

UNITED STATES  
 ATOMIC ENERGY COMMISSION  
 WASHINGTON, D.C. 20545

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FEB 18 1970

50-155

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 ORB #2, DRL

BIG ROCK POINT - CHANGE NO. 19 - THREE PuO<sub>2</sub>-UO<sub>2</sub> FUEL ASSEMBLIES

Amendment No. 3 (April 1969) authorized Consumers Power Company to possess 50 kg of plutonium in mixed oxide fuel rods for irradiation in the Big Rock Point core. As of this date Consumers has used about 1 kg of Pu in the 32 fuel rods irradiated during operating cycle No. 7 (May 1969 to February 1970) and 17.5 kg in the three special EEI PuO<sub>2</sub>-UO<sub>2</sub> fuel bundles. Consumers Power Company could, if they chose, fabricate and insert into the core four or five more mixed oxide fuel assemblies similar to the EEI bundles without violating the operating license or the revised technical specifications. However, any further increase in the use of plutonium enriched fuel would necessitate a change to the operating license to permit possession of plutonium in excess of the present limit of 50 kg, and could signal a definite trend towards an all plutonium enriched core. Such a change should not be permitted without a comprehensive re-evaluation of the core fission product inventory that necessarily accompanies a shift to plutonium enrichment and longer fuel exposure (greater than 20,000 MWD/T fuel depletion). It may be necessary to adjust radiation dose calculational methods to more accurately account for particle releases, impose new operating restrictions, or allow for engineered safety features.

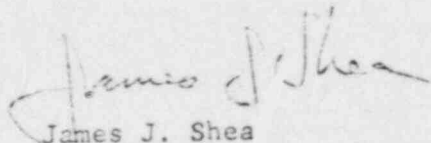
If the variety of fuel rods per bundle and the dependence on burnable poison is to increase or be extended to full cores, the consequences of fuel rod assembly errors should be evaluated. Assembly and inspection procedures should be reviewed. Such complex fuel arrangements can be justified for a small number of bundles such as the three EEI bundles, but for general assembly, live acceptance, more investigation is required.

The prompt threshold of failure, 265 cal/gm for PuO<sub>2</sub>-UO<sub>2</sub> fuel rods, is accepted on a temporary basis based on the limited SPERT IV tests performed to date. Any increase above this level should consider whether local vaporization perturbations (energy release) are large enough to destroy the clad and disperse the fuel. This uncertainty,

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unless coprecipitation of  $\text{PuO}_2$  and  $\text{UO}_2$  is employed in preparation of the fuel mix, may necessitate a conservatively low value for the prompt failure threshold. SPERT tests with particles as large as 200-500 microns would be valuable.



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