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DENTON,H.R. Office of Nuclear Reactor Regulation, Director
RIVENBARK,G.W. Operating Reactors Branch 4

SUBJECT: Forwards response to open item in draft SER re procedures generation package.Rev to writers guide for emergency procedures will be submitted by 841201,per Suppl 1 to NUREG-0737.

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September 12, 1984

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: George W. Rivenbark, Acting Chief
Operating Reactors Branch No. 4

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287

Dear Mr. Denton:

Duke Power Company received a draft Safety Evaluation Report (SER) for the Oconee Procedures Generation Package on August 14, 1984. This SER was attached to Mr. George W. Rivenbark's letter dated August 9, 1984 and contained several open items requiring a Duke response. Attached is a response to each of these open items.

In Section 2.A the SER discusses the Oconee Writer's Guide for Emergency Procedures. Final resolution of these items will require a revision to the writer's guide. This will be submitted to the NRC by December 1, 1984 as a revision to the Duke Response to Supplement 1 to NUREG-0737 for Oconee Nuclear Station.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

JSW:slb

Attachment

cc: Mr. James P. O'Reilly, Regional Administrator
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Group File: OS-801.01
R. H. White (DED)

Oconee Nuclear Station
Draft Safety Evaluation Report (SER)
on the Procedures Generation Package
Duke Power Response

SER Section 2.A Writer's Guide

Open Item No. 2.A(1):

The page margins used in the EOP example of Appendix 1 should be made consistent with the page margin information presented in Appendix 6, Section 7.0

Response: This section of the Oconee Writer's Guide will be revised to reflect the changes suggested by the SER.

Open Item No. 2.A(2):

The discussion on place-keeping aids (Section 2.7, page 11) states that a line to the left of major numbered steps should be used as a place-keeping aid. As currently written, the instructions allow the place-keeping aids to be placed in the left margin, where they could be obscured by the binding. The Section 2.7 write-up should ensure that the place-keeping aids are placed within the margins.

Response: This section of the Oconee Writer's Guide will be revised to reflect the changes suggested by the SER.

Open Item No. 2.A(3):

Attachments, including tables, figures, flowcharts, and other decision aids, can be very useful in reducing the need for calculations and complicated logic statements. Thus, Section 2.10, "Enclosures," of the writer's guide should contain guidance about when a table, figure, flowchart or other attachment should be used. In addition, the writer's guide should include guidance to ensure the useability and accuracy of the attachments. (See NUREG-0899, Subsections 5.5.8 and 5.5.9.)

Response: This section of the Oconee Writer's Guide will be revised to reflect the changes suggested by the SER.

Open Item No. 2.A(4):

The acronyms in Appendix 3 should be made consistent with the rules for forming acronyms in Section 3.5.2, page 18, which state that acronyms should be in all capital letters.

Response: The requirement in Section 3.5.2 of the Oconee Writer's Guide that acronyms be in capital letters will be deleted in the next revision.

Open Item No. 2.A(5):

The writer's guide should contain a discussion on the use of numerals in EOPs that covers the number of significant digits and the use of decimals vs. fractions. The number of significant digits used in an EOP should be consistent with instrumentation reading accuracies. Decimals, rather than fractions, should be used for all cases except where the instrumentation is labeled with fractions. (See NUREG-0899, Subsection 5.6.7.)

Response: This section of the Oconee Writer's Guide will be revised to reflect the changes suggested by the SER.

Open Item No. 2.A(6):

Conditional statements and logic statements have been addressed in Section 3.10 and in Appendix 1. Two additional items should be covered:

(a) "OR" should be defined in either the inclusive or exclusive sense, and the format for using "OR" in the other manner should be specified.

(b) The use of "AND" and "OR" in the same logic statement should be avoided. The writer's guide should include examples of such logic statements so that it is clear to the procedure writer what logic statements to avoid.

Response: This section of the Oconee Writer's Guide will be revised to reflect the changes suggested by the SER.

Open Item No. 2.A(7):

The copy quality of "legibility" of EOPs is essential so that the operator using the EOP during an emergency has no question about what is being read from the text or from an attachment. Thus, there should be a section in the writer's guide (probably in Appendix 6) that discusses legibility. Ideally, the EOP copies should be as legible as an original copy of the master procedure, or, stated differently, copy reproduction should not adversely affect legibility. (See NUREG-0899, Section 6.2.)

Response: This section of the Oconee Writer's Guide will be revised to reflect the changes suggested by the SER.

<u>SER Section 2.B Validation/Verification</u>

Open Item No. 2.B(1):

It is not clear that the scenarios to be selected for use during the validation will be sufficiently comprehensive to ensure that the full complement of EOPs is exercised. Section 7.0 of the "Oconee Proposed Validation Process for Emergency Procedures" should include a description of the criteria that will be used to select the scenarios. The criteria should ensure that single and multiple (including sequential and concurrent) failures are included. Then, a review of the capabilities and the limitations of the simulator will identify

what can be validated on the simulator. For the parts of the EOPs that cannot be validated on the simulator (if this is the case), the criteria for selecting any additional scenarios that may need to be conducted by a control room walk-through or a mock-up walk-through should be described.

Response: To ensure that the full complement of EOP's is adequately exercised as part of the validation process, we intend to write exercise guides that will form scenarios that follow the EOP's. The EOP's follow event tree decision paths that we will write our guides to exercise. Our current exercise guides utilize single and multiple (including sequential and concurrent) failures and, therefore, those we write to perform simulator validation will as well. In the process of developing these scenario exercise guides, limitations of the simulator for validation purposes will be reviewed to determine those areas of the EOP's that must be validated by an alternate method. Since the limitations of the simulator may result in steps or sections of the EOP needing a different validation method, we will evaluate each instance on a case by case basis to determine the appropriate alternate method of validation. Obviously, scenarios developed to validate the EOP's which would be limited by the simulator could be used in a walk-through without writing separate scenarios.

Open Item No. 2.B(2):

The proposed validation process using the simulator is for Oconee Units 1, 2 and 3. Since the three units are different from one another, the validation/verification program description should identify the method that will be used to account for the differences among the units.

Response: The differences between the three Oconee units control rooms are minimal, however, the Oconee validation program description will be revised to specify that the step-by-step walk through validation method will be used to account for any differences among the three units that cannot be validated on the simulator. Additionally, the classroom portion of the operators' emergency procedure training will identify any differences between the units' control rooms.

Open Item No. 2.B(3):

The validation program description, including discussions of both the walk-through and the real-time simulations, have a section addressing "control room compatibility." Neither of these sections address the issue of whether the instrumentation and controls are adequate to meet the needs of the operators.

This issue is related to the Function and Task Analysis described in Supplement 1 to NUREG-0737, which is required to ensure that the operators' information and control needs are met during emergency operations. The issue can be addressed as part of either the EOP upgrade, or the Detailed Control Room Design Review (DCRDR), with suitable cross-reference, since the results of the task analysis are applicable to both efforts. The DCRDR Final Report, submitted as part of the Duke Power Company Response to Supplement 1 to NUREG-0737, has a section that discusses Task Analysis. The process described in the steps

used to conduct the task analysis, provided on pages 52 through 56 of the DCRDR Final Report, do not appear to result in the identification of information and control needs of the operators as derived from the technical guidelines. While there are several sections of the Duke Power task analysis description that allude to identifying the type of information the staff considers necessary, it appears that the task analysis process that is described will only identify which of the existing instrumentation and controls are used to perform the tasks in the guidelines, based on current operating experience, but will not provide the basis for determining the adequacy of these instruments and controls.

In order for the staff to more fully evaluate the extent of any deficiency in the Duke Power task analysis, the task analysis description included in the DCRDR Final Report should be expanded to address the following items:

(a) Page 50, second paragraph, second sentence - Define what is meant by "required" in the phrase "components required to perform each task." The definition should clarify whether "required" means:

1) the components are selected based on which of the existing instrumentation and control parameters (and other instrument and control characteristics) are most appropriate for the task, or

2) the components are <u>derived</u> from the tasks identified in the technical guidelines, based on meeting needs derived from the tasks.

(b) Describe how the Task Analysis will provide the information necessary to determine that (as described on page 50, third paragraph, second sentence), "an information item, needed for the performance of a task, might be unavailable in the control room." This description should include how the task analysis will provide a basis for determining the adequacy of the selected parameters, as well as the other instrumentation and control characteristics.

(c) Page 53, Step 2 - The last sentence on the page, "the analysis will develop a listing of the interfaces (displays and controls) <u>used</u> by operators and an indication of the relative order <u>in which they are employed</u>" (emphasis added) makes it appear that the task analysis identifies existing controls and displays. This is one part of the task analysis description that leads the staff to believe that the task analysis is focused on existing instrumentation and controls, instead of deriving necessary instruments and controls from information and controls needs, and using the needed instruments and controls as a basis for evaluation of existing instruments and controls. This process, if the staff has accurately evaluated the Duke program, needs to be modified to analyze operator actions based on information and control needs derived from the guidelines, which would then be compared to the results of the current process.

(d) Page 54, "Completion of Task Data Forms (TDFs), "fourth sentence - The description for completing the task data forms focuses on actions that an operator takes and instrumentation and controls they use, again implying that the tasks analysis is based on existing instruments and controls, rather than on deriving the necessary instruments and controls from

information and control needs. This process will serve the purpose of identifying (i.e., a survey) existing instrumentation and controls. The Duke Task Analysis program needs to be modified to include the derivation of instrument and control needs.

(e) The interfaces between the various parts of the Task Analysis process and the interfaces with other parts of the DCRDR and EOP upgrade should be described. For example,

1) how are the Task Descriptive Data, as documented on the Task Data Forms, used throughout the remainder of the Task Analysis Process?

2) how are the data used to meet the objectives outlined in Section 4.5.1, Page 50?

3) what is the relationship between the Control Room Survey and the Task Analysis?

4) what is the relationship, if any, between the results of the Task Analysis and the Validation/Verification program for EOPs?

Response to Items (a) thru (d): Clarifications to the Task Analysis for the Control Room Design Review as described in Supplement 1 to NUREG-0737 were described in a memo from H. B. Clayton to D. L. Ziemann, dated April 5, 1984. Duke Power responded to those clarifications in a letter from H. B. Tucker to H. R. Denton, dated May 29, 1984, concerning Catawba Nuclear Station (Docket Nos. 50-413 and 50-414). Since the Task Analysis methodology for Oconee, McGuire and Catawba were identical, we refer you to the Duke response to the referenced clarifications and, in particular, to the response to comment number 4 of the clarifications which concerns the derivation of the characteristics of controls and displays in the Task Analysis.

In addition, we provide the following summary of the Oconee Task Analysis process:

As stated in Duke Power's Control Room Review Plan, the objective of Task Analysis was to evaluate the human engineering suitability of the controls and displays necessary to support the operator actions required during emergency operations. To accomplish this objective, a Task Analysis Team, consisting of one senior reactor operator and one mechanical/nuclear systems engineer, was required to perform four major activities:

1. Develop a complete list of operator tasks for each emergency operating scenario to be analyzed, using the B&W Abnormal-Transient Operating Guidelines (ATOG).

2. Identify the display and control requirements for each operator task.

3. Determine the presence or absence of controls and displays to support the display and control requirements.

4. Evaluate the human engineering suitability of the required controls and displays.

In this process, Task Analysis was divided into two phases: 1) a pre-fill stage followed by 2) a walk-through evaluation using a full-scale mock-up of the Oconee Control Room.

In the pre-fill stage, the Task Analysis Team analyzed operating scenarios developed from ATOG; developed a complete list of necessary operator tasks, using supporting operations and engineering documents; and identified the characteristics of the display and control requirements for each task. During this analysis, the control and display characteristics were compared to existing control room components and those components missing or not conforming to the required characteristics were documented as HEDs.

The documentation resulting from the pre-fill stage for each scenario included a Task Sequence Chart listing all tasks allocated to the operator; Task Data Forms for each task describing the operator's location, the action to be taken, the component to be used, and the component parameters used to verify operator actions; and HEDs documenting those controls and displays either missing or not conforming to the characteristics defined in the pre-fill process.

In the walk-through evaluation, (the second phase of Task Analysis) the senior reactor operator performed each action identified on the Task Data Form and reported his actions to the observing engineer. The engineer monitored the operator's actions to ensure that each step was completed in the proper sequence, observed the operator's interaction with the controls and determined the adequacy of the controls and displays available to the operator. The result of this phase, also documented on the Task Data Form, was either a confirmation that the controls and displays were adequate and properly arranged for the task, or an HED documenting the potential problems identified.

The Task Analysis process summarized above was a systematic approach governed by established procedures, standard data collection and evaluation forms, and performed by a senior reactor operator and mechanical/nuclear systems engineer trained in Task Analysis techniques by human factors consultants from Bio Technology. The program was routinely audited by Bio Technology to assure that the procedures were followed and that the objectives of Task Analysis were met, including the determination that the appropriate controls and displays were available to the operator. The Task Analysis procedures and resulting documentation demonstrate that the appropriate control and display requirements have been identified and properly evaluated.

Response to Item (e)1): As described on page 54 of the DCRDR Final Report under the description of Step 3, Human Engineering Discrepancy Identification, the Task Descriptive Data was used as the basis for a walk-through evaluation of the human engineering suitability of needed controls and displays to support the task requirements. A full-scale Control Room mock-up, Task Descriptive Data, and Task Analysis HED Principles were used in an integrated effort to identify HEDs.

Response to Item (e)2): The HEDs identified during the pre-fill and walk-through evaluation phases of the Task Analysis documented potential problems in the human engineering suitability of controls and displays to support the effective accomplishment of operator actions during certain normal and emergency operations. These HEDs were assessed in the Assessment Phase of the DCRDR as described in Oconee Nuclear Station, Units 1, 2, & 3, Control Room Review, Supplement to Final Report.

Response to Item (e)3): The Control Room Survey systematically compared existing components to absolute human factors guidelines to determine HEDs. This "pass/fail" comparison did not consider control and display needs, operator experience, or component use relationships. The Task Analysis examined operator tasks to determine component use relationships, control and display needs, and, because operators were participants in the Task Analysis, problems, from operator experience.

Response to Item (e)4): The Verification/Validation programs for EOPs assure that the EOPs are technically accurate, consistent with the plant-specific technical guidelines, include all licensing commitments, and can be used by a trained shift to manage emergency events. Inherent in the Verification/Validation programs is a check of the Control Room compatibility of the EOPs.

The Task Analysis, performed as part of the DCRDR, provides a reference point or base line Control Room design to be used for EOP development. The objective of the DCRDR was to strengthen the man-machine interface within the Control Room by assuring the availability, adequacy, and usability of controls and displays needed to perform operating tasks. The Task Analysis, in particular, analyzed the technical guidelines and the emergency operating tasks derived from the guidelines. The assessment and resolution of HEDs identified from the Task Analysis assures that the Control Room contains the needed controls and displays with the necessary characteristics, labeled and arranged properly, to accomplish these tasks.

Future issues or concerns which may potentially impact the technical guidelines, EOPs, or the Control Room design will be addressed by the EOP Verification/Validation programs which provide a procedure for on-going maintenance of the guidelines and EOPs. In this process, issues and concerns are evaluated for potential impact. Those issues and concerns with potential impact are assigned to the proper technical or operational area for resolution. Guidelines and/or EOPs are revised as necessary, and a technical review (Verification/Validation) is performed prior to the issuance of revised EOPs.