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DEPARTMENT OF CHEMISTRY IRVINE, CALIFORNIA 92717

July 6, 1982

U.S. Nuclear Regulatory Commission
Chief, Standardization and Special Projects Branch
Division of Licensing
Washington, D. C. 20555

Re: Docket 50-326, License R-116
Incident Report for July 3rd, 1982
Report under provisions of Technical Specifications:
Section 6.7.c (1).

Gentlemen:

On July 3rd, 1982, our nuclear reactor was inadvertently operated for a period of 1 hour and 11 minutes at a calorimetrically established power level of 327 kilowatts. The run was being performed for power calibration purposes. No safety problem was encountered and no additional potential hazard was created.

Background

Approximately one week earlier, the rotary specimen rack had been removed from the reactor core structure to the side of the reactor tank. This procedure was authorized in order to allow a cooling period for the rack before attempting a repair of a rotary bearing problem which arose over a year ago. Following the removal of the rack the core was reloaded, using appropriate reactivity precautions, and all control rods recalibrated. Values for control rod reactivity worths were found to be quite close to those found before removal of the rack.

The procedure then called for power calibration to be performed using the standard method established for several years at this facility. This calls for operation of the reactor at 80% of full licensed power as indicated by the reading on the linear recorder, for a period of approximately two hours. Following this, the temperature rise per hour is used to compute the true power level of the reactor, based on heater calorimetry performed soon after reactor installation. The Senior Operator performing the calibration was following this procedure.

Approximately 30 minutes into the run, the operator discussed with the Reactor Supervisor that the fuel temperature reading was significantly higher than usual for operation at this power level (270°C vs 200°C previously). Other power indications were: Linear - 80%; %Power - 96%; LOG - 230 kilowatts. The supervisor was of the opinion that the reactor might be running at an overly high level, but that an additional period covering a further temperature data point should be taken for confirmation. It was noted that area radiation levels, and the continuous air monitor were both reading at their "normal" levels for this operation.

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Following the additional period, a plot was made of the temperature rise, and the power level computed at 327 (± 6) kilowatts. Obviously, the removal of the specimen rack had made decrease in the flux level at the linear chamber of approximately 40% instead of the anticipated loss of less than 20%.

Follow-up

On 7/5/82, a further power calibration run was made at an indicated power level on the linear channel of only 100 kilowatts (40% of licensed power). The calorimetric level measured this time corresponded to 174 (± 4) kilowatts. Chamber positions were adjusted so all indicated 70% of full power. Fuel temperature indication was as expected (190°C). All instrumentation is now calibrated and operations will be allowed to proceed.

Because of the difficulty caused by this unanticipated fall-off in flux at the chambers, it appears prudent to propose a change in the specifications for power calibrations in the standard operating procedures. This will be brought to the Reactor Operations Committee for review. It will be proposed that power calibrations be performed at:

> "no more than 80% of 250 kilowatts power level based on the highest indication of any detection system, viz: 80% of linear channel at 250 kilowatts, 80% of % Power channel indication, 200 kilowatts on log channel or 200°C on fuel temperature channel readout."

This change will be enacted prior to the next power calibration for the reactor.

Safety Considerations.

Operation of the TRIGA reactor at this elevated level for a short period raises no safety problem at this facility because of the extremely conservative nature of the design of the facility. This is partly because of the inherent nature of the TRIGA reactor, but also because possible operation up to 1.5 megawatts was anticipated in the design of certain features. One example is the heavier than necessary (for 250 kilowatt operation) ceiling thickness immediately over the reactor. As noted above, there were no signs of the increased power level in indications of the over-tank radiation monitor, or of the continuous air monitor. The most significant increase might be expected to be in the Argon-41 level. However, operation without the rotary rack in place removes one of the major sources of Argon-41 activity in the room. The fact that the sample pneumatic transfer system was not operated during this power calibration run eliminates the single major source of Argon-41 release for the facility from consideration.

Additional burn-up and the associated fission product formation from such a short higher power run is clearly a negligible addition to overall inventories.

Fuel temperatures during this operation were indicated at 270°C maximum. This is way below both the safety limit for fuel of this type (1000°C) and below limiting safety system settings required (800°C) and used (700°C) at the facility. It should be noted that temperatures in excess of this are routinely created at this facility during full power pulses (350°C) and are permitted under safety analysis guidelines.

As a result of these considerations it is concluded that this inadvertent operation beyond the limitations of our license did not constitute a hazard to the health and safety of the public, or our employees. No significant decrease in margins of safety were created, nor were any new safety considerations.

Sincerely yours,

F. S. Rowland

F. S. Rowland
Reactor Administrator

G. E. Miller

G. E. Miller
Reactor Supervisor

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cc: NRC Region V, Office of Inspection and Enforcement
W. Lillyman, Vice-Chancellor, Academic Affairs
V. P. Guinn, Chair, Reactor Operations Committee
Members, Reactor Operations Committee
Senior Reactor Operators