

CT-2091

PDR 3/25/94

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5 August, 1993

Dr. Med El-Zeftawy
ACRS
Dear Med:

Below are my comments on the staff document referenced, and on the subcommittee meeting of August 4, 1993 held in Bethesda.

COMMENTS ON STAFF DOCUMENT

Policy Issues Analysis and Recommendations for Passive Plants

General Comments

It appears that the staff has concluded that the basic safety philosophy undergirding the development being formulated by the various vendors for the passive design of safety systems for advanced reactors can not be supported. The philosophy, and the resulting approach to plant design, is based on the assumption that systems required to cope with design basis accidents can be designed so that virtually no active components (pumps, valves, motors, and the associated sources of motive power, e.g.) are required. It has thus been concluded by the designers that the systems, structures and components that need to be designated as Class 1E are almost exclusively passive systems.

The staff's conclusion is based, at least partly, on the fact that there is no operating experience with many of the systems which are responsible for coping with design basis accidents. The situation is further obscured by the fact that existing codes, practically all of which have been developed to analyze the thermal hydraulic behavior of operating plants, have not been validated for many of the coolant flow regimes that are postulated to exist in the passive plants in off-normal situations. Thus there is low confidence in the coolant flow behavior predicted by these codes for certain off-normal behavior of the passive plants.

As a result, the staff is requesting that the Commission approve a position that, in effect, requires that a number of systems, which the vendors would classify as non-safety systems, must be designed and regulated almost as if they were safety systems. However, the

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staff is apparently reluctant to say that this is what is being requested. This leads to a somewhat Alice-in-Wonderland use of language in which "risk significant" systems (one might have thought that such systems would be safety systems) are singled out for special attention.

The term risk significant is, however, not defined. Rather it appears to be left to the designer to determine which systems are risk significant. (Nevertheless, if previous experience is any guide, the staff review will eventually have a "significant" influence on the eventual determination of which systems are risk significant.) These systems are then required to receive special attention (Not yet well specified) in the design, construction and operating phases of the proposed reactors.

It is hard to believe that the proposed approach will lead to a predictable licensing process. Furthermore, even if the design should eventually be certified, the uncertainty in the COL stage is likely to be such a major hurdle that no US utility ever is likely to apply for a license. I must say that I have some sympathy for the staff in this situation. It is hard to see how one can achieve the necessary confidence in the off-normal behavior of these passive systems without building and operating what is almost a full scale prototype. But if this is what the staff has concluded, it would make a lot of sense to say this rather than to proceed on a path that is unlikely to come close to the original goals of the designers.

I recommend that the ACRS explore this issue further. If, in the view of the committee, the result of the process now being promoted by the staff is likely to produce a certified design with sufficient unpredictability in the COL process that no US utility is likely to apply for a COL, I think the ACRS has a responsibility to call this to the Commission's attention. My initial impression was that the staff believed that what was being proposed was acceptable to the industry. It was only in informal conversation during breaks in the subcommittee meeting that industry representatives expressed serious reservations about the direction which the process is taking. It may well be that the Commission also has the impression that the industry finds the present approach acceptable.

Specific Comments

1. On page 5 of the document reference is made to "a large release frequency of $1.0E-6$ per year" as a "safety goal guideline". Since the staff previously recommended that the task of defining a large release be abandoned, and the Commission approved this recommendation, it is puzzling to see it being resurrected in this situation. This issue was discussed during the subcommittee. The staff seems reluctant to abandon the statement for reasons that are

not clear to me. It appears useless to adopt a criterion which requires the calculation of a quantity (the large release) which is not now defined, and is not likely to be defined in the future.

2) On page 2 it is indicated that there are "inherent (emphasis added) phenomenological uncertainties associated with passive systems". Later in the same paragraph it is stated that "these uncertainties will be reduced" by some combination of testing and analysis. It is not clear how inherent uncertainties can be reduced in this way. And indeed if past experience is any guide, research may increase the uncertainties.

3) The document indicates that an applicant for certification will be required to generate a PRA which will produce not only mean values, but uncertainties as well. Since the only numerical goals mentioned in the document are mean values, how are the uncertainties to be used by the staff?

4) On page 4 a statement is made that the "designer must provide a systematic evaluation of adverse systems interactions between the active non-safety and passive systems." (Presumably the reference is to passive safety systems.) The GDC require that the failure of non-safety systems not disable a safety system. During the subcommittee meeting the question was raised as to whether this statement was meant to go beyond the GDC requirement that the failure or malfunction of a non-safety system must not disable a safety system. The answer was that it was not. It might be well either to state this, or to leave out the statement entirely. Otherwise it may be interpreted as a new requirement requiring a policy change.

5) As pointed out by Pete Davis in a memo to El-Zeftawy dated July 28, 1993, the last line of the first full paragraph of the paper refers to an objective of lowering "the uncertainties of passive safety systems performance to acceptable levels". When asked what this acceptable level is, the staff responded that it is as yet undefined.

Sincerely,

Bill Kerr

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