-2
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc w/enclosure:
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Mr. Thomas J. Kovach
Commonwealth Edison Company

Dresden Nuclear Power Station
Units 2 and 3

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SAFETY EVALUATION REGARDING THE
PROCEDURES GENERATION PACKAGE FOR
DRESDEN NUCLEAR POWER STATION UNITS 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 plan procedure (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 Commonwealth Edison response to the generic letter related to development and implementation of EOPs (Section 7 of Generic Letter 82-33) for the Dresden Nuclear Power Station Units 2 and 3 (Dresden).

Our review was conducted to determine the adequacy of the Commonwealth Edison program for preparing and implementing upgraded EOPs for Dresden. This review was based on NUREG-0800 (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 Commonwealth Edison 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 Dresden has several items that must be satisfactorily addressed before the PGP is acceptable. Commonwealth Edison should address these items in a revision to the PGP, or provide justification for why such revisions are not necessary. This revision and/or justification need not be submitted, but should be retained for

subsequent review by the NRC staff. 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 Dresden administrative procedures and 10 CFR 50.59.

2. EVALUATION AND FINDINGS

In a letter dated October 30, 1984 from B. Rybak (Commonwealth Edison) to Harold R. Denton (NRC), Commonwealth Edison submitted its PGP for Dresden. The PGP contained the following sections and attachments:

- Dresden-Specific Emergency Procedures Guidelines
- Dresden Emergency Writer's Guide
- Description of the Emergency Procedures Verification and Validation Programs
- Description of the Training Program.

The NRC staff conducted a review of the Dresden PGP, and identified its findings in a Draft Safety Evaluation Report (DSER) which was forwarded to Commonwealth Edison in a letter dated July 31, 1985 from J. A. Zwolinski to D. L. Farrar. Commonwealth Edison provided responses to the DSER items in a letter from J. L. Wojnarowski to J. A. Zwolinski dated December 16, 1985 and included a revision to the PGP that incorporated changes to address the identified items. The NRC staff review of the revised Dresden PGP, including the response to the DSER items, is documented in the following subsections. The verification and validation program comments are combined in one subsection.

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

Because staff evaluation of Revision 4 of the generic technical guidelines is now complete, the P-STG program description should be revised to conform with Revision 4 of the General Electric Boiling Water Reactor Owner's Group (BWROG) Emergency Procedure Guidelines (EPGs). Safety significant deviations from the BWROG Emergency Procedures Guidelines should be documented, justified, and archived for future reference.

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 purpose of the writer's guide is to provide administrative and technical guidance on the proper writing techniques during the preparation and subsequent revision of the Dresden Emergency Operating Procedures (DEOPs). The DEOPs consist of separately bound procedures, each with a simplified flowchart at the back. Dresden lists six categories of DEOPs:

- Reactor Control (DEOP 100 Series)
- Primary Containment Control (DEOP 200 Series)
- Secondary Containment/Radioactive Release Control (DEOP 300 Series)
- Contingency Procedures (DEOP 400 Series)
- Support Procedures (DEOP 500 Series)
- General Precautions (DEOP 010)

Our review of the Dresden writer's guide identified the following concerns:

1. DSER Item 2.B.2: Section 4.4.3, page 14, states that "Where possible, an action step or a note should be completed on the page where it began." This statement should be revised to require that action steps and notes be complete on one page. Furthermore, Section 4.4 pertains to the DEOP review and revision process. Because writers should be aware of all guidance when they begin writing procedures, the writer's guide should be modified to ensure that writers are aware of the guidance in Section 4.4 when they begin writing procedures.
2. DSER Item 2.B.5: The guidance added in Section 4.4.4, page 14, is not sufficient to guide writers in producing consistently formatted DEOPs. Writers need specific information to produce consistently formatted procedures. The writer's guide should include requirements for margins, line spacing, and type or pitch size for text, flowcharts, tables, and graphs. The examples provided should be consistent with the text.
3. DSER Item 2.B.6: The concern of this item is not the level of detail included in the steps. No matter what level of detail is used in DEOPs, different types of action steps exist, and procedure writers need guidance to produce consistently formatted steps. The writer's guide should define the following types of action steps, describe how they should be formatted, and provide examples consistent with the text:
 - a. Steps used to verify accomplishment of objectives.
 - b. Steps that must be repeatedly performed. The writer's guide should discuss conditions or intervals determining repetition, and what type of reminder will be used to ensure that the steps are repeated at the correct times or intervals.
 - c. Steps for which several alternatives are equally correct. The writer's guide should contain a commitment to present one alternative, should discuss conditions under which other alternatives will be presented, and provide instructions for formatting multiple alternatives.
 - d. Steps performed concurrently with other steps.

4. DSER Item 2.B.7: Examples alone do not provide adequate guidance to ensure that DEOPs will be consistently formatted. In addition to providing examples, the writer's guide should describe the system of step numbering to be used in DEOPs.
5. DSER Item 2.B.8: Placekeeping aids can assist operators in keeping track of their positions within a procedure. The use of "special binders" described in Section 2.3, page 5, helps solve some placekeeping problems, but it does not adequately ensure that placekeeping difficulties will be overcome. Operators may have to refer to different pages within a single procedure, and they will therefore still need to flip through procedure pages. Additionally, while the special binders may help prevent an operator from losing his page, it is not clear how they will assist an operator in keeping track of his place on the page. Therefore, the writer's guide should be expanded to describe a placekeeping aid that operators use at the individual step level.
6. DSER Item 2.B.9: Section 3.0 does not provide adequate guidance for writing action steps. So that procedure writers can create DEOPs that are consistent and readily understood by operators, the writer's guide should be revised to address the following.
 - a. Adverbs "rapidly" or "slowly" (used in Section 3.1.6, page 10) are vague, do not describe specific actions, and should be included in a list of words to avoid. Alternately, these words can be used if they are appropriately qualified (e.g., cooldown rapidly, but less than 100°F/hr.).
 - b. Sections 3.4.3 and 3.4.5, page 12, discuss words which the procedure preparers should avoid using. In addition to being described in the text, these words should be included in a reference list of words to avoid using.
 - c. Section 3.4.3 instructs procedure writers to define words that may be understood in more than one way. The use with more than one meaning could lead to operator confusion. This section should be revised to state that ambiguous terms will be avoided in EOPs. Such terms should be included in a list of words to avoid.
 - d. Section 3.4.10, page 13, states that common words and their definitions are provided in Attachment 3, (page 21). Section 3.5.1, page 13, provides a list of 12 action verbs, of which only two ("initiate" and "confirm") are included in Attachment 3. Additionally, examples in the text and in Attachments 1 and 2 include other action verbs such as "execute" and "terminate" that are not included in Attachment 3. Attachment 3 should be expanded to present

an inclusive list of acceptable terms and Section 3.4.10 should state that only those terms will be used in DEOPs. Only those action terms included in Attachment 3 should be included in examples in the writer's guide.

- e. Section 3.0 should be revised to state that all sentences will be complete and will be short. Short, complete sentences are more precise than sentence fragments and are more easily understood than fragments or long sentences.
 - f. Section 3.0 should be revised to state that instruction steps will be written as directives, in the imperative mode.
7. DSER Item 2.B.10: In addition to the original concern expressed in DSER Item 2.B.10, revisions of and additions to the writer's guide have introduced new concerns regarding logic terms.
- a. The term "but" is used as a logic term in Attachment 2, Section B.1, page 19. "But" is not commonly used as a logic term and should not be used as a logic term in DEOPs.
 - b. To ensure that logic terms are used consistently and clearly used, Section 3.2, page 11, should be expanded to include a list of all the words that will be used as logic terms, to provide a definition and an example of each term, and to state that no other terms will be used as logic terms.
 - c. THEN is used to join actions rather than to introduce the consequent action in an IF THEN statement in Attachment 1, page 18, Step C-6.d.(1). Actions which are embedded in this way create several problems: embedded actions may be overlooked and not performed, they may be confused with logic statements, and they are difficult to verify with check-offs. In this particular case, an operator could easily overlook the first action, "CLOSE the charging water valve 2(3)-0301-25," because he would expect the action instruction to follow the term THEN. The instructions for the use of THEN, to be added to Section 3.2, should state that THEN will not be used to run actions together. Attachment 1 should be revised accordingly.
 - d. Section 3.2.3, page 11, states that logic terms will be emphasized using location, capitalization, and underlining. However, the use of these techniques in examples in the writer's guide is inconsistent. For example, in Attachment 1, page 18, a blank line is inserted between the contingency and the action in the first IF THEN statement (in the exit condition), but this

blank line is not included in other IF THEN statements. The logic term THEN is usually underlined, but it is not underlined in Section 3.2.7, page 11. To ensure consistency in the formatting of logic statements, Section 3.2.3 should describe exactly how location, capitalization, and underlining will be used to emphasize logic terms, and examples in the writer's guide should be consistent with the description.

- e. In Attachment 1, page 18, Step C-6.6.(1), the conjunction "and" is formatted as the logic term AND. If the difference between the conjunctions "and" and "or" and the logic terms AND and OR is unclear, operators could mistake a conjunction for a logic term. To ensure that conjunctions are formatted in a manner that is clearly different from logic terms, Section 3.2 should specify the formatting of conjunctions so they will not be confused with logic terms and examples should be consistent with the text.
8. DSER Item 2.B.11: The changes made in Section 2.7 do not adequately address the concerns regarding referencing. During the execution of EOPs it is often necessary to refer operators to other procedures or sections of a procedure. Such referencing and branching can cause errors and unnecessary delays.
- a. Section 2.7, page 9, states that references will be indicated by the verbs "enter" and "execute." However, in Attachments 1 and 2 the following terms are used to indicate referencing: "Perform" (Step C.2, page 20) and "per" (Step C-6.d(1), page 18). The format for reference statements should be precisely described in Section 2.7 and all examples should adhere to that format.
 - b. When referencing to another procedure, a step number should always be included in the reference to ensure that operators know where to start in the referenced procedure. Section 2.7, page 9, should be revised to specify that step numbers are required or to specify that referenced procedure will be used in their entirety.
 - c. The referencing examples A and B, in Section 2.7.2, page 9, are confusing. Example A states, "THEN execute DEOP 400-2 (Emergency RPV Depressurization) concurrently with this procedure AND proceed to Step 12.c." There are three sources of ambiguity in this sentence, which lead to six possible interpretations of the sentence. First, it is unclear whether step 12.c is part of DEOP 400-2 or part of the procedure the operator is currently using. Second, it is unclear whether the operator is to begin at the beginning of the procedure and "proceed" through the procedure, executing steps, until Step 12.c is reached, or if he is to "proceed to Step 12.c" and then begin executing

the procedure. Third, if the statement indicates that the operator is to execute the procedure from the beginning to Step 12.c, then it is not clear whether he is to stop executing steps before or after executing the actions in Step 12.c. In example B, the title of the procedure should be moved next to the numbered term it refers to; that is, "DEOP 100 (Reactor Control) Step #1." Section 2.7 should be changed to specify referencing formats that are clear, unambiguous, and easily understood. Additionally, to ensure that writers correctly interpret the examples, the format instructions should be described in the text as well as demonstrated by examples.

9. DSER Item 2.B.12: The changes made in Section 2.3 and 2.5 do not adequately address the concerns regarding organization and format. Consistent, well-organized, and well-labelled EOPs increase the ease with which operators understand and use procedures.
 - a. Section 2.3, pages 5-6, should be expanded to state that each procedure will have a cover page, and that the following information will be included on the cover page: procedure identification (title and number); the revision number; the revision date; the total number of pages; review and approval signatures; the unit designation; and the facility designation. An example, consistent with the text, should be provided.
 - b. Section 2.3, page 5, states that an "index shall identify each DEOP by number and title," but does not describe the desired format of the index. Section 2.3 should provide guidance for constructing indexes.
 - c. Section 2.3, page 5, should specify that each procedure will include a statement as to the scope of that procedure so that operators can be sure they are using the proper procedure.
 - d. Section 2.5, pages 6-7, should be revised to address the following concerns regarding figures and tables.
 - 1) Section 2.5 should address the criteria which will determine the use and content of graphs and tables.
 - 2) Section 2.5 should be expanded to state that graphs and tables will be titled and numbered uniquely so that graphs and tables are easy for operators to find and identify.
 - 3) Section 2.5.3, page 7, should be expanded to state that units of measure in graphs and tables will be consistent with control room labels and with the text of procedures.

- 4) Section 2.5 should be supplemented with examples of a graph and a table that are consistent with the text.

The revision of the writer's guide introduced new concerns. The following comments (B.10 through B.12) address passages of the writer's guide that were added or significantly modified.

10. Section 2.2, page 5, states that DEOP 500 procedures use various types of single column formats which comply with the controls of Dresden Administrative Procedure (DAP) 9-2, "Procedures Preparation." The format controls should be included in the writer's guide.
11. Section 2.6.5 states that cautions may be placed on the left hand pages of procedures. Cautions placed on the facing (left hand) page could be missed by operators. So that operators are aware of all information in a caution before performing the steps to which the caution applies, cautions should always be placed directly before the first step to which they apply, as stated in Section 2.6.2, page 8. Section 2.6.5 should be removed from the writer's guide.
12. The flowchart in Attachment 1, page 16, contains several usability problems. Using this flowchart for guidance in designing DEOP flowcharts could lead to flowcharts that are hard to read and confusing. The writer's guide should be modified as follows:
 - a. The entire text of the sample flowchart is capitalized. If all words are capitalized, then capitalization cannot be used for emphasis. Furthermore, text written in all capitals is more difficult to read than mixed case. The writer's guide should state, and this example should be revised to show, that capitalization in flowcharts will conform to the rules established for DEOPs.
 - b. Section 2.0, pages 4-9, does not address cautions and notes in flowcharts. Cautions and notes should always precede the steps to which they apply. The writer's guide should be revised to indicate that cautions and notes will be placed on the flow path before flowchart steps to which they apply.
 - c. The writer's guide does not describe how cautions should be formatted in flowcharts. To ensure that cautions are always identified, the writer's guide should be expanded to describe a technique for formatting cautions in flowcharts that ensures that they will be easily identified and not confused with flowchart steps.

- d. Because the text in flowcharts can be read more easily if it is double-spaced, the writer's guide should state that the text in flowcharts will be double-spaced.
- e. The sample flowchart contains two different symbols used to enclose text. Consistent use of symbols will enable operators to understand flowcharts more easily. The writer's guide should include a list of all symbols to be used in flowcharts, along with their definitions.
- f. The sample flowcharts contains a step for which there is no exit option. For the step "continue torus temperature control," there are two arrows leading to the step, but there is no way to proceed from the step. The writer's guide should be expanded to describe how the logical movement through a flowcharts should be structured, and this structure should not allow an operator to reach a step from which he cannot exit. The sample flowchart should be modified to reflect this concern. The list of flowchart symbols that should be added to the writer's guide should include a symbol used to indicate flowchart exit points.
- g. The sample flowchart contains nothing to indicate an entry point. The entry point into a flowchart should be clearly identified so that operators enter the flow path at the correct point. The list of symbols that should be added to the writer's guide should include a symbol used to indicate flowchart entry points. The writer's guide should specify a means of indicating the entry point into a flowchart and the entry point should be so indicated in the sample flowchart.
- h. One step in the sample flowchart is not enclosed in a symbol: "Continue torus temperature control." Because the different symbols in flowcharts convey information about the text within them, all flowchart steps should be enclosed in symbols. The writer's guide should state that all flowchart steps are to be enclosed in symbols, and the sample flowchart should be revised accordingly.
- i. In the sample flowchart, text extends outside of symbol boundaries, making both the symbols and the text less legible. Because of problems such as these, hand-drafted flowcharts are more difficult to read. The writer's guide should state that all text in flowcharts should be fully contained within the flowchart symbols. This guidance should not be met by reducing type size to an illegible size or by making symbols so large that the flowcharts become crowded and hard to read. Therefore, the writer's guide should state requirements for symbol size, type size,

and spacing between flowchart elements to ensure flowchart legibility. Consideration should be given to the way the flowcharts will be presented and the distance from which they will be read.

- j. The sample flowchart contains a flowpath that moves from bottom-to-top (the YES flowpath entering the step "Continue torus temperature control"). The flowchart could be designed in a manner that omitted this upward movement without changing the logical structure of the flowchart. Flowcharts are more easily read by operators if, as much as is possible, all flowpaths move either from top-to-bottom or from left-to-right. The writer's guide should contain instructions to ensure top-to-bottom and left-to-right consistency in flowcharts. The sample flowchart should be modified accordingly.
- k. In the sample flowchart, YES flowpaths exit from the left hand corners, the bottoms, and the right hand corners of decision symbols. NO flowpaths exit from the bottoms and from the right hand corners of decision symbols. Flowcharts should be constructed so that all YES flowpaths exit decision symbols from one specific corner, and so that all NO flowpaths exit decision symbols from one other specific corner. This consistency in flowchart design reduces the opportunities for error when operators select a path out of a decision step. The writer's guide should state from which corner of the decision symbol each type of flowpath will exit. The example flowchart should be changed accordingly.
- l. The sample flowchart contains a flowpath that changes direction unnecessarily (the YES flowpath entering the step "Continue torus temperature control"). The flowchart could be designed in a manner that omitted this turn in the flowpath without changing the logical structure of the flowchart. Any angle in a line undermines the integrity of the line and makes the line harder to follow. The writer's guide should be expanded to include instructions that ensure that unnecessary changes of direction will not be made in flowpath lines.
- m. Some of the flowchart steps in the example flowchart include step numbers and some of the flowchart steps do not contain step numbers. The absence of numbers from some flowchart steps raises two concerns: (1) it is not clear when step numbers should be included in flowchart steps and when they should be omitted from flowchart steps, and (2) if those flowchart steps that do not contain step numbers do not correspond to written procedure steps, then it appears that the flowchart does not accurately summarize the written procedure. The writer's guide should be

expanded to state that each flowchart step should contain a step number that reflects the relationship of that flowchart step to the written procedure. The sample flowchart should be revised accordingly.

- n. The sample flowchart contains flow lines that run parallel to each other. If several flow path lines run parallel to each other, operators may have difficulty following the correct line. The writer's guide should indicate a means by which operators will be able to differentiate between such lines (e.g. sufficient spacing between the lines, different line patterns).
 - o. The use of sentence fragments in the sample flowchart makes it difficult to interpret some of the flowchart statements. For example, one step states, "Emergency RPV depressurization required execute DEOP 400-2 concurrently." This statement has two possible meanings: (1) "Emergency RPV depressurization is required. Execute DEOP 400-2 concurrently," or (2) "IF emergency RPV depressurization is required THEN execute DEOP 400-2 concurrently." Because incomplete sentences such as this one can be difficult for operators to understand, the writer's guide should state, and the sample flowchart should be revised to show, that complete sentences are required in flowcharts.
 - p. Several steps in the sample flowchart refer to FIG 2-8, which is not included in the writer's guide. The writer's guide contains no guidance for integrated figures and tables with flowcharts. So that writers have complete information to writer procedures, the writer's guide should discuss the placement of figures and tables with respect to flowcharts.
13. Cautions provide operators with critical information concerning specific steps or sequences of steps in DEOPs. Section 2.6, pages 7-8, should be revised in regard to the following topics:
- a. The revised caution statements in Section 2.6, page 7, and in Attachment 1, page 17, contain action steps. Cautions should describe a hazardous condition which can cause injury or equipment damage, and should describe the consequences of the hazardous condition. Section 2.6.4, page, 8 should state that caution statements will not contain action steps and the examples on pages 7 and 17 should be revised accordingly.

- b. To ensure that cautions are properly written, Section 2.6 should include a definition of cautions.
 - c. To ensure that operators easily understand cautions and notes, Section 2.6 should be revised to state that capitalization will be used for the heading CAUTION or NOTE, but will not be used to present the information in the text of the caution or note.
 - d. To ensure that operators can easily understand cautions and notes, Section 2.6 should be revised to state that only one topic will be included in each caution or note.
14. Because of the delays and errors that can result when referencing is used, referencing should be minimized. Section 2.7, pages 8-9, should include a commitment to minimize the use of referencing. Section 2.7 should also discuss the criteria to be used when deciding if the necessary steps should be included in the text of the procedure or if referencing should be employed. See NUREG-0899, Section 5.2.2, for additional information.
15. Acronyms and abbreviations used in EOPs should be understood easily and used consistently by both procedure preparers and operators. So that EOPs can be clearly understood, the writer's guide should be revised in the following manner.
- a. Section 3.4.11, page 13, should be revised to state that each abbreviation and acronym will have only one meaning.
 - b. Section 3.4.11 should be revised to state that each meaning will have only one abbreviation or acronym.
 - c. Abbreviations for simple expressions, such as CLD for cold, increase the complexity of procedures. Section 3.4.11, page 13, should be revised to state that abbreviations and acronyms for simple expressions will not be used, unless they are part of an engraved name.
 - d. Examples in the writer's guide use abbreviations that are not included in Attachment 4, such as "Bkr" (Section 2.3, page 6), "Aux. Elect." and "turb. Bldg" (Section 3.1.4, page 10), and "Tech. Spec." (Attachment 1, page 15). Only those abbreviations and acronyms included in an approved list of abbreviations should be used in the DEOPs and in examples in the writer's guide. Section 3.4.11, page 13, should be revised to state that only terms included in Attachment 4 will be used in DEOPs, and Attachment 4 should be expanded to include all necessary abbreviations and acronyms. Examples in the writer's guide should be changed to include only those abbreviations and acronyms included in Attachment 4.

16. The correct use of punctuation can significantly increase the understandability of procedures. The writer's guide does not address punctuation; Section 3.0, page 10-13, should be revised to state that standard American English punctuation will be used consistently, and all examples in the writer's guide should be consistent with this guidance.
17. As stated in Section 3.5, page 13, capitalization should be used sparingly because it decreases readability if applied to entire bodies of text. Capitalization should also be used sparingly because the overuse of capitalization decreases the effectiveness of capitalization as an emphasis technique. Additionally, inconsistent use of capitalization can lead to operator confusion. For these reasons, the use of capitalization should be precisely defined. The guidance provided in Section 3.5 that "capitalization can be used to emphasize individuals words or short phrases" could lead to overuse and inconsistent use of capitalization in DEOPs. This use of capitalization should be deleted from Section 3.5, and Section 3.5 should be revised to state that the use of capitalization should be limited to the uses listed in that section. Examples in the writer's guide should conform to this guidance.
18. Section 3.3.4, page 12, states that "acceptance values should be specified in such a way that addition and subtraction by the user is avoided if possible." Section 3.3.4 should be revised to state the need to avoid calculations more strongly, and should indicate how operators will be assisted in making calculations (by such aids as forms or decision tables) if calculations are unavoidable. Examples consistent with the text should be provided.

The adequate resolution of the above items will ensure that the Dresden writer's guide will accomplish the objectives stated in NUREG-0899 and that it will provide adequate guidance for translating the technical guidelines into EOPs that will be usable, accurate, complete, readable, convenient to use, and acceptable to control room operators.

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 program determines that consistency has been maintained between the

writer's guide, EPGs, and the DEOPs by evaluating each DEOP for written correctness and technical accuracy. The validation program determines that the control room operators can manage emergency conditions in the plant using the DEOPs by evaluating each DEOP for usability and operational correctness. Our review of the Dresden verification and validation program description identified the following concerns:

1. DSER Item 2.C.1: The verification program should include a specific description of the method by which the verification and validation process accounts for differences between Units 2 and 3.
2. DSER Item 2.C.2: Neither the revised verification and validation program description nor Attachment 2, pages 2-10, discusses the selection of team members in the verification and validation process. The types of personnel including engineers, operations personnel, and human factors experts, and the criteria for selecting these team members should be specified.
3. DSER Item 2.C.3: Neither the revised verification and validation program description nor Attachment 2, pages 2-5, through 2-10, discusses the roles and responsibilities of human factors experts in the verification and validation process. The roles and responsibilities of personnel, including engineers, operations personnel, and human factors experts, should be specified.
- 4.a. Section 3.1 of the validation and verification 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 and verification 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.
- b. 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 EOPs 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.

5. Section 3.1 states that "the validation process will be documented by use of a form and any discrepancies will be recorded and resolved accordingly." Section 3.1 should describe the plan, and the forms used in the plan, to correct and revise DEOPs as a result of the validation process.
6. Section 6.0 states that "all revisions to DEOPs will be evaluated to determine if the verification and validation process must be applied to the revision." Section 6.0 should include the criteria that will be used for determining whether it is necessary to revalidate and reverify changes that result from the V+V process.
7. Section 3.1 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.
8. Section 3.1 should include a description of the plan by which adequacy of control room instrumentation and controls will be determined, and a description of the plan by which correspondence between EOPs and control room instrumentation and controls will be determined.

With adequate resolution of the above items, the Dresden verification and validation program should accomplish the objectives stated in NUREG-0899 and should provide assurance that the EOPs adequately incorporate the guidance of the writer's guide and the technical guidelines and will guide the operator in mitigating emergency conditions.

D. Training Program

The description of the operator training program on the Dresden upgraded EOPs was reviewed to determine if it described acceptable methods for accomplishing the objectives stated in NUREG-0899. The Dresden training program is expected to assure, as a minimum, that all licensed personnel have a working knowledge and understanding of the DEOPs. The program describes a six phase course consisting of 50 classroom hours and 18 simulator training hours.

As a result of our review of the revised PGP, the NRC staff has the following comments.

1. The training program description should be expanded to indicate that all EOPs will be exercised by all operators on the simulator or, for those areas not conducive to simulator training, in control room walk-throughs.

2. The training program description should indicate the use of a wide variety of scenarios, including simultaneous and sequential failures, to fully exercise the EOPs on the simulator and in control room walk-throughs, thus exposing the operators to a wide variety of EOP uses.

3. CONCLUSIONS

The staff concludes that the PGP submitted by Commonwealth Edison Company for Dresden Units 2 and 3 in a letter to the NRC, dated October 30, 1984, and as supplemented in a letter dated December 16, 1988, should be reviewed to address the programmatic improvements outlined in Section 2 of this report. A PGP revision should not be submitted to the NRC. For items the licensee deems inappropriate, no longer applicable, or unnecessary for inclusion in its PGP, it should develop and maintain documented justification in an auditable form. All revisions to the PGP should be reflected in plant EOPs within a reasonable period of time, e.g., the next planned revision of the EOPs.

Principle Reviewer: G.W. Lapinsky

Dated: March 15, 1990