

NUCLEAR ENGINEERING SCIENCES DEPARTMENT
Nuclear Reactor Facility
University of Florida



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August 10, 1991

14 Day Report:
Failure of Fuel Box
Outlet Thermocouple

Nuclear Regulatory Commission
Suite 2900
101 Marietta Street, N.W.
Atlanta, GA 30323

Attention: Regional Administrator, Region II

Re: University of Florida Training Reactor
Facility License: R-56, Docket No. 50-83

Gentlemen:

Pursuant to the reporting requirements of paragraph 6.6.2(g) of the UFTR Technical Specifications, a description of a potential violation of the Technical Specifications was reported by telephone/teletype (Attachment I) on 28 July 1992 and a 14-day written report is submitted with this letter to include occurrence scenario, NRC notification, evaluation of consequences, corrective action and current status. The potentially promptly reportable occurrence involved the failure of the thermocouple circuit on fuel box #2 outlet line.

Scenario

On 27 July 1992 following a full power run for 10 minutes and after the second startup of the day was begun at 1505 and at 1609 after 35 minutes of operation at 100 kW full power, temperature recorder outlet #2 was noted to be reading 0 on scale indicating a failure in the circuit monitoring the water temperature at the exit of the south center fuel box #2. Because of this failure, an unscheduled reactor shutdown was commenced at 1609 hours with the reactor shutdown and secured at 1610 hours. With the exception of the temperature recorder Point #2, all systems were noted to respond normally during the shutdown for which two(2) SROs were present.

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After completion of the unscheduled shutdown, Maintenance Log Page #92-24 was opened and circuit continuity was checked and verified from the temperature recorder in the control room back to the equipment pit from which point the circuit leads to the thermocouple in the fuel box #2 outlet line which is not normally accessible beneath the biological shield. A careful check of the temperature recorder showed that temperature recorder point #2 had failed downscale about 7-8 minutes prior to completion of the first run at 100 kW for which the reactor was shutdown and secured at 1430 hours. Subsequently, the failure downscale was not noted due to the downscale failure point printing on the thickly inked edge of the recorder paper with all the other points printing in a bunched area as expected. The SRO was the same for both runs but he had been relieved by a second SRO for eight minutes for sample insertion during the second run at the 1 watt power level prior to running up to 100 kW and neither noted the failure until the first SRO did so after about 30 minutes at full power.

Primarily because of the delay in noting the failure (understandable per the explanation above), this event was reported to a special Reactor Safety Review Subcommittee Executive Committee meeting on 28 July 1992. The unscheduled shutdown performed on July 27, 1992 was reviewed with agreement that the failure downscale of the thermocouple for fuel box #2 was not a violation of the technical specifications. Tech Spec items considered here were the Design Features in Section 6.1 listing all the thermocouples as well as Table 1 in Section 3.2.3 in the Limiting Condition for Operation (LCO) which only specify six (6) of the eight (8) thermocouples on the primary side. This LCO consideration was the key one applicable versus Specification (3) in the Limiting Safety System Settings as the water would not exceed 155°F for any conditions considered normal. Indeed normal maximum operating temperatures for the fuel box outlet water are in the range of 120°F. Dr. Vernetson indicated he would report the occurrence to Region II and follow any instructions they might have. There was considerable discussion about whether blockage of fuel box #2 could be detected in this case with indications in the negative reactivity effects of boiling, probable rupture disk breakage if any steam would be generated, flow changes due to increasing pressure differences and variations of the other temperature indications all giving the operator evidence of a flow blockage should such occur. The flow changes in other fuel boxes would occur long before any boiling could occur even in a partially blocked fuel box. On this basis the committee approved relief restarts with one failed thermocouple to complete several experiments provided the NRC would concur in this evaluation. One of the reasons for this consideration was that fuel inspection (B-2 Surveillance) requiring biological shield unstacking was already scheduled for mid-August; therefore, it was planned that both the repairs to the thermocouple system and the fuel inspection could be performed with one unstacking in the interest of ALARA and overall safety. The RSRS Executive Committee was also to be notified prior to such a restart with running limited to no more than three hours at power for the two experiments.

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NRC Notification

After the RSRS Executive Committee meeting NRC Region II was informed of this event per a telephone conversation on 28 July 1992 with Mr. Craig Bassett relative to the loss of the temperature indication from fuel box #2. The situation was confirmed in a following telecopy (**Attachment I**). At this time the failure was described, the key Tech Spec sections were reviewed especially the fact that there is no limiting condition for operation preventing startup provided 6 of the 8 primary temperature monitoring points are operable and the fact that the maximum normal fuel box outlet temperature is only about 120°F. There was agreement on a request by the Region II Inspector to treat the event as reportable.

In a subsequent conversation with Craig Bassett of Region II and NRC Project Manager Ted Michaels(Rockville), it was agreed that the UFTR could be restarted for the two experiments to be completed subject to special vigilance by the operators involved; one run would be at 100 kW for one hour, the other at 10 kW for one hour.

Current Status

This information on NRC permission to restart briefly was communicated to RSRS Executive Committee members and the two runs were completed uneventfully on July 30(100 kW) and July 31 (10 kW) respectively with the reactor then shutdown and secured awaiting fuel inspection and whatever repairs would be needed for the thermocouple system. As of this date(August 10), no further information can be provided until the core region can be accessed and inspected. Plans are to unstack the core shielding and proceed to inspect the fuel and repair the thermocouple system in a timely fashion. Plans are to inspect the fuel first allowing further decay of the activated materials around the thermocouple where most of the dose for these two projects is expected to be committed.

This inspection effort is expected to begin on August 11, 1992 with unstacking of the core biological shielding with fuel inspection occurring on August 12, 1992 and thermocouple system repairs to commence after fuel inspection is complete. Following completion of all checks and necessary surveillances the UFTR will be restarted to full power performed in steps to assure shielding replacement is adequate. After performing the requisite radiation surveys, the UFTR will then be returned to normal operations.

Evaluation Corrective Action

This event is evaluated not to have involved a violation of UFTR technical specifications. The planned maintenance will be used to correct the problem. Considering the difficulty of noting this failure, the reactor was shut down and secured in a responsive interval.

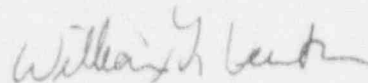
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Current Status/Consequences

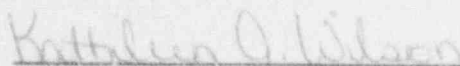
As indicated the Reactor Safety Review Subcommittee (RSRS) Executive Committee met on July 28, 1992 to review this event and the members were notified prior to the brief restarts. The committee essentially agreed with actions taken and with the staff evaluation that the occurrence did not represent a violation of the UFTR Technical Specifications. The Executive Committee will be consulted for approval of restart of the UFTR and subsequent return to normal operations after the corrective action has been implemented. Reactor Management and the RSRS Executive Committee agree there has been no significant compromise to reactor safety in the occurrence and no impact on the health and safety of the public. Other than considering the event in the next regular RSRS meeting, this occurrence is now considered closed, though NRC Region II will be notified prior to restart for the radiation surveys needed before return to normal operations.

If further information is needed, please advise.

Sincerely,



William G. Vernetson
Director Nuclear Facilities



Notary Public

8/10/92
Date

Notary Public, State of Florida

My Commission Expires March 22, 1995

Bonded Thru Troy Fahn - Insurance Inc.

cc: D. Simpkins
Reactor Safety Review Subcommittee
USNRC - Document Control Desk