



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

March 20, 1984

Mr. William J. Dircks
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Dircks:

SUBJECT: ACRS REPORT ON DRAFT TASK ACTION PLAN - CONTAINMENT PERFORMANCE GUIDELINES - JANUARY 4, 1984

During its 287th meeting, March 15-17, 1984, at the request of the NRC Staff, the ACRS reviewed the Draft Task Action Plan, Containment Performance Guidelines (CPGs), dated January 4, 1984. In its review, the ACRS had the benefit of discussions with representatives of the NRC Staff and of a Subcommittee meeting held on March 14, 1984.

Enclosure 2 of the Draft Task Action Plan poses a series of questions to the ACRS. The following comments will tend to be structured about the Staff's questions. The essence of the ACRS comments is that the containment should be a major contributor to the defense-in-depth philosophy, including coping with accidents beyond the design basis. The ACRS favors the development of CPGs.

Question 1

Does the ACRS agree with the problem statement? If not, how should the problem be stated?

Answer

The problem statement appears to be given on the bottom of page 3 of the draft document. It does not address the issue of why CPGs should or should not be established. It is necessary to address this issue in order to decide on the form the guidelines should take.

The problem description ties the usefulness of a containment design objective to the usefulness of current methodologies for assessment of containment performance. This is an unnecessary and inappropriate restriction. Had a similar restriction been applied to the development of other currently used design criteria, many would never have been adopted.

Question 2

Does the ACRS agree with the statement of objectives? Should there be any additions or deletions? Please list them.

Answer

The list of primary and secondary objectives is fairly extensive. However, containment performance for a specific reactor will hinge on the relative frequency of all the accidents in the entire spectrum. It is not clear how (or whether) the Staff plans to address this matter and factor it into the containment assessment. For example, recent NRC Staff actions on resolution of some unresolved safety issues seem to have focused on core melt probability, rather than risk, for perspective into decision making on acceptability of a proposed resolution. Since the accident sequences most important to risk are frequently not the largest contributors to core melt frequency, we question such an approach.

The listed objectives do not include an attempt to provide assurance that containment is a major contributor to defense-in-depth. We believe that this is a very important objective.

In item g, it is stated that various containment designs are to be treated in a relatively consistent manner; however, in item h, "special credit" for specific design features is proposed. It is not clear whether these two statements are partly in conflict.

In item g, it is not clear that, "to reflect the uncertainties, one must prescribe a range of values," or, if so, how one will use such a range. Under "Selected Phenomena," achieving improved containment performance by improved containment heat removal measures is not mentioned. The reason for this omission is not clear. Finally, it is not clear whether external phenomena are to be explicitly included in the assessment.

Question 3

Six proposed alternatives are the PRA, deterministic, a combination of the deterministic and PRA alternatives, translate the Safety Goals back to compatible containment performance goals and write a set of specifications based on the familiar design basis approach taking care to make the new specifications consistent with existing regulations and the approach outlined by ACRS in NUREG-0739. What does the ACRS view as the advantages and disadvantages of each approach? Does ACRS have a preferred approach? If yes, why is it preferred? Is any approach more compatible with the safety goals than others? If yes, which one? and why?

Answer

We question whether using PRA alone will be workable, partly because of large

uncertainties, partly because of differences of opinion to be expected among different groups analyzing the problem.

Developing containment guidelines solely from the quantitative safety goals suffers equally from a strong dependence on PRA. It also might permit a situation where containment would not be needed because the safety goal was met by a combination of melt prevention and emergency procedures.

We question whether an approach which uses only existing regulations and past experience can provide a basis for deciding on containment performance requirements for severe accidents.

During the Subcommittee and Full Committee meetings, the NRC Staff said it had considered the matter further and had narrowed the field down to four alternatives which they labeled as follows:

1. probabilistic - threshold model
2. probabilistic - leak-before-break model
3. deterministic - figure of merit
4. deterministic - specification of performance criteria

We question the first two, if they are to rely solely on PRA. We also disagree with choosing a model which arbitrarily assumes how the loss of containment integrity will occur. We are skeptical of the deterministic models, in particular their use of subjective, numerical weights for a set of containment performance factors.

We prefer something like the hazard state approach described in NUREG-0739, by which containment would be required to contribute appropriately to defense-in-depth.

Question 4

What are the uncertainties that the ACRS believes are associated with the approach? How should the uncertainties be ranked? What weight of importance should be assigned to the uncertainty?

Answer

The ACRS, the NRC Staff, and others have identified various sources of uncertainty associated with containment performance. We need to be shown that the proposed system of rankings or importance weight is an appropriate way to proceed.

Question 5

The Staff is interested in receiving input from as many knowledgeable sources as possible. We plan to solicit input from outside NRC and are considering EPRI, INPO, AIF, NSSS vendors, public action groups, and foreign regulatory groups. In particular, in the latter two groups are there specific groups we should solicit views from?

Answer

We suggest discussing the matter (and ascertaining current containment philosophy) with regulatory groups in all countries developing their own approach to LWR regulation, including the United Kingdom, France, West Germany, Switzerland, Italy, Sweden, and Japan.

Question 6

Does the ACRS have an opinion on whether there should be different CPGs and design objectives for existing and future plants? If yes, how should they be different?

Answer

We believe that there should be different containment performance goals and design objectives for existing and future plants. The flexibility with which the design of existing plants can be modified is severely constrained. Some changes that would be relatively straightforward in new plants may be very costly or impractical in existing plants.

The CPGs for new plants should be more ambitious and should consider (and possibly include) the effect of such steps as are feasible to minimize the frequency or even the potential for large airborne releases of radioactive material.

Question 7

Does the ACRS believe it is preferable to have numerical guidelines or goals in the CPGs and design objectives? If yes, what would representative values be? How would one relate these values to the safety goals?

Answer

We believe it would be useful to try to define quantitative goals in the CPGs and design objectives. As noted above, these would be different for future and current plants, and may have to vary among classes of current plants. Such goals would have to be constructed in a way which allows for

some very low probability accidents that negate containment effectiveness. There may be need for a separate performance guideline on the frequency of such accidents.

The Safety Goal Policy should provide a rough perspective on such decision making. However, considerations of large uncertainties, of the desirability of having defense-in-depth, and of the large economic cost of a core melt (even if no significant off-site releases result) may lead to a choice of design objectives for core melt frequency and containment performance whose combined effect is not directly derived from the safety goals.

Question 8

If one defines an attribute as, "a characteristic of an alternative which is capable of being evaluated in terms of its utility contribution to the composite utility for a specific objective," the classes of attributes below are intended to fully characterize the six approaches in B.3. Is the set complete? What additions and deletions would ACRS recommend? Why? What "weight" would ACRS recommend? Why? What "weight" would ACRS assign to each class of attributes, if any, (and each attribute include later)?

- a. Viability of alternatives;
- b. Credibility of improvement;
- c. Acquisition cost of achieving (implementing?) alternative;
- d. Impact on NRC;
- e. Impact on industry; and
- f. Expected overall benefits.

Answer

We are skeptical that the decision on this matter should be made by a weighting of various attributes. Therefore, we will not at this time attempt to recommend "weights."

Question 9

Does the ACRS consider the existing containment performance requirements adequate for design basis accidents? If not, where do inadequacies exist and how should they be fixed?

Mr. William J. Dircks

- 6 -

March 20, 1984

Answer

The NRC Staff deleted this question from the list at the March 15-17, 1984 Committee meeting.

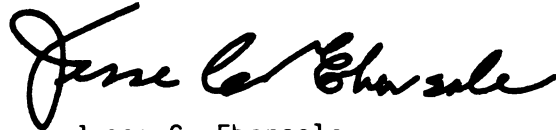
Question 10

Should as much credit be given to containment integrity for meeting the safety goal in severe accidents as for meeting the regulatory requirements for dealing with design basis accidents? If yes, why? If no, why not?

Answer

Yes, but in a context which does not evaluate severe accidents in the same way current design basis accidents are analyzed. One is interested in actual capability, not the meeting of design and regulatory requirements.

Sincerely yours.

A handwritten signature in black ink, appearing to read "Jesse C. Ebersole". The signature is fluid and cursive, with a large initial "J" and "E".

Jesse C. Ebersole
Chairman