



UNITED STATES
ATOMIC ENERGY COMMISSION

WASHINGTON, D.C. 20545

FEB 22 1971

D. L. Ziemann
File (Docket No. 30-155)

THRU: D. L. Ziemann, Chief, ORB #2, DRL

EVALUATION FOR BIG ROCK POINT - AUXILIARY NEUTRON SOURCES (CONSUMERS
POWER COMPANY)

By letter dated January 18, 1971, Consumers Power Company proposed that two auxiliary neutron sources contained in removable fuel rod positions in two fuel bundles be inserted into the Big Rock Point Nuclear Reactor (see attached Figure 5.1). According to the proposed change (No. 25), the two additional sources will improve the startup count rate which on occasion has been marginal at 3 CPS as a result of lower core reactivity when shutdown because of increased use of burnable poison, lower plant load factor and longer shutdowns. We have redesignated the request Proposed Change No. 23.

We have reviewed the proposed change and note that the auxiliary sources consist of a homogeneous 50-50 mixture of antimony-beryllium compacted to a minimum packing fraction of 80 percent, encapsulated in 0.483 inch OD 304 SS tubes with 0.033 inch wall thickness, and encapsulated again in a zircaloy fuel tube of the same quality and dimensions as tubing used for fuel rods and cobalt targets. The overall length of the auxiliary stainless steel source tubes is 60 inches with the source material located in the middle 25 inches. The remaining space in the source tube is void which, over the expected 15-year lifetime of the sources, is calculated to be pressurized to 803 psia by the helium generated. The maximum source temperature, calculated to be 911°F, is not excessive and the tubing should not fail due to the stresses associated with the maximum expected tubing temperature (750°F) or the maximum internal pressure (803 psia). We have confirmed that the calculated pressure at operating conditions is less than 803 psia and less than 310 psia at ambient temperatures and that the source capsule stresses are not excessive. The maximum source temperature (911°F) is well below the beryllium melting temperature of 2340°F or the antimony melting temperature of 1170°F; and we conclude, therefore, that mass migration will be negligible.

The licensee has calculated that replacement of a 35 gm/ft cobalt target with one of the proposed auxiliary neutron sources will increase the overall bundle maximum local peaking factor by approximately 4%. Considering that this increase occurs only over the 25-inch length of the

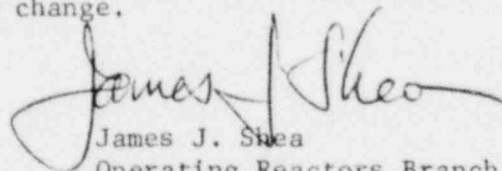
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source and that the peak center temperature of Reload-F assemblies, as reported in Consumers Proposed Change No. 21, was 200°F below melting, at 122% power, such an increase will not result in fuel melting, i.e., peak fuel temperatures are calculated to be about 5000°F. The predicted 0.6 percent increase in the fuel bundle reactivity due to the proposed neutron sources would not be detectable since it is too small to change the core reactivity significantly and it would not affect the shutdown requirements. If the count rate increases as anticipated following radiation of the auxiliary sources, reactor startup, using existing procedures, will be enhanced . . . , i.e., the counts/sec will be easier to distinguish above noise and background level.

We have been informed by Consumers Power Company that appropriate considerations for quality assurance have been provided by the fabricators. Material certification of the physical and chemical composition of all source components was reviewed and approved by them. Design calculations were also reviewed and approved. By telecon 1/26/71, we were informed that the auxiliary sources for Big Rock Point and similar sources for Palisades were manufactured by The Monsanto Company. Monsanto also has provided many sources of this type for Westinghouse, Combustion Engineering and Babcock & Wilcox Company reactors. The sources as described, therefore, are not unique to the Big Rock Point reactor. Based on these considerations and previous discussions with Consumers regarding the Company's practices and requirements for quality assurance, we have concluded that an exhaustive evaluation of quality assurance for the Big Rock Point neutron sources is not warranted.

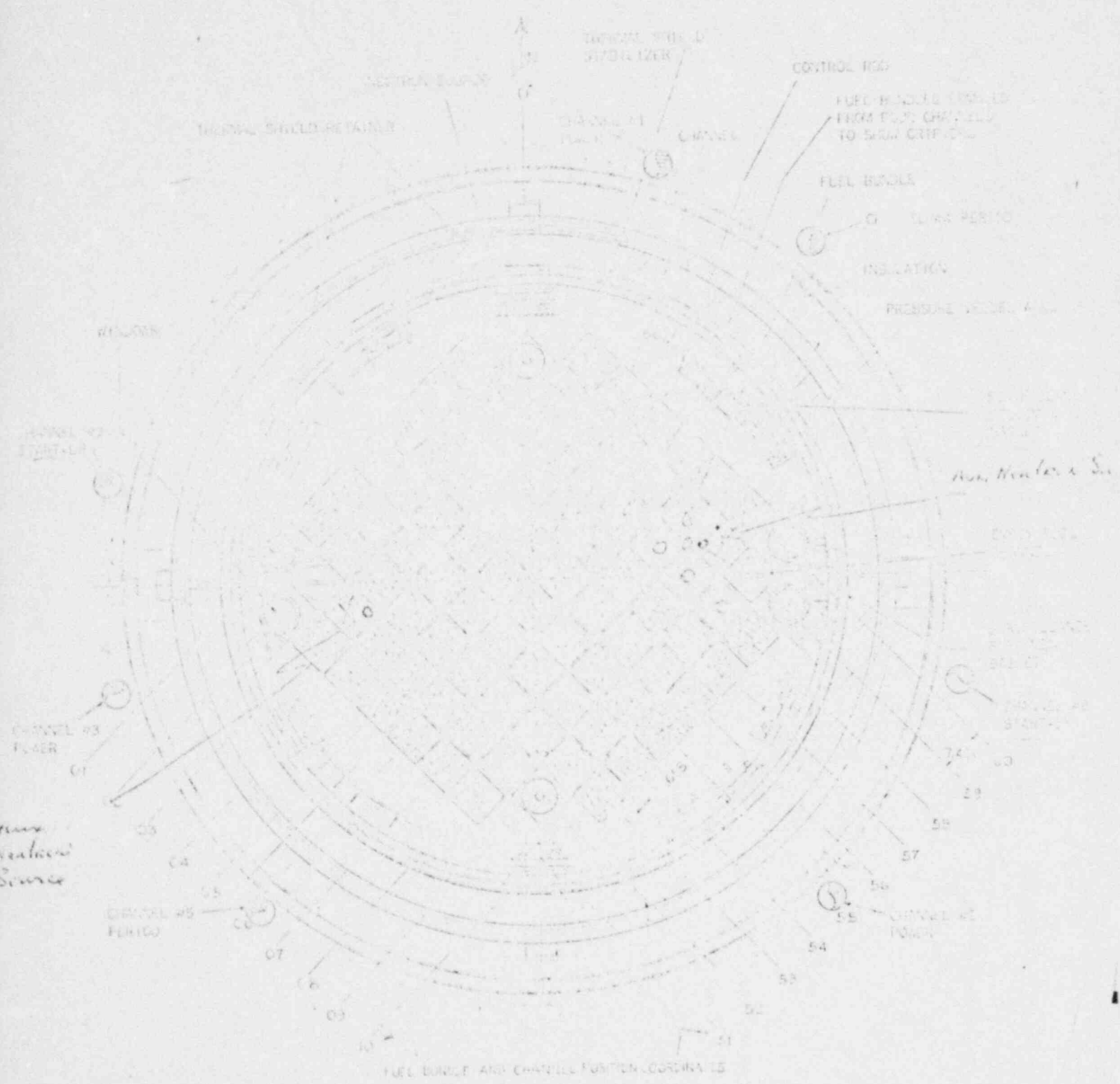
We agree that the design of the auxiliary sources is conservative and that safety may be enhanced by insertion of the proposed two auxiliary sources because if the shutdown neutron population increases as expected uncertainties in measuring neutron count rates will be reduced. Therefore, the auxiliary neutron sources should be installed as requested during the refueling outage (currently scheduled for February 1971). Accordingly, the Technical Specifications should be changed as proposed by Consumers Power Company. Insertion of the two auxiliary neutron sources does not increase the probability or change the consequences of the design basis accident nor does it involve significant hazards considerations not described or implicit in the Safety Analysis Report. There is reasonable assurance that the health and safety of the public will not be affected by the change.



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CORE CONFIGURATION
SECTION THROUGH FUEL
FIGURE 5.1



FUEL BUNDLE AND CHANNEL POSITION COORDINATES