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COMMENTS ON DG-1052 / RESPONSE TO ACRS COMMENTS ON DG-1040

As a member of the ANS working group that developed ANSI/ANS-58.8-1994, I wish to comment on that Standard and on the proposed Reg Guide that would endorse it.

REVIEWED BY: DR. USNRC

General

As stated in both those documents, it is plant design criteria, and not human performance criteria, that the methodology provides, supporting the analysis of design basis events in SARs. The methodology is unique in that it substantively addresses the issue known in human factors jargon as "function allocation." It is, I believe, commendable in doing so with only a modest extension of the existing plant safety analysis framework. And it is hard to dispute that it is far more practical, objective, empirically-based, and safety relevant than the competing "state-of-the-art" methods urged, if not imposed, by Section 4.4.3 of NUREG 0711 (Human Factors Engineering Program Review Model).

Response to ACRS Comments on DG 1040

In a letter dated November 14, 1995, the ACRS raised several objections to DG-1040, which are discussed below.

1. "We find no technical basis for the estimates of minimum times for operator actions in ANSI/ANS-58.8-1994." - The technical basis is for the criteria on time response, rather than for any particular time estimates, and that basis is summarized in the Appendix to the 58.8 Standard. In contrast, time estimates are based largely on analysis of the time required for the operator's tasks, guided by the rather conservative rule to allow one minute per manipulation. The technical basis for any particular time estimate remains the responsibility of the analysts, who must be able to justify their modeling of operator tasks as well as that of transient phenomena, plant system responses, etc. It seems reasonable that analysts' estimates are likely to be improved by use of a consistent approach to producing mandatory details. Likewise, independent reviewers should find a standard analysis easier to scrutinize and critique.
2. "Comparison of the recommended times with results from exercises done on plant simulators does not demonstrate that these times are appropriately conservative." - This objection has several interpretations. The problems of generalizing from simulator results to the real world have been noted elsewhere, but the lack of practical alternatives leaves little choice. Given that constraint, as is described in both 58.8 and 1040 (and with more caution, in 1052), exercises on plant simulators *did* show the times to be conservative, unless the multiple studies of General Physics, Westinghouse, and APG/ORE are being altogether held in doubt. So the question must revolve around the issue of *appropriate* conservatism, which may be equated in this analysis with the confidence level selected. Although arbitrary, the 95% level is certainly not without scientific precedent. And until a more appropriate level can be specified, it is a more conservative value than is currently endorsed.
3. "Consequently, we... do not believe that this endorsement is the appropriate way to resolve Generic Safety Issue B-17." - Or even an acceptable way? Or at least, better than nothing? Nobody has yet suggested that 58.8 is worse than nothing...but considering how long B-17 has gone unresolved, the "inadequacy" of the industry Standard approach, and the lack of viable alternatives, it may be concluded either that B-17 is not really a serious safety issue, or that we believe our luck is better off as it is.
4. "The Standard does not address operator response times for advanced nuclear power plants." - I see no reason, in terms of sufficient conservatism anyway, to expect a different standard to apply. All else being equal, advanced plants tend to add margin to the time available for action. The issue then becomes whether more actions are required, or whether the one-minute-per-manipulation thumbrule has become invalid. The former issue is addressed by the existing methodology. The latter issue may be a viable concern. However, if unexpected process delays and added workload at the man-machine interface are

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sufficient to offset the improved time response margins of the advanced plants, it will not be due to the inadequacy of the 58.8 methodology. And certainly, during advanced control room ITAAC execution, the continued validity of the one-minute-per-manipulation assumption could be readily tested.

5. "We find [staff use of ORE results] to be inappropriate because these experiments were not subjected to independent peer review and the staff did not have access to the actual data collected." - My impression is that this is a matter of degree. I thought some of the ORE results were published in the open literature, and some of the results were available to the Working Group's consultants (DG 1052 Ref.s V-8 & V-9); thus some may yet be available to the Staff. More important, the ORE work was a something of a test of the results of earlier studies in which the staff was involved (DG 1052 Ref.s V-5, V-6 & V-7). The ORE work failed to invalidate the earlier studies. But neither the ACRS nor the ORE work disputes the original studies. So I don't really find this to be a strong objection to the Standard's endorsement.

Respectfully submitted on January 24, 1997 by Robert D. Fuld, Member, ANS-58.8 Working Group.

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