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Docket No. 50-155

JUL 2 1 1967

Consumers Power Company
218 West Michigan Avenue
Jackson, Michigan 49201

Attention: Mr. Robert L. Haueter
Assistant Electrical Production
Superintendent

Gentlemen:

Proposed Change No. 13 to the Technical Specifications of License DPR-6, Docket No. 50-155, submitted by your letter dated May 26, 1967, describes six new "center-melt" fuel bundles to be inserted into the Big Rock Point reactor and proposes power operating limits for these special fuel bundles.

By telephone on June 5, 1967, Consumers Power Company was notified that our review of the proposed change to the Technical Specifications could not be completed by June 12, 1967, as requested, in time to permit insertion of the six "center-melt" fuel bundles during the current refueling outage.

On June 27, 1967, we met in the Bethesda offices of the regulatory staff with representatives of the Consumers Power Company of Michigan and General Electric Company to discuss the proposal and expand the evaluation in selected safety related areas. As a result of this meeting, we have prepared the enclosed list of items which must be resolved before we can continue our evaluation of your proposal to operate the Big Rock Point reactor with "center-melt" fuel in six special fuel bundles, described by you as "intermediate performance fuel" with incipient central melting and "advanced performance fuel" with definite but moderate central UO_2 fuel melting.

Answers to the enclosed items should be submitted as a supplement to your Proposed Change No. 13. Three signed copies and 37 additional copies should be supplied.

Sincerely yours,

DRL JJShea:bsp — DRL ERGeury — DRL SLevine — DRL DJSkovholt — DRD PAMorris

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Enclosure:
DRL Comments and Questions Related to Reactor Operation with Molten UO_2 Fuel

Donald J. Skovholt
Assistant Director for Reactor Operations
Division of Reactor Licensing

OFFICE ▶
SURNAME ▶
DATE ▶

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-6

ADDITIONAL INFORMATION REQUIRED IN SUPPORT OF

PROPOSED CHANGE NO. 13 TO

CONSUMERS POWER COMPANY OF MICHIGAN

TECHNICAL SPECIFICATION FOR BIG ROCK POINT REACTOR IN

CHARLEVOIX COUNTY, MICHIGAN

1. Reactivity Insertion Accidents

1.1 It was previously reported (supplement to Big Rock Point Technical Specification Change No. 10) that a gravity drop of a rod worth .04 delta k/k could cause a maximum vertical displacement of the vessel of 0.17 ft and 0% maximum vessel strain. The corresponding limiting rod worth value for the rod ejection accident was reported to be .02 delta k/k.

How have these limiting rod worth values changed for the "C" core with and without the proposed special "center-melt" fuel bundles as a result of the more realistic analysis which prevents the second power burst due to the steam explosion in the vicinity of the dispersed high enthalpy fuel rods?

1.2 A possibility exists that the very high enthalpy states in the "center-melt fuel" bundles adjacent to the dropped control rod could cause extensive core damage impairing the control rod scram and core cooling capability. Please discuss the analytical methods and test results which assure that core geometry is preserved following control rod drop accidents with rod worths as high as .025 delta k/k.

1.3 What is the flux suppression factor at the center of the "center-melt fuel" rods, particularly the 0.700 inch diameter fuel rods, and how is the fuel enthalpy gradient across the fuel rod cross section considered in assessing the extent of fuel and core damage?

2. Loss of Coolant Accident

It has been stated in Proposed Change No. 13 that, as a consequence of the duration of the postulated primary system blowdown (greater than 4 seconds) and the high heat transfer rates expected in the core during blowdown, the center-melt fuel rod temperatures will be reduced to a level characteristic of the ensuing decay power generation and are thus virtually independent of the initial stored energy content. The fuel, however, heats up again during the time interval of film blanketing following the blowdown and until core cooling is effective.

2.1 Please discuss the analytical methods and input assumptions for determining peak fuel rod temperatures, and present comparative maximum temperatures for "C" and "center-melt" fuel rods after the MCA until the temperature rise has been arrested by fire main water sprayed onto the core via a single spray header inside the reactor vessel.

2.2 Indicate the sensitivity of the fuel rod temperatures to duration of blowdown and core spray initiation delays.

2.3 Discuss the applicability of the test data presented in Figure 25 of the referenced proposal, which is based on initiation of core cooling (core spray) before fuel temperatures reach 1250°F.

2.4 Present clad stresses during the coolant blowdown period when the fuel rods are being rapidly cooled by ejected primary coolant.

3. Multi-Rod Critical Heat Flux Correlation

Please justify the use of the new GE Multi-Rod Critical Heat Flux Correlation in calculating "center-melt fuel" core performance limits, considering the spiked arrangement of the center-melt fuel rods within the bundles where power ratios of adjacent rods are approximately 18:1 in contrast to the normal situation where adjacent fuel rod power ratios are nearer to 1.

4. Calculational Accuracy

It has been stated that axial power shapes for the "center-melt fuel" bundles are known within 5% and that radial power shape for the highly enriched fuel spiked with depleted fuel rods has an uncertainty factor of 10%. Are these uncertainty factors included in the fuel temperature calculations during accident conditions, and the performance limits based on minimum critical heat flux ratio of 1.5 at 122% overpower?