Docket No. 50-255 JUN 29 1973

Consumers Power Company
ATTN: Mr. R. C. Youngdahl
Senior Vice President
212 West Michigan Avenue
Jackson, Michigan 49201

Change No. 18
License No. DPR-20

Gentlemen:

Your letters dated April 26, 1973 and June 8, 1973 proposed changes in the Interim Special Technical Specifications of Provisional Operating License No. DPR-20 (Amendment 4) for the Palisades Plant. Additional information relative to those changes was submitted by letter dated June 28, 1973. The changes proposed extending the core average exposure since clad collapse is not predicted to occur during the extended period. In addition, you requested that the peak linear heat generation rate remain at 13.2 kW/ft during the extended period and the flux peaking augmentation factor be increased. These proposals have been designated Change No. 7.

Combustion Engineering calculated the time to collapse with the BUCKLE code using the actual plant operating history. The initial results of these calculations indicated that first collapse will occur in the 22.5 mil wall clad after about 10,800 real time hours which corresponds to about 9,000 MWD/MTU. The minimum clad thickness of fuel in the reactor is 22 mils; however, collapse of the thicker cladding is expected to occur before the 22 mil wall clad because of the effect of the higher flux which the rods having slightly thicker cladding are exposed to in their core locations. The 22 mil rods are in a lower flux area of the core. We have also calculated the time to collapse using the BUCKLE code. We originally predicted a minimum time to collapse of 12,200 hours (or 10,500 MWD/MTU) for the 22.5 mil wall fuel rods. The differences between the results of CE's and our calculations were evaluated to determine the reasons for the divergent answers. CE used different values for the yield stress (σ_{ys}) and Poisson's ratio (ν). In addition CE used an option in BUCKLE that was overly conservative in that it did not allow the normally observed variation of σ_{ys} with temperature, but

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kept it constant through the calculation. Combustion's values of σ_{ys} and ν were based on data from its labs that is representative of typical production material and felt by them to be conservative and appropriate. When CE reran the code with its measured values of σ_{ys} and ν and with appropriate temperature dependence, the resultant time to collapse for the 22.5 mil wall clad was 11,400 hours (about 9700 MWD/MTU for the case with zero internal pressure. We agreed with this result. This calculation is considered to be overly conservative as it neglects the effect of internal pressure increase due to the heatup of the helium backfill gas and ignores the internal pressure buildup due to the time dependent release of fission gas. With conservative credit for the helium backfill pressure buildup of only 20 psia and neglecting the fission gas contribution to internal pressure, the time to collapse is calculated to be 12,000 hours (<10,300 MWD/MTU). We conclude that no cladding in the reactor will collapse prior to a core exposure of 10,300 MWD/MTU.

In the June 8, 1973 submittal you stated that the peak linear heat generation rate value for local peak burnups in excess of 9600 MWD/MTU should not exceed 13.2 kW/ft. This value is acceptable since it was previously shown to be conservative for full power operation. The gap conductance reached its minimum value at a local peak burnup of about 4000 MWD/MTU. From then on, clad creepdown, fuel cracking and fuel swelling have provided enough gap closure to increase the gap conductance and the allowable peak local linear heat generation rate. As burnup occurs, the calculated peak LOCA temperature will decrease with a constant linear heat generation rate. We have previously concluded that for a peak linear heat rate of 13.2 kW/ft at a local burnup of 9600 MWD/MTU, the LOCA clad temperature would not exceed 2300 °F. Maintaining a peak linear heat generation rate of 13.2 kW/ft beyond a local burnup of 9600 MWD/MTU would result in lowering the peak clad temperatures as a result of a LOCA. We have concluded that operation with uncollapsed fuel beyond a local burnup of 9600 MWD/MTU at a peak linear heat rate of 13.2 kW/ft is acceptable.

The final item you proposed was to increase the peaking augmentation factor from 1.10 to 1.112 at the top of the core. This change is based on a reanalysis at higher core average burnups using the previously approved CE augmentation model presented in CENPD-75 and supplements. We conclude that this is acceptable.

Your April 26, 1973 letter requested a change in Item 5 of the Interim Special Technical Specifications. Item 5 states that the plant will be placed in a cold shutdown condition following a core average burnup of 6000 MWD/MTU if information concerning densification had not been

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submitted and approved by the Staff. You requested that we reconsider this item and require somewhat less restrictive operating limits. The methods used to develop the peak linear heat rate for a 2300 °F clad temperature following a LOCA are discussed in the safety evaluation accompanying Tech Spec Change No. 5. These same methods have been used to determine the peak linear heat rate and the results have been shown to satisfy the requirement that collapsed fuel will not exceed an 1800 °F clad temperature as a result of a LOCA. The 1800 °F temperature was presented in our November 14, 1972 densification report as being appropriate for collapsed cladding. When the methods described in the safety evaluation are used with the restriction that the maximum allowable clad temperature does not exceed 1800 °F as a result of a LOCA, the resultant peak linear heat rate is 9.0 kW/ft. Therefore we feel that a conservative limit for operation with collapsed fuel is 9.0 kW/ft, and the Interim Special Tech Specs should be changed to reflect this new limit.

We conclude that the approved changes do not involve significant hazard considerations not described or implicit in the Final Safety Analysis Report and that there is reasonable assurance that the health and safety of the public will not be endangered. Accordingly, pursuant to Section 50.59 of 10 CFR Part 50, the Technical Specifications of Facility Operating License No. DPR-20 are hereby changed as set forth in revised pages, copies of which are enclosed.

Sincerely,

R. C. DeYoung, Assistant Director
for Pressurized Water Reactors
Directorate of Licensing

Enclosure:
Revised Tech Spec Pages

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DATE ▶	6/28/73	6/28/73	6/29/73	6/29/73	6/29/73	6/29/73

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