GAMMA-METRICS

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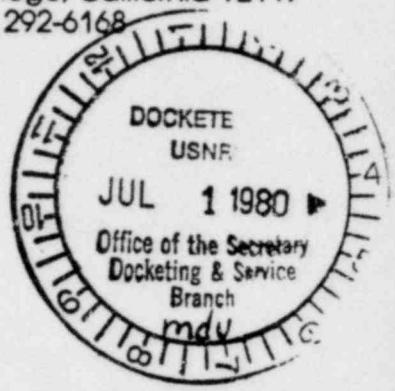

Dr. A. S. Hintze
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: Reactivity Control, Neutron Flux, 1cps to 1% Power

REFERENCE: U.S. NRC Regulatory Guide 1.97, Revision 2, Pages 15, 24, 35, 44, 55 and 64, Tables 2, 3, 2A, 3A, 2B, and 3B.

Dear Dr. Hintze:

We were pleased to speak with you by telephone last week. We had called to express our concern that the requirement for using a fission chamber had been removed from Revision 2 of Regulatory Guide 1.97, for measuring neutron flux in the range fom one count per second at source level to 1% power.

We understand from speaking to you that that requirement was removed because it is the policy of the NRC to specify requirements, rather than to specify how to fulfill those requirements. We agree completely with that position.

However, we believe that it is very important that you specifically direct the industry to the use of a safe, reliable, and dependable neutron flux detector. We firmly believe that your original choice of the fission chamber was very wise. BF3 and B10 detectors are inadequate for this type of measurement. The Regulatory Guide 1.97, without specifying the type of detector, could achieve the same objective of enhancing plant safety and accuracy of reactivity control by adding functional requirements for the measurement. We recommend that the following requirements be included in Regulatory Guide 1.97:

- o Measured variable - Neutron Flux
- o Range - Reactor source level to 1% Power
- o Minimum signal - 1 count per second
- o Detector design life - Greater than 10 years at 100% Reactor Power

- o Detector neutron sensitivity shall not be degraded as the gamma flux level changes.
- o Detector neutron sensitivity shall not change more than 1% with integrated neutron and gamma flux dose for 10 years at 100% Reactor Power.

As you are aware, the utilities have experienced very poor reliability and poor detector life using B10 lined and BF3 detectors. Both of these

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detectors experience severe degredation of performance and sensitivity in gamma fields above a few hundred R/hr. In the boron lined detectors, the organic binder is degraded by radiation. In the BF3 detector, the gas gain is permanently degraded by integrated gamma dose, and is temporarily degraded by gamma flux level. Therefore, a reactor operator obtaining his information from a BF3 detector with calibration reference at reactor startup, would be led to believe that the neutron flux was lower than it actually was during reactor shutdown, because of the lower neutron sensitivity due to higher gamma flux level and due to integrated dose during reactor operation.

The high replacement rate of the B10 and BF3 detectors has been a problem for the operators and causes undue personnel exposure from extra handling of the detectors as they fail.

That the recommended requirements are reasonable has been demonstrated by the installation of a system in the Maine Yankee Atomic Power Company reactor plant. The system used fission detectors which from many years of reactor operating experience, have proven to be very reliable. In the past, fission detectors were thought to have too little sensitivity for use at reactor source level. This apparent difficulty was resolved in the system installed at the Main Yankee site. For more information, we recommend that you contact R. D. Wyckoff of Maine Yankee Atomic Power Company.

We urge you to include the recommended requirements in Regulatory Guide 1.97. Those requirements are achievable and will greatly enhance the performance, safety and reliability of the Reactivity Control, neutron flux monitor, and will reduce personnel exposure.

Very truly yours,

Clinton Lingren

Clinton L. Lingren
Vice President

CLL/jad

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