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U.S. Nuclear Regulatory Commission
Document Control Desk
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Subject: McGuire Nuclear Station
Docket Nos. 50-369, -370
Control Room Review HED Modifications

Gentlemen:

By letter dated March 29, 1984 and May 3, 1985, Duke provided responses to NUREG-0737, Supplement 1 and included a schedule of completion of Control Room Review/-HED Modifications. By letters dated March 2, 1987, April 8, 1987, and November 20, 1987, Duke provided an implementation and status report. Our letter of November 20, 1987 detailed, among other things, the delay of HED M-1-0018 until the 1988 Unit 1 refueling outage (1EOC5), and Unit 2 refueling outage (2EOC4).

In late 1987 after partial implementation of HED M-1-0018 and prior to the implementation of HED M-1-004A, McGuire Operations determined that further reviews were needed prior to proceeding with implementation of HED M-1-004A and M-1-0018.

Duke has subsequently determined that HED M-1-0018 should be cancelled for the following reasons:

1. The existing panel configuration is adequate and simpler in design than the proposed modification.

   The purpose of the ESF Monitor Light Panel is to provide the operator with a quick indication that all ESF components have actuated properly during a safety injection. This removes the burden of scanning the Control Board to determine the status for over 69 separate components. By grouping the indications together properly, the panels should be lighted or dark depending on the emergency sequence.

   After reviewing our present design, the proposed design, and our emergency procedures, Duke has determined that little benefit is gained by the modification during the initial cold leg injection phase when time is most critical. A very small improvement is made after transfer to cold leg recirculation or hot leg recirculation; however, the procedure guides the operator component by component through these transfers and the operation is performed manually when time is not as important. The monitor light panel serves as the third backup in these instances.

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2. During the original Control Room Review, there was concern of lighted versus dark panels being used as indication. Lighted panels were preferred because on dark panels the operator could not easily determine whether a particular indicator was off or the bulb was burned out. Duke feels that this concern is adequately covered by the weekly inspection Operations conducts of all light bulbs used for indication in the control room. Also, the new design included dark panels in certain accident scenarios and therefore did not eliminate this concern.

3. Duplication of inputs from approximately 83 ESF valves located in the reactor and auxiliary buildings are required to be added by the modification. Each one of these valves must be rewired by rearranging internal wiring on the limit switch packs. This rework will require recalibration of the switches, functional verification of the EMO function (including proper interlock operation), and valve stroke time testing. The coordination of work associated with these valves is a complex task requiring tight control to ensure there is no negative impact to refueling and normal operation. Because of the large scope and complexity of this work, there is justified concern over the potential increase in risk associated with a wiring error or coordination mistake affecting plant safety during and following the outage.

Thus, Duke believes the significant amount of work required to make a marginal gain provides justification for cancellation of HED M-1-0018.

Duke's April 8, 1987 letter to the NRC detailed considerations not factored into the two part installation of HED M-1-004A, and recommended complete installation during the 1988 refueling outages, (1EOC5 and 2EOC4). There is not sufficient justification for installing HED M-1-004A in its entirety. The original scope of this HED was to:

1. Remove colored film from all tiles except for panels F01 and AD1;
2. Convert blank panels SI9 and SI10 from status to annunciator panels;
3. Revise engraving on 429 tiles (50% of total tiles);
4. Move 688 windows within the same panel or to another panel;
5. Add 31 windows;
6. Delete 34 windows; and,
7. Convert some status windows to annunciator type and some annunciator windows to status type.

Generally, annunciator alarms are located above their respective system controls; however, some alarms, primarily within individual annunciator panels, are only partially arranged by function. The original Duke Control Room Review Team (CRRT) proposed a rearrangement of annunciator windows to functionally group all alarms. In addition, some rearrangement of the status light system was proposed.

The proposed rearrangement affects 688 windows (including both annunciator and status panels); however, only 134 windows are being moved more than one panel away. The other 554 windows are being rearranged either within the same panel or

moved to an adjacent panel. Adjacent panels are located within two feet of each other.

Several factors have changed since the original decision, to implement the modification, was made in 1983. Notably, the McGuire operators as a group have had an additional five years (ten reactor years) of operating experience with the present arrangement of the annunciator and status light systems. The operators have also received continued training on the McGuire Simulator during the past five years. The simulator uses the same annunciator and status light system arrangement as the McGuire plant control board. Operator performance during the almost seven total years of operation has shown that the existing arrangement of annunciator and status light systems 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 Power 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 necessarily placed in a less than optimum alarm monitoring situation, and during the time period before the modifications have been completed on both 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 for individual alarm recognition 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 at this time that the rearrangement of the annunciator and status light system windows constitutes a greater potential for operator error than the benefit to be derived from the arrangement. Therefore, during the 1988 Refueling Outages (1EOC5 and 2EOC4) Duke will implement only items 1 and 3 of the annunciator modifications listed above. Duke is currently reviewing the add/delete changes and the fifty individual human engineering discrepancies associated with the annunciator modification. As a result, Duke is placing the other items (2 and 4-7) on hold until the review is complete. Duke will notify the NRC of any other changes to this schedule.

Very truly yours,

Hal B. Tucker

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