



May 24, 2000

Nuclear Regulatory Commissions
Document Control Desk
Washington, DC 20555

Re: Information Letter
License R-2, Docket No. 50-005

Dear Sir or Madame:

This is an information letter to inform you of a non-reportable operational event, which took place at the Penn State Breazeale Reactor on Monday, May 15, 2000 at about 1741 hours. This event was discussed with Marvin Mendonca (NRC Headquarters) and Tom Dragoun (NRC Region 1) on Tuesday, May 16, 2000. Based on that discussion they concurred with our assessment that this was not a reportable occurrence.

Description of the Event

The reactor was being operated at 700 kW against the FNI (Fast Neutron Irradiator) in the normal FNI configuration with the SA (safety rod) at the UEL (upper electrical limit); the TR (transient rod), SH (shim rod), and RR (regulating rod) balanced; and the control system in 2-Rod Auto controlling using the SH and RR. Approximately 6 minutes into the run a failure of the (WR) Wide Range pre-amplifier occurred. There was no prior indication of this failure. Following the failure the safety system and the control system performed as designed.

When the failure occurred the WR signal immediately began falling toward zero. The control system which utilizes the WR as its power signal saw this as decreasing power and began to withdraw the RR and the SH. Approximately two (2) seconds into the event the WR power signal had decreased sufficiently that WR/PR (Power Range) power spread stepback setpoint was exceeded. The WR receives its input from a fission chamber; the PR receives its input from a gamma ion chamber; these two channels provide redundant and diverse measurements of reactor power. A reactor stepback which inserts the SA, SH, and RR to their LEL (lower electrical limit) was automatically initiated. The SH and RR were fully inserted at about 17 seconds into the transient and the SA was fully inserted at about 27 seconds. The reactor was in a shutdown mode (greater than \$1.00 subcritical) significantly before 17 seconds. Note that the stepback is a latching action and requires a console key RESET to remove.

At the time of the failure the RO was preparing to take hourly readings and observed the rapidly decreasing WR signal, the rod motion, and the decrease of reactor power as indicated by the PR (gamma ion chamber) signal and the fuel temperature. He assessed that the reactor was being shutdown properly as a result of an at that time unknown failure and immediately paged the SRO. The SRO reached the control room in a matter of a few seconds. He also verified the reactor was in a safe condition, verified that a stepback had taken place and that appropriate annunciation signals were present. Both the RO and SRO utilized diverse and redundant channels of information to verify the condition of the reactor since the normal WR channel was now out of service. These sources of information included the PR channel (which includes both the gamma ion chamber signal and the fuel temperature signal) as well as auxiliary information provided by a spare WR and a CIC (compensated ion chamber).

The RO correctly assessed that there had been an instrumentation failure and then assured the reactor was in a safe condition. Rather than disturb the conditions and possibly disrupt recording of information and future trouble shooting he chose not to trip the reactor. Note the SA, SH and RR were automatically inserted. The TR remained withdrawn; the reactor was shutdown by about \$5.00. The RO and SRO independently assessed the condition of the reactor and determined that the reactor was in a safe condition. The SRO used the historical trend to determine the events that had taken place and to provide a graphical picture of the event. He then instructed the RO to secure the reactor. The RO drove the TR to its LEL and removed the console key thus placing the reactor in a secured mode (approximately \$7.00 shutdown).

The RO and SRO made appropriate log book entries, collected historical information, notified the Director and the Manager, Operations and Training, initiated appropriate paperwork for the evaluation of the event, placed a DNO (Do Not Operate) tag on the console, stopped the transfer of data to DCC-Z to preserve the historical information, and verified by multiple means such as PR (gamma ion chamber), fuel temperature, spare WR (fission chamber), and CIC that the reactor was in a secure condition. They also contacted the instrumentation system expert, who conducted some initial troubleshooting. The initial diagnosis was a failed pre-amplifier or detector.

Corrective Actions and Follow-up

Further testing determined that the event was caused by a failure of the input stage of the preamplifier. The preamplifier was replaced with a spare; an alignment check was performed and compared to the last available WR information. After a reactor checkout the Director authorized limited operation to verify the correct operation of the WR channel. Operations were conducted under the direct supervision of the Director at 200, 400, 600, and 800 kW with comparisons between the WR, the PR, the fuel temperature, the spare WR, and the CIC; a comparison was also made with readings taken during a recent power ascension. The WR was verified to be reading correctly. The Director then authorized a return to normal operations.

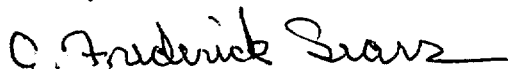
The Director interviewed the RO and the SRO as well as conducting reviews of the console printouts and historical trends with the system expert in order to determine the conditions of the event, the sequence of actions during the event, and the performance of the reactor instrumentation and safety system. A determination was made that the event was not a reportable occurrence as defined by the Technical Specifications since the RSS (reactor safety system) remained capable of performing its functions due to the diverse means of measuring reactor power. It was decided that an information letter was appropriate.

Discussions have been held with the WR vendor regarding the failure. The pre-amplifier has been returned to the vendor for repair and assessment.

The event was reviewed with the licensed staff at a status meeting.

No further communications concerning this event are anticipated. If there are any questions please contact me.

Sincerely,



C. Frederick Sears
Director, Radiation Science & Engineering Center
Breazeale Nuclear Reactor

CFS/skr

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