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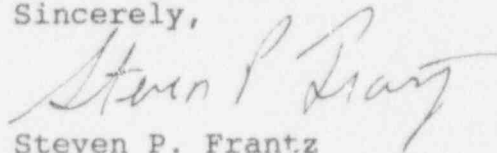
Mr. William T. Russell, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Bill:

In preparation for the meeting on November 2, 1994, between General Electric and the NRC Staff regarding the application of Section 50.59 to the severe accident evaluations in Chapter 19 of Tier 2 of the Design Control Document, Joe Quirk asked me to forward to you the enclosed paper. This paper describes a proposed process for controlling changes to the severe accident evaluations, and it explains the bases for the proposed process.

We look forward to discussing this matter with you and to answering any questions you may have.

Sincerely,



Steven P. Frantz

Enclosures
cc(w/encl):

Dennis M. Crutchfield
Richard W. Borchardt
Jerry N. Wilson
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PROPOSED CHANGE PROCESS RELATED TO THE
SEVERE ACCIDENT EVALUATIONS IN CHAPTER 19

I. Introduction

The purpose of this paper is to describe a proposed process for controlling changes by an applicant or holder of a combined license (COL) with respect to the probabilistic and deterministic evaluations of severe accidents contained in Chapter 19 of Tier 2. This proposed process is contained in Section 3.8 of the Design Control Document (DCD) for the Advanced Boiling Water Reactor (ABWR) submitted by General Electric (GE) on October 28, 1994.^{1/}

II. Executive Summary

There will be a number of controls for plant-specific changes in the DCD, including controls on changes related to applicable regulations, Tier 1, Technical Specifications, Tier 2*, and Tier 2 in general. In addition to these numerous controls, Section 3.8 of the DCD Introduction for the ABWR identifies a proposed process for controlling changes related to the severe accident evaluations in Chapter 19. The proposed process in Section 3.8 consists of two parts:

- 1) screening criteria, which would require a safety evaluation for changes that would adversely affect the

^{1/} The process preferred by GE was provided to the NRC in Section 3.8 of the DCD Introduction for the ABWR submitted on September 7, 1994. The NRC Staff rejected this process. GE has therefore revised Section 3.8 in an attempt to identify a process acceptable to the NRC Staff.

function of an important feature identified in Section 19.8 or that would eliminate or preclude a function identified in Chapter 19 as serving to prevent or mitigate a severe accident.

- 2) a requirement that a change be subject to prior NRC approval as part of a COL or COL amendment, if a safety evaluation determines that the change would result in a significant increase in the probability or consequences of a severe accident evaluated in Chapter 19.

The purpose of the screening criteria is to identify those changes that might have an appreciable potential for affecting the severe accident conclusions in Chapter 19. Screening criteria for changes in severe accident evaluations are warranted because most changes are expected to have no effect on the overall results of the evaluations. Thus, imposition of a requirement to perform safety evaluations for all changes in Chapter 19 would be an unwarranted expenditure of industry resources, and would divert the attention of plant management from more important safety issues.

The purpose of the second part of the change process is to allow a change to be made without prior NRC approval unless the change involves a significant increase in the probability or consequences of a severe accident. Not all increases in the probability or consequences of severe accidents are significant from a safety standpoint. Minor increases in the probability of some accident scenarios will not affect the overall core damage frequency or the conclusions of the severe accident evaluations. Therefore, changes that result in insignificant increases should not require prior NRC review and approval. Furthermore, requiring prior NRC review and approval for all changes that

increase the probability or consequences of a severe accident evaluated in Chapter 19 would result in an unwarranted expenditure of resources by both the NRC and licensees.

III. Discussion

A. Background

In general, changes to Tier 2 of the DCD will be controlled by the change process in 10 CFR 50.59. However, Section 50.59 was developed to apply to the evaluation of design basis accidents in safety analysis reports (SAR) for Part 50 plants. For several reasons, it would be inappropriate to apply the literal language in Section 50.59 to severe accident evaluations in Chapter 19 of Tier 2. First, interpreted literally, Section 50.59 would require a safety evaluation of all changes in the evaluations in Chapter 19; however, Chapter 19 contains numerous evaluations which are intended to demonstrate that certain severe accident conditions and accidents are inconsequential to safety. It would be unnecessarily burdensome to require preparation of a safety evaluation for minor changes related to such evaluations. Second, under a literal application of Section 50.59, any increase in the probability or consequences of severe accidents evaluated in Chapter 19 would require prior NRC approval, even if the increase is trivial (e.g., an increase in probability from $1E-9$ to $1E-8$). The resources of both the NRC and licensees would be better spent on matters that are more important to safety. Therefore, the change control process for the severe accident

evaluations in Chapter 19 should reflect the special nature of those evaluations.

Furthermore, the change process for Chapter 19 should also account for other existing controls on changes that help ensure that changes will not significantly increase severe accident risks. In particular, the following controls exist for plant-specific changes in the DCD by a COL applicant or licensee:

- 1) Any change that does not comply with an applicable regulation requires an exemption under 10 CFR § 50.12.2/
- 2) Under 10 CFR § 52.63(b)(1), any change in a provision in Tier 1 of the DCD requires an exemption and NRC approval as part of a COL or COL amendment.
- 3) Any change in a provision designated as Tier 2* will be subject to a special process involving the NRC Staff.^{3/}
- 4) Under 10 CFR §§ 52.63(b)(2) and 50.59, any change to the Technical Specifications requires a COL amendment.
- 5) Under 10 CFR §§ 52.63(b)(2) and 50.59, any change in Tier 2 involving a unreviewed safety question, as traditionally defined in relation to design basis accidents, requires prior NRC approval in the form of a COL or COL amendment.

^{2/} At the very least, such applicable regulations will include the provisions in 10 CFR Parts 20, 50, 73 and 100. The NRC Staff has also proposed to designate certain of its positions on severe accidents as "applicable regulations."

^{3/} Section 3.5 of the DCD Introduction for the ABWR states that changes to Tier 2* require prior NRC Staff approval. It is our understanding that NRC is also considering other processes for Tier 2* changes, such as negative NRC consent or designation of such changes as unreviewed safety questions.

Thus, any controls on changes related to Chapter 19 will be in addition to these numerous other controls.^{4/}

B. Description of the Proposed Change Process Related to Severe Accident Evaluations in Chapter 19

In addition to the numerous controls discussed above, a proposed process for controlling changes to Chapter 19 has been included in Section 3.8 of the DCD Introduction for the ABWR.

The proposed process in Section 3.8 would consist of two parts:

- 1) screening criteria to determine whether a change related to Chapter 19 warrants further safety evaluation.
- 2) for those changes warranting further safety evaluation, criteria for determining whether the change requires prior NRC approval as part of a COL or COL amendment.

Each of these parts is discussed in more detail below.

Additionally, the entire process is reprinted in full in Attachment 1, and a flow chart of this process and its relationship to other change processes is depicted in Figure 1.

^{4/} Given the five change control processes described above, additional controls on changes related to Chapter 19 are not necessary to provide adequate protection for the public health and safety. Additional controls on changes to Chapter 19 would exceed the controls currently applied to changes by Part 50 licensees (who are not required to consider the impacts of changes on the probability or consequences of severe accidents). Additionally, in its severe accident policy statement (50 Fed. Reg. 32138 (1985)), the Commission concluded that additional protection against severe accidents risks at Part 50 plants was not necessary to provide adequate protection for the public health and safety. Nevertheless, the industry has consistently taken the position that additional controls on changes related to severe accidents for Part 52 plants would be appropriate. See, e.g., Enclosure to the letter dated October 8, 1992, from Raymond N. Ng (NUMARC) to Dennis Crutchfield (NRC).

C. Part 1 - - Screening Criteria

The purpose of the screening criteria is to identify those changes that might have an appreciable potential for affecting the severe accident conclusions in Chapter 19. In general, it may be expected that almost all such changes will involve an important feature in Section 19.8, because the stated purpose of Section 19.8 is to identify "those features that contribute significantly to the mitigation or prevention of a particular accident sequence or event scenario." Therefore, the first screening criterion refers to the important features in Section 19.8. Additionally, in response to directions from the NRC Staff, a second screening criterion was developed to encompass the remainder of Chapter 19. The second criterion requires that a safety evaluation be performed for any change that would eliminate or preclude a function identified in the text of Chapter 19 as serving to prevent or mitigate a severe accident.^{5/}

Together, the two criteria provide assurance that any change that could significantly affect the results of the severe accident evaluations will be identified for further safety

^{5/} By definition, the functions covered by the second criterion, but not by the first criterion, may contribute to but are not "important" for mitigation or prevention of severe accidents. Given the relatively unimportant nature of these functions, the large uncertainty in the severe accident evaluations, and the large amounts of margin in the results, it is extremely unlikely that a change involving one of these functions would have an appreciable impact on the severe accident evaluations unless the change results in the elimination or preclusion of the function.

evaluation. Furthermore, these two criteria should not be viewed in isolation. Instead, they are simply one part of a much broader process for controlling changes to the DCD. As discussed in Section A above and shown in Figure 1, there are at least five other processes for controlling changes to the DCD in addition to these screening criterion. These other processes will also help assure that significant changes will be identified for further evaluation.

In the view of the industry, there are several reasons why the change process for severe accident evaluations should include screening criteria. First, Chapter 19 is very extensive and detailed (even with the PRA details deleted). It evaluates many severe accident scenarios that are of extremely low probability (e.g., with frequencies on the order of $1E-9$, $1E-10$, and even lower). The progression of many of these scenarios is affected by components which are not designed or intended to have any safety function. For example, for the ABWR, flooding analyses take credit for leakage through the truck door in the Turbine Building; containment bypass analyses account for closure of the non-safety-related turbine bypass valves; the calculation of the fission product release fraction from the core accounts for the mass of the steam dryer; and the calculation of the severe accident temperatures in the drywell depends upon the mass of equipment in the drywell. It is unreasonable to force a licensee to perform safety evaluations for changes in such parameters. Even if worst case assumptions are made regarding these

parameters, the overall conclusions of the evaluations would not change.^{6/} Thus, given the nature of the evaluations for severe accidents in Chapter 19, safety evaluations for changes related to such accidents should be limited to those changes which have an appreciable potential for affecting the conclusions of the evaluations.

Second, a Part 50 plant typically performs many hundreds of 50.59 safety evaluations of minor design modifications and changes to procedures and tests each year. Requiring a COL holder to consider all of the Chapter 19 evaluations as part of each of 50.59 safety evaluation would necessitate a substantial expenditure of resources with little or no safety benefit. Furthermore, since 50.59 safety evaluations are reviewed by management, such a requirement would divert management time and attention from more important safety issues.

Finally, the proposed process is consistent with the Commission's guidance in the Staff Requirements Memorandum (SRM) dated February 15, 1991. This guidance stated that the 50.59-like change process should ensure the "preservation of the severe accident, human factors, and operating experience insights that are part of the certified design" (emphasis added). GE and the NRC Staff have expended considerable resources in developing

^{6/} In this regard, the severe accident evaluations in Chapter 19 should be contrasted with the evaluations of design basis accidents in Chapters 6 and 15. The evaluations of design basis accidents are dependent upon safety-related components and are based upon conservative assumptions. Therefore, it is reasonable to treat severe accident evaluations differently from evaluations of design basis accidents.

these insights, and the insights have been placed in Section 19.8 of Tier 2. The first criterion will ensure that these insights will be preserved in accordance with the Commission's direction.

D. Part 2 - - Criterion for Prior NRC Approval

The purpose of the second part of the change process for Chapter 19 is to require prior NRC approval only for "significant" increases in the probability or consequences of a severe accident. The proposed criterion is qualitative because of the difficulty in specifying any single quantitative value for significance, since there are a large number of factors that relate to significance (e.g., total core damage frequency, frequency of the particular accident scenario, and the amount of margin to NRC's and industry's severe accident goals). It is anticipated that the industry, with input from the NRC, will prepare guidance to provide more detailed criteria for determining whether a particular increase is significant or not.

In the view of the industry, this criterion is necessary because not all increases in probability or consequences of severe accidents are significant from a safety standpoint. As discussed above, many of the accident scenarios evaluated in Chapter 19 have an extremely low probability of occurrence. Many increases in the probability of some accident scenarios (even some increases of several orders of magnitude) will not affect the overall core damage frequency or the conclusions of the severe accident evaluations. Therefore, changes that result in

insignificant increases in the probability or consequences of severe accidents do not warrant prior NRC review and approval.

Finally, requiring prior NRC review and approval for insignificant increases in the probability or consequences of a severe accident evaluated in Chapter 19 would be unduly burdensome. Such a requirement would force both the NRC and licensees to expend a significant amount of time and expense related to the drafting, processing, and review of formal applications. Such a requirement would also divert management attention from issues that are more important to safety.

IV. Conclusions

It would be inappropriate to apply Section 50.59 literally to the severe accident evaluations in Chapter 19, because it would impose substantial burdens upon both the NRC and licensees with little or no safety benefit. Instead, the change process should be specifically tailored for the special nature of the evaluations in Chapter 19.

The proposed process in Section 3.8 of the DCD Introduction would limit the scope of changes requiring safety evaluations to those changes that have an appreciable potential for affecting the severe accident conclusions in Chapter 19. Additionally, the proposed process would not require prior NRC approval of a change unless it would significantly increase the probability or consequences of a severe accident. The proposed process is also consistent with the Commission's SRM dated February, 15, 1991,

since it will help ensure the preservation of severe accident insights. Finally, the proposed process would focus the resources of both licensees and the NRC on matters with potential safety significance. Therefore, the NRC Staff should accept the proposed process in Section 3.8 of the DCD Introduction for the ABWR.

ATTACHMENT 1

3.8 Chapter 19 of Tier 2

Chapter 19 of Tier 2 contains various deterministic and probabilistic severe accident evaluations for the ABWR standard design. These evaluations of severe accidents shall be subject to the provisions of 10 CFR 50.59, as provided below.

3.8.1 Screening Criteria

A safety evaluation of a change in the facility, procedures, or tests described in Tier 2 must consider the evaluations of severe accidents in Chapter 19 if either of the following criteria are satisfied:

- a) The change would adversely affect a function identified as an important feature of a structure, system, or component in Section 19.8 of Tier 2; or
- b) The change would eliminate or preclude a function identified in the text of Chapter 19 as serving to prevent or mitigate a severe accident.

3.8.2 Need for NRC Approval

If it is determined as a result of a safety evaluation that the change would cause a significant increase in the probability or consequences of a severe accident that is evaluated in Chapter 19, prior NRC approval of the change shall be sought as part of an application for a COL or COL amendment.

FIGURE 1

FLOW CHART FOR CHANGE PROCESS
AS APPLIED TO CHAPTER 19

