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SUBJECT: Requests extension of schedule for implementation of outstanding human engineering discrepancy solutions.

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April 20, 1988

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
Detailed Control Room Design Review (DCRDR)

Dear Sir:

By letter dated August 9, 1985, Duke Power Company (Duke) submitted a response to the NRC Supplemental Safety Evaluation Report (SER) of June 10, 1985, on the Detailed Control Room Design Review (DCRDR) for Oconee. The August 9, 1985 Duke letter provided information regarding the schedule for implementing Human Engineering Discrepancy (HED) solutions at Oconee. Duke had indicated that completion of the HED modifications would require four (4) Refueling outages. However, to assure the most effective management of the implementation of all station modifications, procedure revisions, program development and enhancements; and, to accommodate higher priority work, such as the Babcock and Wilcox Owners Group (B&WOG) Safety Performance and Improvement Program (SPIP) recommendations, Duke considers it necessary to extend the implementation of HED solutions from four (4) refueling outages to six (6) refueling outages. This extension was a result of a re-evaluation of HED modifications and a review of the remaining unimplemented HED solutions in conjunction with all other station modifications.

Duke remains committed to timely implementation of HED solutions which significantly enhance safety. Duke would also like to note that, in general, the more safety significant HED solutions have already been implemented. At present the percentage of HED modifications that have been completed for Unit 1 is 63% (through 2 refueling outages); for Unit 2 the percentage is 62% (through 2 refueling outages); and for Unit 3 the percentage is 60% (through 2 refueling outages). Using two additional refueling outages to complete the implementation of HED solutions, the cumulative percent of HED's to be completed per outage for each unit is provided by the following table.

End-of-Cycle (EOC) Refueling Outage	Unit 1	Unit 2	Unit 3
8	------	45%*	40%*
9	43%*	62%*	60%*
10	63%*	70%	70%
11	70%	80%	80%
12	80%	90%	90%
13	90%	100%	100%
14	100%	------	------

*Percent of HED modifications actually completed as of December 1, 1987. These percentages reflect the total number of HED's after cancellation of some HED's as identified in this letter.

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Based on the current refueling outage projections, the scheduled date for the start of the Unit 1 EOC 14 refueling outage is May 1993; Unit 2 EOC 13 refueling outage is October 1993; and Unit 3 EOC 13 refueling outage is November 1992.

Along with the delay in completing the implementation of HED solutions, Duke considers it necessary to delay the completion of Regulatory Guide 1.97 modifications. By a letter dated September 28, 1984 Duke had provided a report of the plan to address Regulatory Guide 1.97, Revision 2 for Oconee. The plan consisted of three phases; (1) review; (2) assessment; (3) implementation. The implementation phase of the plan consists of designing and installing those modifications to accident monitoring instrumentation as identified in the assessment phase. The implementation phase was an integrated effort to insure effective orderly implementation of all DCRDR, Safety Parameter Display System (SPDS) and Regulatory Guide 1.97 modifications or additions. This integration effort necessitates a two refueling outage extension for completing Regulatory Guide 1.97 modifications. For each unit, Duke currently has over 60% of the Regulatory Guide 1.97 instruments in service. The remaining instrumentation will be implemented no later than the beginning-of-cycle (BOC) 15 for Unit 1; BOC 14 for Unit 2; and BOC 14 for Unit 3.

In addition, Duke has re-evaluated of the remaining unimplemented HED solutions to see if changes which have occurred since the original review was performed invalidate the need for or reduce the benefits of the HED solution below justifiable levels. In carrying out this re-evaluation, a team similar in makeup to the original control room review team was formed. The same process and criteria as the initial DCRDR was utilized. One important difference between this review and the original Control Room review is the additional time and experience that has been gained since the performance of the original review in 1983. A summary report of the results of this re-evaluation task is provided as Attachment 1. In summary, the re-evaluation identified 19 HED's with benefits either wholly or partially below justifiable levels. Justifications for not implementing these HED's are also provided. In addition, for 3 HED solutions, an alternative solution was identified.

In summary, Duke recognizes the importance of having a strong management program for station modifications and the impact that modifications can have on plant safety. However, each modification must be managed with due consideration of schedules and cost/benefit analysis. Considering these factors, Duke finds it necessary to extend the schedule for the implementation of the outstanding HED modifications. In addition, a re-evaluation identified certain HED modifications for which total implementation is no longer justified, due to cost/benefit analysis or alternate solutions. Duke acknowledges the NRC Staff's concerns in the HED area, (as discussed by NRC letters to Duke dated September 28, 1984, June 10, 1985 and November 6, 1986), and the impact that this postponement and re-evaluation may have. In this regard, Duke requests that further discussions that the Staff may desire regarding this issue be coordinated through normal licensing channels.

Very truly yours,

Hal B. Tucker

Hal B. Tucker
PFG/2/sbn

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DUKE POWER COMPANY
OCONEE NUCLEAR STATION

ATTACHMENT 1

SUMMARY OF HED MODIFICATION RE-EVALUATION RESULTS

Introduction

The purpose of this report is to provide a summary of the results of the re-evaluation of the outstanding Human Engineering Discrepancy (HED) modifications. The report discusses nineteen (19) HED modifications with benefits either wholly or partially below justifiable levels. A revised implementation schedule for the remaining outstanding HED solutions is also provided.

Re-Evaluation Guidelines

The following guidelines were established for the re-evaluation task:

(1) Cost and/or resource problems alone were not used as a basis for an HED modification cancellation. A new cost/benefit analysis was considered in the re-evaluation, only if the cost/benefit of the modification has changed significantly due to additional technical constraints and other factors that were not known by the original Detailed Control Room Design Review (DCRDR) team.

(2) A similar multi-departmental review team as originally utilized in the initial DCRDR effort was required in considering the possible cancellation of an HED modification. This does not necessarily mean the same group of people. The team consisted of personnel from the following areas:

Station Operations
Station Projects
Design Engineering/Electrical
Design Engineering/Mechanical

(3) The same criteria used in the original CRDR effort was used to evaluate the HED.

Summary of Results

Table 1 identifies the results of the HED re-evaluation. Three (3) HED modification solutions (one per unit) will be altered based upon implementing an alternate solution. Seven (7) HED modifications will be cancelled based upon the availability of the now completed SSF. Twelve (12) HED modifications (four per unit) will be partially or totally cancelled based upon re-evaluation of the cost/benefit. Table 2 provides a description of the HED problem, solution and the non-implementation justification. An alternate solution to previous HED solutions is provided by Table 3.

Implementation Schedule

Considering the complex coordination required for the installation of the remaining HED solutions with all Babcock and Wilcox Owners Group (B&WOG) Safety Performance and Improvement (SPIP) activities, the remaining NUREG-0737 Supplement 1 activities, and Station modifications already scheduled for future outages, a commitment schedule with some degree of flexibility is required. The following commitment schedule for the remaining HED solutions is summarized into percentages of the total HED's to be corrected by the end of each fuel cycle.

Unit	Fuel Cycle Number	Cumulative HED Solution Completion
Oconee 1	EOC 11	70
	12	80
	13	90
	14	100
Oconee 2	EOC 10	70
	11	80
	12	90
	13	100
Oconee 3	EOC 10	70
	11	80
	12	90
	13	100

The necessary design work to support the above schedule is currently in progress. While the calendar date of an individual refueling outage may vary due to variables in unit operation, the projected dates for the last fuel cycle of each unit are May 1993 (O1C14); October 1993 (O2C13); and November 1992 (O3C13).

Table 1

Oconee Nuclear Station
HED Re-Evaluation Results

Unit 1	Unit 2	Unit 3	Comments
0-1-156	0-1-156	-------	ASP lighting - cancel - use SSF
0-1-174	0-1-174	-------	ASP environment - cancel use SSF
0-1-406	0-2-408	0-3-369	ASP controls - cancel - use SSF
0-1-232	0-2-232	0-3-230	Linearize scales - partially implement
0-1-87	0-2-65	0-3-29	AB1 rearrangement - partially implement
0-1-49	0-2-42	0-3-207	Annunciator - partially implement
0-1-118	0-2-89	0-3-73	VB1 rearrangement - cancel
0-1-62	0-2-40	0-3-57	ICS selector switches - alternate solution

Table 2

Oconee Nuclear Station
HED Re-Evaluation
HED Non-Implementation Justification

HED No. 0-1-156

Problem Description:

This HED was concerned with the normal and emergency lighting levels at the Auxiliary Shutdown Panels (ASP) not meeting recommended guidelines.

Solution Description:

Provide improved normal and emergency lighting levels for the ASPs.

Non-Implementation Justification:

When this HED was originally evaluated, the Oconee Standby Shutdown Facility (SSF) was still in the construction stage. The SSF and the ASP have essentially the same purpose, that is, to provide an alternate means of establishing and maintaining a Hot Shutdown Condition for any unit. The SSF is now functional and, therefore, the reliance on and importance of the ASP are greatly reduced. Thus, the enhancements to the ASP as specified for this HED solution are no longer necessary.

HED No. 0-1-174

Problem Description:

This HED concerned the projected environmental conditions in the Auxiliary Shutdown Panel (ASP) area in the event of an accident.

Solution Description:

Construct a room enclosing the ASPs and provide a HVAC cooling unit.

Non-Implementation Justification:

When this HED was originally evaluated, the Oconee Standby Shutdown Facility (SSF) was still in the construction stage. The SSF and the ASP have essentially the same purpose, that is, to provide an alternate means of establishing and maintaining a Hot Shutdown Condition for any unit. The SSF is now functional and therefore, the reliance on and the importance of the ASP are greatly reduced. Thus, the enhancements to the ASP as specified for this HED solution are no longer necessary.

HED No. 0-1-406, 0-2-408, 0-3-369

Problem Description:

This HED concerned the arrangement and labeling of existing indications and controls on the Auxiliary Shutdown Panel (ASP) and the addition of a few indications and controls to enhance operation from the ASP.

Solution Description:

Provide additional controls and indications needed and rearrange existing controls.

Non-Implementation Justification:

When this HED was originally evaluated, the Oconee Standby Shutdown Facility (SSF) was still in the construction stage. The SSF and the ASP have essentially the same purpose, that is, to provide an alternate means of establishing and maintaining a Hot Shutdown Condition for any unit. The SSF is now functional and therefore, the reliance on and the importance of the ASP are greatly reduced. Thus, the enhancements to the ASP as specified for this HED solution are no longer necessary.

HED No. 0-1-232, 0-2-232, 0-3-230

Problem Description:

This HED concerned certain meters, that utilize square root scales (non-linear).

Solution Description:

Provide instrumentation, components, and calibration as necessary to linearize the following meter scales: unit vent (stack) flow, reactor building ventilation cooler inlet and outlet flow, and reactor building purge flow.

Non-Implementation Justification:

The utilization of the reactor building ventilation cooler inlet and outlet flow indicators does not require a detailed reading of these parameters and therefore, the accuracy of a non-linear scale for the normal range is acceptable. Accordingly, this portion of the HED solution is no longer necessary.

HED No. 0-1-87, 0-2-65, 0-3-29

Problem Description:

The arrangement of Control Board AB1 is not consistent between units and some related components are not grouped together. The electrical gauges on Control Board UB2 are not consistently arranged between Units and some related gauges are not grouped together.

Solution Description:

Rearrange and modify components on Control Board AB1 for better grouping of relocated devices and to be consistent between units. Relocate meters for CT1 amps to Control Board UB2 and rearrange associated meters on Control Board UB2 for similarity between units.

Non-Implementation Justification:

This HED will be implemented as originally planned, with the exception of the rearrangement of the condensate, chemical addition, and heater drain controls on control board AB1. The benefits gained by this rearrangement are considered to be small compared to the negative effects due to the many years of operating experience with the present arrangement. As such this portion of the HED solution will not be implemented.

HED No. 0-1-49, 0-2-42, 0-3-207:

Problem Description:

Annunciator tiles are not functionally grouped and do not reflect their priority. Tile engravings are inconsistent and some deviate from standard Oconee abbreviations. Some annunciator are used as status lights and some new annunciators are needed, while others need to be deleted.

Solution Description:

Rearrange and relabel approximately 500 annunciator tiles. Add a turbine/generator "First Out" panel. Revise audible alarms so that individual panels are grouped to a specific horn for the purpose of differentiation between alarms. Revise annunciator logic so that all tiles are dark (unlit) in the non-alarm state.

Non-Implementation Justification:

During the original DCRDR, several potential HEDs concerning the annunciator alarm system were identified. Rather than develop individual solutions for each of the identified HEDs and perform separate cost-benefit analyses, an administrative decision was made to perform a separate study of the annunciator system and to develop a solution package for cost-benefit analysis. It was determined during the study that none of the identified HEDs represented any safety significant deficiency. However, it was assumed that several proposed modifications to the annunciator system could in some measure improve operator performance. The solution package developed by the separate study team addressed four general areas of improvement:

(1) Rearrangement of annunciator system windows to functionally group all alarms.

(2) Add a turbine/generator "first out" panel.

(3) Revise audible alarms to group individual panels to a specific horn for the purpose of differentiation between alarms.

(4) Revise annunciator logic so all tiles are dark, etc.

In the area of rearrangement, the solution package developed by the DCRDR team proposed a significant modification to the existing annunciator system beyond resolving the identified HEDs. For example, out of 630 annunciator system windows, the proposed rearrangement affected approximately 467 (74%). However, of the 467 windows to be rearranged, 406 (87%) of the movements were only within individual annunciator panels to further functionally group alarms which were partially functionally grouped. The original study performed by the DCRDR team indicated that there was some benefit to be gained from the rearrangement modifications, however, the benefit could not be quantitatively assessed. A decision was made to schedule the modifications even though an explicit level of benefit could not be determined.

In re-reviewing the modifications to be implemented, Duke has become increasingly concerned about the potential safety significance of performing all parts of the modification. Specifically, Duke is concerned about the safety significance of the number of rearrangements of annunciator windows on a system on which the operators have had significant operating experience and training.

Several factors have changed since the original decision to implement the modification was made in 1983. Notably, the Oconee operators as a group have had an additional five years (15 reactor years) of operating experience with the present arrangement of the annunciator system. The operators have also received continuing training on the Oconee simulator. The simulator uses the same annunciator arrangement as the plant control board. Operator performance during the almost fifteen total years of operation has shown that the existing arrangement of the annunciator system is adequate. Considering this experience, the scope of the rearrangement, and the negative transfer of training and experience from the existing arrangement to the new arrangement, Duke is concerned about the increased potential for operator error if the rearrangement is implemented. This increased potential for operator error would exist not only during an adjustment period after the modification is completed, but during the modification on an individual unit (when the plant will be placed in a less than optimum alarm monitoring situation); and during the time period before the modifications have been completed on all three units, when the annunciator arrangement for the units will be different.

In addition, a recent EPRI study (Research Project RP-2011) found, in general, that the difference in operator performance between an annunciator system where alarms were generally grouped with their respective system controls and one in which alarms were strictly system/functionally grouped with additional demarcation was "not statistically significant".

Considering these factors, it is Duke's judgement that the rearrangement of the annunciator system windows constitutes a greater potential for operator error than the benefit to be derived from the rearrangement. Therefore, we intend to reduce the scope of the HED solution to include:

(1) Add a turbine/generator "first out" panel.

(2) Revise audible alarms to group individual panels to a specific horn for the purpose of differentiation between alarms.

(3) Revise annunciator logic so all tiles are dark, etc., but not to implement the rearrangement of annunciator system windows as originally proposed.

HED No. 0-1-118, 0-2-89, 0-3-73

Problem Description:

The valve switch arrangement on Control Board VB1 is not functionally arranged.

Solution Description:

Rearrange components on Control Board VB1.

Non-Implementation Justification:

The valve switches on VB1 have a very low frequency of use (approximately once per cycle). These are primarily drain, block and bypass valves for various steam systems. These controls have undergone a relabeling effort to aid the operator in identifying particular components. Operating experience with the present arrangement after the relabeling effort has shown that the present arrangement is adequate, therefore the rearrangement of these controls is no longer necessary. Accordingly, this HED solution will not be implemented.

Table 3

Oconee Nuclear Station
HED Re-Evaluation
HED Alternate Solution

HED No. 0-1-62, 0-2-40, 0-3-57

Problem Description:

The selector switches for the display of ICS parameters are presently keylock switches. There are only one or two keys for 24 key switches.

Initial Solution Description:

Replace these key operated switches with non-key rotory type selector switches.

Alternate Solution Description:

Replace the lost keys so that each keylock switch will have its own key.