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Consumers
Power
Company

General Office: 312 West Main Avenue, Jackson, Michigan 49201 • Area Code 517 788-0550

June 12, 1973

Mr. John F. O'Leary, Director
Directorate of Licensing
US Atomic Energy Commission
Washington, DC 20545

Re: Docket No 50-255
License No DPR-20
Reactor Noise Analysis

Dear Mr. O'Leary:

On June 7, 1973 we contacted representatives of Region III, Directorate of Regulatory Operations and the Directorate of Licensing by telephone to inform them of excore flux detector signal oscillations at the Palisades Plant. During those conversations, a history of the observed excore detector signal oscillations was conveyed as well as significant details of test programs and analyses performed to date and currently under way. We further informed those representatives that we have concluded that this is not formally reportable at this time in accordance with the provisions of the Technical Specifications. Late Friday afternoon, June 8, representatives of Region III, Directorate of Regulatory Operations contacted me and requested that, even though the analysis is not yet complete, a short informational letter be submitted early the next week. This letter will fulfill that request.

In December 1972 excore detector signal oscillations were detected using highly sensitive instrumentation. Further investigations were conducted during the next month and it was preliminarily concluded that these signal oscillations were not due to instrumentation electronic noise. The maximum amplitude of the excore detector varies with detector pairs (detectors separated 180 azimuthal degrees). For the pair showing the maximum noise amplitude, using a 20-second sample period, 4% peak-to-peak variations are observed at irregular intervals about once per sample. At lesser intervals, oscillations with smaller peak-to-peak amplitudes have been observed. Analysis of opposite pairs of excore detectors showed that there is approximately a 180-degree phase angle between detector pair signals. Following the 7-week outage to repair steam generator tube leaks (March 1973), additional detailed data were obtained. The data include prompt in-core signals, excore subchannel data (top and bottom), detector data, external vessel accelerometer (snubber area) data, loop flow data, data with three pumps in operation (one combination), signal amplitude versus power level, loop RTD and in-core thermocouple data as well as data on all six excore channels and are currently being analyzed.

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Analysis of data recorded in March indicates that the portion of the excore detector signal oscillations characterized by the 180-degree phase angle between opposite detector signals does not indicate nuclear power oscillations or pressure vessel motion. The data does suggest internals movement involving the core support barrel, core shroud and possibly, the core moving as a unit. The motion, in turn, causes changes or modulation of the leakage flux detected by the excore nuclear instruments.

Movement of the barrel and shroud is most likely caused by hydraulic pressure pulsations in the downcomer annulus. The pulsations can result from a combination of flow turbulence, inlet coolant impact on the barrel and excitation of the known hydropneumatic 0.4-0.6 CPS natural frequency of the combined pressurizer and primary coolant system. If the core is moving, it is likely the result of mechanical forces from the barrel acting through the core support plate. If the oscillation is attributed to internals motion, it is not possible to quantify the movement of the barrel/shroud or the core. However, motion limits can be determined based on signal oscillation magnitude and the calculated signal attenuation caused by individual or combined internals motion. For example, 99 percent of all oscillations are less than or equal to 3 percent (peak to peak) of the full power detector reading. If the barrel shroud and the core moved as a unit, this could correspond to a 95 mils peak-to-peak movement. If only core motion were the cause, it would require 50 mils peak-to-peak movement. Fifty mils are within the motion that is allowed by as-fabricated clearances. Purely on the basis of signal oscillations, any combination of barrel/shroud movement and core movement is possible, provided the two movements locate a point falling on a straight line connecting the two motion extremes.

In view of the data indications, emphasis is now being placed on a study of the implications of the suggested movements on internals integrity. The study is still in progress but nothing has been seen to date to indicate a cause for concern in this respect. In particular, regarding the core, Combustion Engineering, Inc previously conducted tests which show no sign of fuel assembly wear or fretting for repeated forced deflections which exceed the deduced values.

Further data were collected in late May to early June to give further definition to the oscillation and its origin. Analysis of the data is in progress as well as that data obtained during March 1973. Results of this further detailed analysis will be available within the next two to three weeks.

On May 16, 1973 the Safety Audit and Review Board (SARB) reviewed the excore detector signal oscillations. Based on the oscillations not changing significantly, a detailed safety analysis and the preliminary results of the analyses being performed which were summarized above, SARB concluded that continued operation of the plant did not pose

Mr. John F. O'Leary
Reactor Noise Analysis
June 12, 1973

3

any hazards considerations not described or implicit in the Final Safety Analysis Report. SARB recommended that at least once per day the plant staff monitor the oscillations to determine if a significant change in the oscillations has occurred. Another SARB meeting will be held when the results of the data analysis become available.

In addition to this letter, representatives of Region III, Directorate of Regulatory Operations requested that the flux oscillation surveillance be increased to once per operating shift and that Regulatory Operations be immediately notified if a significant change occurs. Consumers Power Company agreed to both of these requests and the once-per-shift surveillance has been initiated. As the nature of the oscillation traces are not symmetrical or uniform, we are developing a definition of "significant change" to ease interpretation of these traces.

We will keep representatives of both the Directorates of Licensing and Regulatory Operations informed with respect to the results of analyses which are being performed.

Yours very truly,

Ralph B. Sewell (Signed)

RBS/mel

Ralph B. Sewell
Nuclear Licensing Administrator

CC: BHGrier, USAEC