Docket File

DEC 20 1974

Docket No.s 50-133

K. R. Goller, Assistant Director for Operating Reactors, L

HUMBOLDT BAY, UNIT NO. 3 - CYCLE 10 OPERATION - TAR NO. NOT ASSIGNED

Plant Name:	Humboldt Bay, Unit 3
Licensing Stage:	OL
Docket No.:	50-133
Responsible Branch and Project Manager:	ORB-2 F. Anderson
Technical Review Branch Involved:	Core Performance Branch
Requested Completion Date:	12/18/74
Description of Review:	Tech Spec Change

The Pacific Gas and Electric Company submittal of December 11, 1974 in regard to fuel densificatin effects has been reviewed. The effects of fuel densification on the fuel rod will increase the stored energy, increase the linear thermal output, increase the probability for local power spikes, and decrease the thermal conductance of the fuel cladding gap. The appliaant indicates that all of these effects have been considered and are negligible for transients and accidents (other than LOCA). For the LOCA analysis, a uniform value for gap conductance, implied to be conservative, has been utilized to establish the new Technical Specification limits for peak heat flux.

The effects of fuel densification on Humboldt Bay cycle 10 fuel appears to have been considered in a manner which provides a basis for interim approval to operate until PG and E can provide the staff with a report of their calculations with sufficient detail to comprehensively document the anticipated effects of fuel densification in the Humboldt Bay Plant. Therefore, the plant is approved to operate until March 31, 1975 at which time PG and E must have provided to the staff, and obtained approval of, their detailed model for fuel densification effects on the Humboldt Bay Plant.

The basis for interim operation until March 31, 1975 follows:

1) both types of fuel, GE and Exxon, are of sufficient density, 94.3 and 93.5% TD, respectively, to be classified as stable fuel,

2) the fuel column length of 77 inches is sufficiently short to reduce the pprobability of large gap formation

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3) the results of prior post irradiation examinations (some after 4 years exposure) at Humboldt Bay have revealed the absence of large axial gaps and collapsed cladding, and

4) the calculated gap conductance for the identical designed fuel rods, as presented in the GEGAP-III review, is in excess of 300 BTU/ft^2-°F, the uniform value used for LOCA analysis.

As indicated previously, we have determined that the details and bases for the analysis provided by PG and E on the effects of fuel densification (Attachment II to 12/11/74 letter) is adequate for an in-depth technical review. In the letter of 8/19/74 (Ziemann to Searls), PG and E was provided with AEC Technical Reports for GE and Exxon fuels and requested to provide the necessary analyses and other relevant data for determining the consequences of fuel densification and the effects on normal operation, anticipated transients, and accidents. The applicant was also provided with the AEC Technical Report on Densification of Light Water Reactor Fuels, November 14, 1972 and requested to provide the details as given in Section 5.0, staff findings and conclusions (pp. 69-72). We request that PG and E provide the following:

1) Graphical plots or tables of gap conductance vs. burnup as a function of linear heat generation rate (e.g. 9, 11, 13, 15 and 18.5 kw/ft) for GE and Exxon fuel obtained in an acceptable BWR fuel thermal performance code.

2) Cladding creep collapse calculations for GE Type III and Exxon Type IV fuel. Also, clad collapse observations obtained from PIE of similar cladding after exposure in Humboldt Bay.

3) Calculated values for axial column shrinkage and changes in the linear heat generation rate, indicating the components due to densification and thermal expansion.

4) Details of the models and calculations for local power peaking. Individual models should consider the maximum axial gap size, the distribution of axial gap sizes, the probability and core location of gaps, and the power spike as a function of axial elevation.

   Show how the power spike factor is applied in calculating the LHGR limits. Densification caused spikes should be considered for both GE and Exxon fuel.

5) Manufacturing and operating data so that the staff can independently evaluate the creep collapse calculation:

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Cladding O.D., in
Cladding Thickness, in. As Manufactured with two-sigma limits
Cladding Ovality, in.

Average Wall Temperature, °F
Hot Initial Pressure Differential, psi (maximum)
Fast Neutron Flux, nv
Region Identification (limiting assemblies)

PG and E is scheduled to submit their evaluation of Humboldt Bay under the FAC requirements on March 31, 1975. For our review of their FAC analysis, the above requested analysis of the effects of fuel densification should also be completed.

Original Signed by
Victor Stello

Victor Stello, Jr., Assistant Director
for Reactor Safety
Directorate of Licensing

cc: P. O'Connor
F. Anderson
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Docket File
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