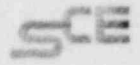


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K. P. BASKIN  
MANAGER OF NUCLEAR ENGINEERING,  
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April 20, 1981

Division of Human Factors Safety  
Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Attention: Voss Moore

Dear Mr. Moore:

Subject: Comments on advance copy of NUREG-0659,  
"Staff Supplement to the Draft Report  
on Human Engineering Guide to Control  
Room Evaluation"



We have reviewed an advance copy of NUREG-0659 forwarded to us by INPO and have enclosed a summary of our comments.

In general, we agree with the approach taken in this program. Our major concern is that the considerations of cost and time do not appear to have been adequately factored into the program schedule. In a program of this type, the available resources dictate the detail of review that can be accomplished within a fixed schedule. Therefore it is essential that an adequate amount of time be allowed for completion of the work. We would recommend that the effort be subdivided and prioritized to provide timely completion of more important items and to provide feedback on progress during the program.

Please continue to coordinate industry review of this matter through INPO.

Very truly yours,

*K P Baskin*

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Enclosure  
cc: J. L. Voyles (INPO)

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COMMENTS

NUREG-0659

ADVANCE COPY

The following comments are offered on NUREG-0659, Staff Supplement to the Draft Report on Human Engineering Guide to Control Room Evaluation, Advance Copy:

GENERAL COMMENTS

Page IV-1, Section IV, Systems Review: In general, we agree with the approach given in this section. However, because of the extent of work required to accomplish this task on the existing generating units, it is recommended that this work be divided into at least three phases in order to best meet the objectives of NUREG-0700 for those systems which would have impact on plant safety. In the first phase, the specified systems review work would be performed on the nuclear safety related systems for the postulated transients and accident conditions. Completion of this first phase would be required within 1 year following release of the NUREG-0700.

The next phase would encompass the systems review effort on the nuclear safety related and respective support systems by considering those operating modes along with systems and equipment failures and operating errors which can induce the postulated transients and accident conditions. During this phase, the review would also cover additional plant systems which are not nuclear safety related but which, if misoperated, may induce conditions leading to the postulated transients or accident conditions. The third phase would cover the systems review of the remaining plant systems not included in the previous phases. The second and third phases would be performed in serial order of 1 year intervals each following the first phase.

The rationale for recommending the above alternative is the desire to direct the limited available human engineering and technical resources to the most critical systems and respective controls and displays in the control room in the first year. Otherwise, the problem we see is the potential for many errors which would be induced by an overly accelerated systems review and resultant control room design review efforts on all plant systems to comply with the prescribed 1 year period.

SPECIFIC COMMENTS

1. Page III-8, Paragraph a, and Page III-28, Paragraph b: These paragraphs state that the normal panel reading distance is from 16 to 28 inches. This distance is satisfactory for a sit down board design but should not necessarily apply to a sit-stand or standup board design. Longer viewing distances may be desirable for some board designs to provide the reactor control operator with a wider readable area as needed depending upon the usage. Therefore, it is recommended that the guide be revised to reflect that appropriate viewing distance ranges be established by the control room design team as criteria for the board design.

2. Page III-30, Paragraph 6.6.1.1:

- a. The consideration of frequency should include the consideration for duration. For example, certain controls should be arranged for convenient use by the control operator when making analog adjustments.

Also, the concept of frequency of use should be clarified as used in this guide. For example, various high priority functions may have a low frequency of use over a calendar period. However when used, these may have a very high frequency of use for short (say under 1/2 hour) intervals.

- b. Second Paragraph and Figure entitled, "Preferred Manual Area": This guideline seems to rule out the combination control desk-vertical board design. The figure would promote board designs which would induce operator fatigue particularly when making analog adjustments. Out of necessity based on years of operating experience, high priority control stations involving analog adjustment dials, control switches, pushbuttons, and other devices have been placed on the control desk with the respective displays located in the sloping and vertical sections of the board immediately above the controls. By so doing the operator can assume a more relaxed arm position while accomplishing his control actions. Therefore, it is recommended that the guide be revised to allow the use of this design concept.

3. Page III-32, Paragraph 6.6.1.2.b and c: As written, these paragraphs appear to stress the importance of using the red and black borders as specified in lieu of color shading or other demarcation techniques. For some control board designs, such border markings can cause considerable confusion to the operator. Therefore it is recommended that the guide be revised so that equal importance is placed on the alternative demarcation techniques, rather than emphasizing the preference for the 1/16 inch borders. Also these should be referred to as examples of demarcation, and more emphasis should be placed on the need to develop and evaluate the demarcation method.

4. Page III-34: This page appears to be redundant to III-32.

5. Page III-36, Paragraph 6.7.1.2: An additional relationship should be noted in this paragraph as follows, "the encroachment of the functional results on the operating (particularly Technical Specification) limits."

6. Page III-39, Paragraph c: The control-display relationship as given in this guide may induce operator errors since it is inconsistent with the normal relationship of displays immediately above the respective controls. No problems would be expected if this concept were followed uniformly throughout the board in lieu of those specified in Paragraphs 6.7.2.1 and 6.7.2.2. However if this is used in conjunction with the other arrangements, there will be a greater risk of operator errors when compared with using the left to right control orientation with respect to top to bottom display orientation (as related to sequence of use).