UNITED STATES
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WASHINGTON, D.C. 20545

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THRU: R. J. Schemel, Chief, ORB #1, DRL

SAFETY EVALUATION FOR PROPOSED CHANGE NO. 3 TO THE TECHNICAL SPECIFICATIONS

By letter dated July 8, 1970, GE applied for the subject change which would authorize the use of guinea pig fuel rods under the inner refueling ports at full power; and by letter dated September 8, 1970, GE revised the application for the proposed change. Our letter of January 18, 1971 to GE requested additional information and discussed the safety aspects of the proposed change. We concluded that the change could be authorized if an adequate response to the request for additional information was received. A copy of the enclosure to our letter is attached.

By letter dated January 28, 1971, GE responded to our request. Their response proposed: (a) changes to the technical specifications and supporting bases for the safety limits (SL) and limiting safety system settings (LSSS), (b) additional surveillance of inner guinea pig rods when the reactor is operated above 17.5 MWt, (c) an analysis to determine if flux peaking can occur at the inner guinea pig rods, and (d) a limiting condition for operation (LCO) applied to the distribution of poison rods.

With regard to steady-state operation above 17.5 MWt with the inner guinea pig rods in place, the proposed change to the bases for the SL clearly describes the increase in linear power density (see attached Figure 1 for a comparison of conditions) and the consequent reduction in the "allowance for uncertainty in onset of damage or consequences". To compensate for this reduction, GE proposed additional surveillance of the rods to be performed after reaching 20 MWt, after the first 300 MWt-days above 17.5 MWt, and at every 600 MWt-days thereafter. In our opinion, the proposed additional surveillance is adequate.

With regard to excursion testing, GE proposed a more restrictive SL on maximum allowable energy addition to the core. If the energy addition were to reach the proposed SL, the temperature of the inner guinea pig rods would not exceed the temperature of the hot standard rod. GE has not proposed a reduction in the maximum planned transient; therefore, the "operating margin" and "safety margin" associated with excursion testing will be decreased by 15%. To compensate for this reduction, GE has agreed by telephone to modification of Specifications 4.3.B and C to require examination of an inner guinea pig rod rather than an outer guinea pig rod before and after certain excursions. We conclude this surveillance in conjunction with the stepwise approach to the maximum planned transient as required by the existing specifications will adequately compensate for the reduced margins.

The additional information regarding the small amount of flux peaking resulting from control rod configurations and from poison rod distribution appears reasonable; however, the proposed LCO on poison rod distribution is only marginally acceptable because GE has not estimated the consequences of permissible asymmetric poison rod distribution. However, based on the information presented, we conclude that the increase in linear power density would not be more than a few tenths of a kW/ft and that such an increase would be insignificant.

Page 4-9 of the Facility Description and Safety Analysis Report (SAR) indicates that the ratio of inner guinea pig power to standard rod power can be as high as 1.20 as compared to 1.15 used in the application for Proposed Change No. 3. Mr. Meyer indicates that the 1.20 is incorrect and that he will take appropriate action to correct the SAR.

Based on this evaluation, we conclude that there are no hazards not described or implicit in the SAR and that the reactor can be operated in the manner proposed with reasonable assurance that the health and safety of the public will not be endangered.

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Enclosures:
1. Enclosure to the letter
2. Figure 1

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INFORMATION REQUIRED CONCERNING

PROPOSED CHANGE NO. 3

TO SEFOR TECHNICAL SPECIFICATIONS

At the conclusion of our evaluation of the application for a Provisional Operating License for SEFOR, we concluded on the basis of the information presented at that time that it would be prudent to remove the guinea pig rods from the core positions under the inner refueling ports prior to operation at power levels above 17.5 MWt. The SEFOR Technical Specifications included such requirement in the form of a limiting condition for operation (LCO). Proposed Change No. 3 to the Technical Specifications would delete this LCO.

The Technical Specifications for SEFOR include a safety limit of 22 MWt and a limiting safety system setting (LSSS) of 21 MWt. At these power levels, the expected linear power densities in the hottest standard fuel rod would be about 22.5 kW/ft and 21.5 kW/ft, respectively. These limits were selected to provide a margin of safety with respect to the estimate of the damage threshold (~26 kW/ft) for the fuel rods based on capsule tests. Because the guinea pig rods located in core positions under the inner refueling port have a linear power density 15% greater than the hot standard rod, the power density of the inner guinea pig rods at 17.5 MWt would be about that of the hot standard rod at 20 MWt. The linear power density of the inner guinea pig rods would be about 24 kW/ft at a core power level of 20 MWt, 25 kW/ft at the LSSS of 21 MWt, and 26 kW/ft at the 22 MWt safety limit.

The Proposed Change No. 3 would permit operation at core power levels up to 20 MWt with the guinea pig rods in the inner positions, and with the same LSSS and safety limits. Thus there would be a significant reduction in the margin between the estimated damage threshold and the power density in the guinea pig rods at the safety limit. The initial application for the proposed change restated information on fuel performance contained in the application for the provisional operating license and proposed a requirement for inspection of inner guinea pig rods at one unspecified time after reaching 20 MWt. Because the arguments in support of the change contained no new information with regard to fuel performance, we indicated in discussions with the licensee that in view of the lack of additional information, more extensive and specific surveillance requirements for the guinea pig rods would be appropriate. The licensee suggested that in lieu of such additional surveillance; a more restrictive LSSS on reactor power could be proposed.

By letter dated September 8, 1970, Proposed Change No. 3 was revised to include a formula for reducing the LSSS to be used when the inner guinea pig rods are in the core. The formula takes into account changes in the core loading and selects the LSSS such that the linear power density of the innermost guinea pig rod at the LSSS would not exceed that of the standard hot fuel rod if the reactor was operated at the safety limit power of 22 MWt with 600 fuel rods in the core (22.5 kW/ft). This LSSS is much more restrictive with regard to power than is the present LSSS (e.g. for a core loading of 636 fuel rods, the LSSS would be 20.3 MWt). The revised proposal does not provide for any increase in the surveillance of the guinea pig rods over that originally proposed.

In discussions with the SEFOR staff, we have indicated that we would consider a proposal for adjustment of the safety limit and the LSSS that includes appropriate bases and is keyed to a program of additional surveillance of the guinea pig rods, provided that the bases for such Technical Specifications are supported adequately in the application. In addition, we discussed our need for an analysis which demonstrates that flux peaking will not occur in the vicinity of the inner guinea pig rods, and if necessary, a proposal for appropriate LCO's (e.g. addressing the distribution of B_4C rods) to assure the validity of the analysis. On the basis of these discussions, we believe that a mutually acceptable surveillance schedule could be proposed.

Our discussions with the SEFOR staff also disclosed that they intend to operate with the inner guinea pig rods in the reactor during excursion testing. Such excursion tests would be initiated from steady-state power levels of 15 MWt or less. The application does not address excursion testing with such a core loading and our previous evaluations did not consider such testing. The Technical Specifications contain a safety limit on energy generated during an excursion that is based on the maximum linear power density for the hottest standard rod in the core. Until the licensee applies for, and we authorize, excursion testing with a core loading including inner guinea pig rods, the reactor is not licensed for excursion testing with these rods in place. On the basis of discussions with the SEFOR staff, it appears that an appropriate application in this regard can be prepared.

In summary, the information needed to complete our review is:

1. a revised proposed specification for the LSSS and the safety limit on reactor power and a basis which takes into account the linear power densities within the guinea pig rods;

2. a revised proposed specification for surveillance of the guinea pig rods;

3. an analysis which demonstrates that excessive flux peaking near guinea pig rods will not occur; if an LCO concerning B_4C rods is needed to provide adequate assurance, it should be proposed;

4. a revised proposed specification for the safety limit on energy generated during an excursion and a basis which takes into account the linear power densities within the guinea pig rods.

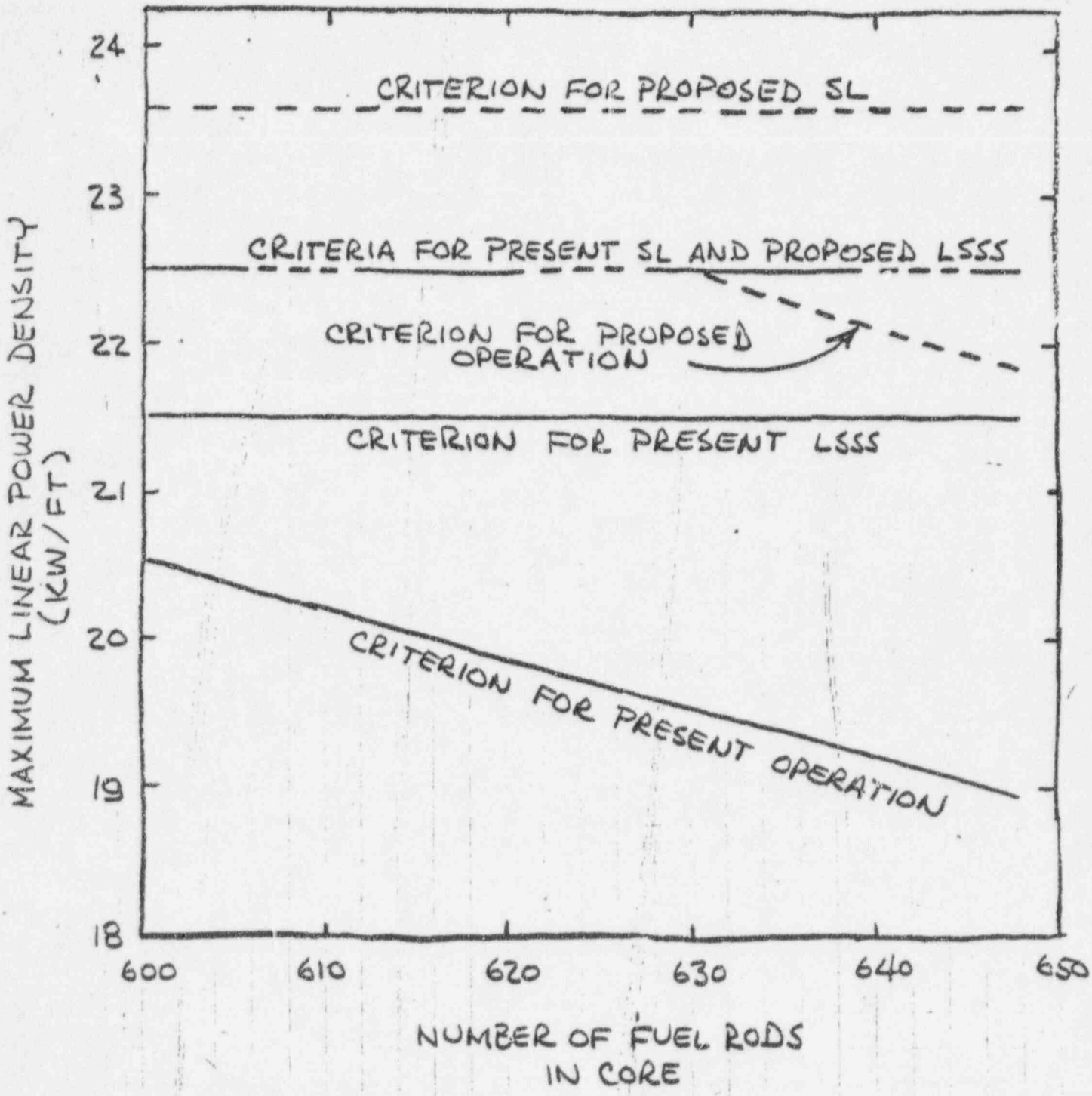

FIGURE 1. Criteria for Operation and Limits Applicable Now and Applicable under Proposed Change No. 3.