

UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D. C. 20555

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MEMORANDUM TO:

Brian Sheron, Director Division of Reactor and Plant Systems Office of Nuclear Regulatory Research

FRCM:

Stuart A. Treby, Assistant General Counsel for Rulemaking and Fuel Cycle Office of the General Counsel

SUBJECT:

REVISION OF ECCS RULE, 10 CFR 50.46 AND PART 50, APPENDIX K

We have received the package containing the proposed revision to the ECCS rule. The package consists of a brief SECY paper, a draft Statement of Considerations for the final rule, a draft regulatory guide ("RG"), summary of public comments on the rule and the RG, an environmental assessment ("EA"), and a regulatory analysis. There are a number of concerns with the proposed revision which I propose representatives of OGC discuss with members of your staff at a meeting on Tuesday, May 24, 1988 at 1:00 p.m. The areas of concern are discussed below in this memorandum. Other comments are redlined on the proposed final rule, RG, etc. Mr. Geary S. Mizuno should be contacted (x21639) if there are any questions before the meeting.

(1) The use of the terms, "realistic" and "best-estimate" is confused throughout these documents. According to the first sentence of footnote 1 of the RG (Enclosure F), both terms "have the same meaning." However, the second sentence of footnote 1 defines best-estimate, but not realistic, as embodying those techniques that attempt to predict realistic response without conservatism. By not mentioning the term, "realistic", the second sentence implies that there is a difference between "realistic" and "best-estimate." Is there a difference? If not, then use one term or the other; do not use both terms. We also note that a member of the ACRS indicated that the Staff's use of the term, "best-estimate" was incorrect. Is the ACRS comment valid? This is a further reason to drop the use of "best-estimate", and exclusively refer to "realistic" techniques.

The Statement of Considerations for the proposed final rule uses the terms "realistic" and "best estimate" without defining them or noting their interchangeability. This should be done at the very beginning of the Statement of Considerations.

There are a number of places where conservatism is recommended for "best-estimate" calculations. See pp. 10, 38. In other places, the RG refers to "uncertainties and blases." See pp. 19, 23, 25, 26. Yet footnote 1 states that "best-estimate" techniques do not include

8905100241 890504 PDR PR 50 52FR6334 PDR assumptions which provide a conservative bias. What is correct? Related to this concern is the meaning and effect of the statement (common to pp. 19, 23, 25 and 26) that "uncertainties and biases of a correlation or model should be stated as well as the range of applicability." Is this at odds with the regulatory scheme that requires uncertainty to be quantified in accordance with Section 2?

(2) The proposed final rule requires quantification of the uncertainty in the realistic/best estimate calculations. Apparently, Section 2 of the RG is intended to provide guidance on demonstrating uncertainty. However, the RG goes on to refer to this uncertainty quantification in terms of a "95% probability level." Section 2.4 goes on to discuss "statistical treatment of calculational uncertainty. This does not sound like what is normally understood as "statistical."

The RG refers to "examining the influence of the individual parameters on code uncertainty." This sounds like a sensitivity analysis, where one attempts to determine how much the results vary as input parameters are changed in value. Uncertainty, on the other hand, normally refers to the degree of confidence one has in the accuracy of a measurement. Exactly what is being asked for in the RG? Also, is it correct to use the term, "probability level?" The RG also uses the term, "confidence level;" how does the Staff define this term and how does it differ from "probability level?"

(3) According to the Statement of Considerations for the proposed final rule, Enclosure E, p.8., the new reporting requirements are not a backfit, since they are not new but merely represent a "clarification and relaxation" which will now appear in the Code of Federal Regulations. This is not consistent with the Backfit Rule. According to 10 CFR 50.109, a backfit is defined as:

> the modification of or addition to systems, structures, components or design of a facility...which may result from a new or amended provision in the Commission's rules or the imposition of a regulatory staff position interpreting the Commission rules that is either new or different from a previously applicable staff position... (emphasis added).

The existing ECCS does not have reporting requirements; nor does the Staff have any guidance on reporting. Hence, the new reporting provisions are not "clarifications," but in fact are new requirements. Hence the Backfit Rule applies. Even if the new requirements represented "relaxations," the Backfit Rule would still apply since there is no exemption for "relaxations," as opposed to more burdensome requirements.

For much the same reason, the assertion on p. 23 of the Statement of Considerations that a backfit analysis is not required because the

proposed final rule does not require a change but "only offers additional options," is also incorrect.

- (4) With regard to the new reporting requirements, Section 50.46(a)(3)(i) of the proposed rule states that when realistic modeling is employed, a significant change or error is defined to include the "sum of the absolute magnitudes" of a cumulative set of changes. By contrast, where the existing Appendix K modeling is employed, the revised Appendix K, Section I.C.5.b defines significant change quite differently, viz. the "net effect of an accumulation of changes." What is the reason for this difference?
- (5) The Statement of Considerations in particular, the backfit analysis and the discussion of no significant environmental impact, as well as the environmercal assessment (Appendix H) and the regulatory analysis (Appendix I) are deficient in handling various aspects of cost/benefit (including risk):
 - a. The Statement of Considerations' finding of no significant impact refers to a 5-10% increase in total power, and indicates that it is based on the EA finding that such a power increase will not cause a difficulty in meeting existing "environmental limits." 1/ However, the EA (Enclosure H) does NOT refer to a maximum 10% increase in total power. Rather, the EA refers to a maximum expected increase of 5%. Hence, there is no basis for the Statement of Considerations' finding of no significant impact.
 - b. The Statement of Considerations relies on the EA for the finding that there will be no difficulty in meeting existing radioactive effluent limits. The EA discussion (at p.3) is cursory, and without appropriate references or technical bases for the assertions in the text. For example, there is no basis for the assertion of a linear relationship between power level and fission inventory. Second, it is unclear why a small increase a power would not have a significant effect on the utility's ability to meet effluent limits. For example, if a plant were operating near or at the 10 CFR Part 20 effluent limits, a small increase would be significant. Thus, the EA is

^{1/} The use of the term, "environmental limits" is imprecise. We should refer to the Commission's radioactive effluent limits here. This will also serve to strengthen the discussion distinguishing the Commission's authority over radioactive effluents, versus the authority of EPA to regulate other "environmental limits" such as thermal water discharges.

again an inadequate basis for the Statement of Considerations' finding of no significant impact.

c. The Statement of Considerations' backfit analysis also refers to the 5-10% increase in power level (see p.24), and refers to the regulatory analysis' conclusion (Enclosure I) that there will be "negligible" increase in fission product inventory. As discussed above, the appropriate figure is 5%, not up to 10%. Also, neither the backfit analysis nor the regulatory analysis have any references, citations or other basis for assertion of the linear relationship between power and fission product inventory.

- d. In responding to a commenter, the Statement of Considerations indicates that based upon the regulatory analysis, the choice of realistic versus conservative modeling has little effect on public risk since the probability of a large break is so low. Looking on p.6 of the regulatory analysis, however, discloses only a repeat of the assertion in the Statement of Considerations with no apparent basis. There is a reference to a "limited generic analysis of the effect on safety" in the next sentence. However, the nature of this "generic study" as described on p.4 of the SECY paper, does not appear to provide the technical basis for a conclusion on the probability of a large break LOCA and its effect on risk 2/. Moreover, it is only a draft report.
- e. The regulatory analysis, in common with the documents discussed above, is inconsistent in referencing the increased power level attributable to the rule change. On one hand, at the top of p.5 it references a 5% increase in power. However, in the next paragraph, a 5-10% power level is discussed. And on p.9 of the regulatory analysis, a 4-6% figure is mentioned twice. These inconsistencies within this document, and among all documents supporting the rule change, must be eliminated.
- f. The RG makes reference to "elimination of a ECCS system," or reduction in, inter alia, surveillance requirements as a potential consequence of the rule change. See p.6. What did the Staff have in mind here? The rule requires an ECCS system. How can a utility eliminate a required system? And how does

^{2/} This document, entitled, "Compendium of ECCS Research for Realistic LOCA Analysis," is described in the SECY paper as "identif[ying] and describ[ing] the NRC methodology for the estimation of the uncertainty of thermal-hydraulic safety analysis codes."

the rule affect the need to conduct surveillance? If the proposed final rule permits this, then the regulatory analysis is entirely inadequate, as well as the Statement of Considerations, since these consequences are not discussed, or inadequately discussed.

- (6) The RG value/impact analysis relies upon the regulatory analysis performed for the final rule (Enclosure I). This does not appear to be acceptable, since the final rule regulatory analysis only evaluated the rule itself, and did not evaluate the impacts of the RG's guidance itself. In order to rely upon the regulatory analysis, a statement has to be made that the regulatory costs and benefits are the same as the final rule, so that a separate analysis is not necessary.
- (7) The RG contains recurring deficiencies of the same type. While individua, problems are marked in red on the draft, it would be useful to discuss them in a generic fashion:
 - a. There are a number of places where models are required to account for certain factors, but where no validation with existing data, test results or code predictions (to the extent possible) is required. See, e.g., RG Sections 1.2.2, pp.12-13; 1.2.3.1, p.14, where several factors relevant to fuel-cladding gap calculation are required to be accounted for, but validation against appropriate data is not required in all cases.
 - b. The requirement to validate models using "appropriate data and analyses" is good. See, e.g., RG Sections 1.2.3.6, p.16; 1.2.3.8, p.24. However, the RG doesn't specify what constitutes appropriate data and analyses. Why not? In some, but not all cases, the Staff lists those data sets or test results which the Staff believes should be used in validation. See, e.g., RG Sections 1.2.3.5.1, p.17; 1.2.5.1.2, p.20. Why isn't this done in all cases? For example, why doesn't the Staff list what it believes to be applicable data for validating modeling of total fluid flow leaving the core exit, RG Section 1.2.13.2.1, p.29?
- (8) Enclosure J is characterized in the SECY paper as an "additional discussion regarding the inherent margin in the 2200 degree limit." SECY paper, p.3, see also p.8. In fact, the Appendix is largely devoted to whether 2600 degrees represents a "real limit" above which significant fuel damage would occur. The first paragraph of Appendix J asserts, without supporting references or documentation, that the 2200 PCT limit was "based on a large body of research" which is "well founded and equally valid today." However, the remaining discussion, in discussing whether 2600 degrees is a "real" limit, states that "recent experiments show that control rod failure can occur below 2200 degrees in such a way

that fuel cladding damage may result." The discussion concludes, "some margin above 2200 degrees exists, but it is too uncertain to quantify at this time." This simply does not qualify as a showing of an "inherent safety margin" above 2200 degrees; in fact it shows the opposite. What is Appendix J supposed to do, with regard to this ECCS proposal? Why is the Appendix necessary? The characterization of Appendix J in the SECY paper must be changed to accurately reflect the purpose and contents of the Appendix.

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