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Note to A. Giambusso

GENERAL COMMENTS ON THE GINNA FUEL PROBLEM

This brief memo summarizes many of the thoughts I expressed during the recent review of the Ginna fuel problem as well as some more general comments related to safety and the overall reactor licensing situation. The revelation of serious degradation of fuel in the Ginna reactor with potential safety ramifications has highlighted some areas which require further consideration, i.e.,

(1) the broader safety implications,

(2) the general techniques of safety evaluation and more specifically the rationale and methods employed in authorizing resumption of power at Ginna, and

(3) actions to be taken.

1. The Broader Safety Implications. Although authorization of the startup of Ginna and of the continued operation of Robinson and Point Beach, all with anomalous fuel rod behavior, can be justified on the basis of appropriate operating restrictions and increased surveillance requirements, it is the potential generic problems related to reactor fuel as now known (densification and fuel migration) which are of concern and must be treated on a high priority basis. Presently accepted predictions of steady state, transient, and accident performance are based on a fuel model which is significantly different from reality -- a model which in specific areas can now be considered as rather naive. In view of the surprising steady state performance, the entire question as to the ability to predict fuel performance during transient and accident conditions must now be thoroughly reexamined. Reevaluations based on new insights cannot be adequately accomplished in a period of several weeks or even several months since the full implications may require more operating experience, some testing, and extensive discussions with fuel experts.

It appears that definite indications of anomalous fuel behavior in the form of measured in-core neutron flux spikes have been observed at many operating reactors but, until recently, ignored. This situation reemphasizes the great need for obtaining and adequately evaluating operating experience, as well as the advisability of factoring it into

safety considerations. The Ginna problem again raises the question as to whether, with the limited attention to operating experience to date, we are proceeding prudently when we authorize continuous increases in reactor power levels. This will be referred to later.

As an additional comment, the new information and more importantly the insights that emerge from the surprising behavior of the Ginna fuel should perhaps lead to a reexamination and reevaluation of our assumed understandings in other areas associated with the effects of high irradiation which are based on extrapolated results, e.g., the embrittlement of vessels from a fast neutron flux.

2. The Techniques of Safety Evaluation. Part of the approach in authorizing power resumption at Ginna consisted of a reevaluation of the LOCA, setting 1800F as the limiting accident temperature for degraded fuel and calculating a corresponding peak allowable kw/ft. It must be recognized that this procedure assumes the validity of trading temperature margin for design peaking factor margin, and is based on the assumption that through a simple limitation of the calculated cladding temperature, the performance of degraded fuel during a LOCA will be acceptable. Not only has the Ginna fuel situation raised questions as to the general ability to fully understand steady state fuel performance, but also it must certainly indicate possible limitations on a complete understanding of the performance in a transient as severe as a LOCA (considering, for example, the action of rapidly expanding weakened cladding). Additionally, portions of the calculational model are in question, e.g., gap conductance, stored energy, and local peaking factors. The following statement extracted from page 2 of the June 30 daily digest of the ECC Rule Making Hearing in relation to the fuel migration problem indicates the magnitude of this new problem.

> "Dr. Buck then queried 'Do I gather from that answer that the effect of the various items connected with fuel migration would therefore be an increase of something more than 600 degrees, or is this a legitimate conclusion?' Mr. Moore replied in the affirmative."

The continued case by case analytical evaluation of the LOCA must again be questioned. In my opinion the continuation of the present methods serves limited safety purposes and again tends to ignore real problems e.g., in the present case the performance of degraded fuel, and in the more generic case, the deficiencies in an ECCS system which involves transport of water to the core rather than direct placement there.

The approach to the Ginna fuel problem heightens my concern and disagreement with the staff procedure which utilizes the individual plant approach requiring specific case by case action. The major emphasis in the determinations of the conditions at which Ginna and other reactors with similar fuel situations should be operating, must be on a full utilization of the available operating data such as could be accomplished by an evaluation of NOK experience and an examination of its fuel, rather than on the use of case by case numbers derived from analyses incorporating new and unverified information.

3. Action To Be Taken. There are two areas of importance; (1) action related to reactors having fuel with the potential for cladding collapse, and (2) generic action related to all reactor facilities. With regard to item (1), in my opinion, we should request all facilities containing non pressurized fuel with sufficient irradiation to cause cladding collapse to have the fuel replaced as soon as practical. This consideration is especially significant for Indian Point 2 which will have a full core of non pressurized fuel. With regard to item (2), the generic situation can be met by considering a restriction on power for all reactors which obtain a moderately high burnup fuel until a full understanding of fuel performance is attained. There is no assurance without adequate in-pile experience (which does not now exist) that pressurized fuel will not also become significantly degraded.

Finally, in view of the questions and concerns raised, it may be appropriate to use the Ginna fuel situation as a vehicle for an in depth discussion of the value of a general moratorium on reactor power at an appropriate level until adequate operating experience is obtained. Such a moratorium does not necessarily have to involve derating and might only result in a limitation of power ratings to those presently authorized. With the planned issuance of the Zion and TVA operating licenses we will have taken another step upwards in authorized average power rating and total reactor power. It would appear that this is an appropriate time for such an in depth discussion.

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