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NUCLEAR POWER SYSTEMS DIVISION

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MFN-124-83

JUL 5 1983

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, DC 20555

Attention: Cecil O. Thomas, Chief
Standardization & Special Projects Branch

Gentlemen:

SUBJECT: IN THE MATTER OF 238 NUCLEAR ISLAND GENERAL ELECTRIC
STANDARD SAFETY ANALYSIS REPORT (GESSAR II) DOCKET NO.
STN 50-447

COMMENTS ON ACRS LETTER DATED 6/15/83

Reference: Cecil O. Thomas to Dr. Glenn G. Sherwood, letter dated
June 30, 1983

We are very pleased to be in receipt of the ACRS letter documenting the favorable completion of their review of our GESSAR II Application for a Final Design Approval (FDA) of our BWR/6 Mark III Nuclear Island Design. We are also pleased with the ACRS acknowledgement that "At this point in the NRC Staff's review, no items remain as Outstanding Issues."

Although there are many statements in the ACRS letter that are clear as to their meaning and implications, there are others that warrant comments by General Electric Company, the applicant.

With respect to the applicability of this FDA, we are well aware that this first level of approval is for operating licenses for projects which referenced GESSAR II in their Construction Permit applications. Further, it would seem appropriate that the ACRS not perform an ad hoc evaluation of the GESSAR II application for an interim FDA, provided that the GESSAR II application meets all of the requirements of the final Commission Policy Statement on Severe Accidents. It must therefore follow the NRC Policy Statement on Severe Accidents for standard plant applications. We also support the view that the more meaningful Final Design Approval or Certification is the approval associated with potential application to new projects. We look upon the wording of the ACRS letter as a clarification of the status of their review, and not as a limitation on our standardization activities.

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With regard to other subjects addressed within the ACRS letter, we offer the following comments.

On the subject of interfaces between the nuclear island and the balance of plant, the GESSAR II application encompasses the entire Nuclear Island of a Nuclear Power Plant, the seven buildings of radiological significance, thus eliminating the usual significant interface issues that existed in the past between the nuclear boiler and the associated supporting systems and buildings. We feel this is a significant simplification and contribution to safety. Of course, we now have the residual consideration of a few remaining interfaces between the Nuclear Island and the Balance of Plant. The ACRS can be assured that our attitude of rigorous and diligent vigilance will continue on these remaining interfaces.

With respect to Intergranular Stress Corrosion Cracking in operating nuclear plants, the ACRS will continue to be kept well informed. We are confident that our knowledge of this phenomena has reached a rather complete state for detecting and mitigating cracking on some operating units designed and built in the 1960's and early 1970's. The superior materials selected for our standard GESSAR II plant BWR/6 will preclude the occurrence of IGSCC in the future.

The continuing identification by the ACRS of the importance of assuring that the seismic contribution is acceptably low is fully appreciated. The ACRS is aware that the seismic margins in our GESSAR II standard plant have taken this into account in a very conservative manner to allow this standard plant to be applied to an envelope of siting conditions from sandy soil to rock, and from low to high seismic.

With respect to the capability of the GESSAR II design to properly handle severe accidents involving core damage and possible hydrogen generation, we continue to believe that the appropriate design approach is more core cooling, e.g., depressurization, core sprays, more water supplies, etc., not hydrogen equipment. We believe that the NRC Severe Accident Program Evaluation now underway will confirm our approach. However, the GESSAR II design currently does require a system for coping with large amounts of hydrogen that would be generated in accidents involving severe core damage. Although the hydrogen control system is not provided within the scope of Nuclear Island, the utility applicant must provide the system as defined by the GESSAR II interface requirements in order to satisfy the FDA as approved by the NRC staff.

We agree with the ACRS that the documentation of the remaining confirmatory issues on the GESSAR II will not be especially difficult. That activity is already underway.

We look forward to the granting of this initial FDA on GESSAR II, and will continue to diligently pursue the Certification of the Final Design Approval on a schedule consistent with the NRC administrative actions on their proposed Commission Policy on Severe Accidents and Related Views on Nuclear Reactor Regulation.

Sincerely,



Glenn G. Sherwood, Manager
Nuclear Safety & Licensing Operation

GGs:hmm/D070521

Attachment

cc: H. R. Denton
D. G. Eisenhut
L. S. Gifford (w/o att)
F. J. Miraglia (w/o att)
D. C. Scaletti

SPECIFIC COMMENTS ON
SELECTED PARAGRAPHS OF THE
JUNE 15, 1983 ACRS GESSAR II LETTER

Paragraph 1

During its 278th meeting, June 9-11, 1983, the Advisory Committee on Reactor Safeguards completed a limited review of the reference design described in General Electric Standard Safety Analysis Report (GESSAR II) for a Final Design Approval (FDA). GESSAR II provides the safety information for a reference system consisting of a single BWR/6 Mark III nuclear steam supply system, with a rated core thermal power of 3579 Mwt, and associated systems and structures, including the reactor building (the shield building and containment), fuel building, diesel generator buildings, control building, auxiliary building, and radwaste building. A Subcommittee meeting was held with representatives of the General Electric Company (the Applicant) and the Nuclear Regulatory Commission (NRC) Staff on April 21-22, 1983 in Santa Monica, California. The Full Committee considered this matter during its 277th meeting, May 12-14, 1983. The Committee also had the benefit of the documents referenced.

Comments on Paragraph 1

This paragraph is typical of most opening paragraphs of ACRS letters with one notable exception: the term "limited review" was utilized in the first sentence in lieu of "review". While the technical significance of "limited review" on a design that has been under regulatory review for 10 years is questionable, it is clear that the review of GESSAR II was conducted without limitation in the context requested by the NRC staff.

Paragraph 3

The NRC staff advised the ACRS that, if the proposed Commission Policy Statement on Severe Accidents and Related Views on Nuclear Reactor Regulation is approved containing its current Section VI on Standardization Policy, the staff would shortly thereafter consider the GESSAR II design for an interim FDA under Section VI for future CP applications while awaiting completion of Commission action on severe accident policy. This aspect of Section VI is among the several aspects of the proposed Policy Statement which the ACRS do not favor. If the GESSAR II design (or some other proposed FDA), is brought to the ACRS for review in connection with a new plant prior to specific action by the Commission on severe accident policy, the Committee would expect to perform an hoc evaluation of such considerations as part of its own review.

Comments on Paragraph 3

We are greatly concerned about the committee's unfavorable view of the proposed severe accident policy. We have made a concerted effort to meet the requirements for a forward-referencing FDA. We have planned our technical efforts toward obtaining a forward-referencing FDA late August 1983 which would allow ample time for the Commission to act following the conclusion of the July 9, 1983 comment period. However, with the ACRS opposition implied by this letter, it is extremely likely that the Commission action would not be complete until sometime in 1984. We would find this totally unacceptable. Further, without a final policy statement, it would be counter-productive for the Committee to perform an ad hoc

evaluation of GESSAR II for a forward-referencing FDA. We urge that the ACRS re-examine its concerns on the proposed policy statement and strive to resolve these concerns before the end of the comment period so that the nuclear industry can advance once again.

Paragraph 4

It will be necessary for the General Electric Company to maintain vigilance over the interface boundaries between the standard nuclear island and the balance of plant. Efforts to ensure compatibility across these interfaces must be formalized and rigorously applied. The Committee remains interested in the methods used to maintain interface compatibility and wishes to be kept informed.

Comments on Paragraph 4

As described to the ACRS on May 13, 1983, the GESSAR II Nuclear Island scope of design practically eliminates the complex interfaces that exists in the more conventional NSSS and the balance of plant. The remaining interfaces are between the turbine island and the service building facilities. The reduction in interfaces is from tens of thousands to no more than several hundred.

At these interfaces, we provide requirements as to what the interfaces should be, what systems interactions we have considered and incorporated into the design. Levels of requirements that we impose on the Applicant are the same that we use for the design of the Nuclear Island proper. We have formal documentation to control these interfaces just as we do for the Nuclear Island. Such interfaces are reflected in the documents supporting the GESSAR II design that we listed for the staff in our May 3, 1983 transmittal (over 900 top level documents).

Further, we assure compliance by periodically reviewing the interfaces with the Applicant. We review the total system for conformance which includes performing failure modes and effects analyses. The AEs also provide an independent verification with their internal procedures. To ensure that we have complied with the staff interface requirements, we provide GESSAR II/FSAR interface tables for each chapter. These tables provide a formal agreement between GE and the staff as to the interface definitions. These interface tables can be used by both the Applicant and staff at the OL stage to ensure that all interfaces have been adequately addressed.

GE will keep the Committee informed on any changes or modifications to the methods used to maintain interface compatibility.

Paragraph 5

In spite of many past assurances that stress-assisted corrosion cracking of primary system components was well understood and would be avoided in the future, significant cracking is being observed in many currently operating BWRs. The material being proposed for this application are

supposedly much improved. However, because of actual operating experience to date, we believe that the applicant should maintain a vigorous research program to identify material and water chemistry changes that will control or eliminate the stress-assisted corrosion cracking problem and should closely monitor the performance of functional systems utilizing the newer materials. The Committee wishes to be kept informed.

Comments on Paragraph 5

As presented to the ACRS on May 13, 1983, as a result of the experiences that we have had on operating BWRs over the past 8 years and the extensive amount of development testing work we have done, we are quite confident today that we know how to prevent stress corrosion cracking in BWRs. Consequently and in particular for the GESSAR II design, this is accomplished as described below:

1. The GESSAR II design complies with Regulatory Guide 1.44, Rev. 0 and with the requirements of NUREG-0313, Rev. 1. Regulatory Guide 1.44 addresses 10CFR50, Appendix A, GDCs 1 and 4, and Appendix B, i.e., requirements for components important to safety shall be designed in accordance with appropriate codes and to accommodate the effects of and to be compatible with the environmental conditions associated with reactor operations. Experience with operating reactors has demonstrated that certain wrought austenitic stainless steels, when welded, are sensitized to the degree that they are susceptible to stress corrosion cracking in reactor coolant water environments. With selection of alloys and control of thermo-mechanical processing, intergranular stress corrosion cracking (IGSCC) of reactor coolant pressure boundary components can be avoided.
2. All austenitic stainless steel material that is fabricated into components which see temperatures in reactor environment greater than 200°F is purchased as low carbon grade or nuclear grade and in the solution annealed condition in accordance with the applicable ASTM and ASME specifications.
3. Cooling rates from solution annealing heat treatment temperatures are required to be rapid enough to prevent sensitization. Resistance to IGSCC is verified using ASTM A262, Practice A methods.
4. Material changes have been made to minimize the possibility of IGSCC. All welded wrought austenitic stainless steel in the reactor coolant pressure boundary is low carbon nuclear grade 316LN with .02% maximum carbon content and nitrogen control for strength. There is no piping which is service sensitive or nonconforming as defined in NUREG-0313, Rev. 1. All other applications of stainless steel (types 304 and 316) are of the L grade (0.03% maximum carbon content).

5. Welding heat input controls are required for all stainless steel welds. For machine, automatic and manual welding, interpass temperatures are restricted to 350°F maximum for all stainless steel welds. High heat welding processes such as block welding and electroslag welding are not permitted. All weld filler metal consumable inserts and castings are required by specification to have a minimum of 5% ferrite.

We believe that the measures we have taken coupled with our extensive development testing program does not warrant the ACRS letter usage of "supposedly much improved" in the second sentence. General Electric, and most of the technical community are quite confident that the IGSCC issue is well in hand. However, we fully agree with the need to closely monitor the performance of functional systems utilizing the "newer" materials. We will certainly keep the ACRS informed on this monitoring program.

Paragraph 6

The Committee has in several prior operating license or construction permit reviews noted the importance of assuring that the seismic contribution to risk is acceptably low, with due allowance for lower frequency, more severe earthquakes than the safe shutdown earthquake. This recommendation applies equally well to the GESSAR II design.

Comments on Paragraph 6

At the May 13, 1983 ACRS meeting we addressed the question of seismic design margin. The subject was addressed in two parts. The first part examined the design margin inherent to the light water reactors. The basic safety margin is in the range of 6 to 80. In addition, the GESSAR II design has "built-in" seismic capacity for site exceeding the design bases, horizontal acceleration of 0.3g. Even for the "worst" site, this safety margin is on the order of 2 which means the minimum safety margin is clearly an order of magnitude. Thus, we are confident that the seismic contribution to risk of the GESSAR II design is negligible.

Paragraph 7

The GESSAR II design does not include provisions for coping with the large amounts of hydrogen that would be generated in an accident involving severe core damage. It will be necessary for a utility applicant to make the appropriate provisions as part of the balance of plant.

Comments on Paragraph 7

In our response* to the CP/ML Rule*, we provided a comparison of costs and benefits of alternative hydrogen control systems and committed the Applicant to provide the details of the selected system in his FSAR. This interface requirement is item No. 1.127 of the GESSAR II/FSAR Interface Table 1.9-1.

* Amendment No. 17 on 6/15/83 and our other related transmittals on 6/7/83 and 6/28/83.

Further the Applicant is required to provide a hydrogen control system capable of handling hydrogen generated by the equivalent of a 100% active fuel-clad metal water reaction subject to specific design requirements and performance features. This interface requirement is item No. 1.130 of the GESSAR II/FSAR Interface Table 1.9-1.

The GESSAR II design currently does require a system for coping with large amounts of hydrogen that would be generated in accidents involving severe core damage. Although the hydrogen control system is not provided within the scope of the Nuclear Island, the Applicant must provide the system as defined by the GESSAR II interface requirements in order to satisfy the FDA as approved by the staff. Of course, as permitted by Section 1.9.2 of R.G. 1.70, the Applicant can take exceptions to any portion GESSAR II as long as these exceptions can be justified. It may well be that when the GESSAR II PRA review is complete, the cost-benefit test may demonstrate that hydrogen control is unnecessary.

Paragraph 8

At this point in the NRC Staff's review, no items remain as Outstanding Issues. There is a set of Confirmatory Issues that await additional documentation. We found no reason to believe that any of these issues will be especially difficult to complete and recommend that they be completed in a manner satisfactory to the NRC Staff.

Comments on Paragraph 8

We are making good progress in resolving the confirmatory issues. Only 12 issues remain unresolved at this time out of 32 issues contained in the GESSAR II SER (outstanding plus confirmatory). We expect to resolve all the issues by August 1983.