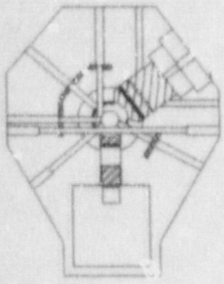
Radiation Science Laboratory
University of Illinois at Urbana-Champaign
Department of Nuclear Engineering / College of Engineering



214 Nuclear Engineering Laboratory
103 South Goodwin Avenue
Urbana, IL 61801-2984

217-333-7755/0866
217-244-5916 fax

Administrator
Richard L. Holm
r-holm@uiuc.edu

Health Physicist
Mark Kaczor
m-kaczor@uiuc.edu

January 12, 1998
Docket No. 50-151

Alexander Adams Jr.
Sr. Project Manager
United States Nuclear Regulatory
Commission
M.S. 11-B-20
Washington, DC 20555

Dear Mr. Adams,

Pursuant to our phone conversation of January 8, 1998 this letter is to inform the Nuclear Regulatory Commission in writing of our discovery of a procedural and Technical Specification violation. On November 17 and 21, 1997 one of our operators performed a pulse of the TRIGA reactor without first performing a fuel temperature and power level indication channel check per the operating procedures and technical specifications. A discussion of the events, their significance and the corrective action is attached.

If there are any questions concerning this matter please do not hesitate to call me.

Sincerely,

Richard L. Holm
Reactor Administrator

c: Tom Burdick, USNRC, Region III
Reactor Committee
file

A020 1

Discussion of Procedural and Technical Specification Violations
on November 17 and 21, 1997
with regard to fuel temperature and power indications
at the
University of Illinois Nuclear Reactor Laboratory.
January 8, 1998

Discussion of Events

On November 17 and 21, 1997 an operator performed a pulse on the reactor without performing the required checks on the reactor for fuel temperature and power indications per the operating procedure. This was discovered during the quarterly review of the operating logs and preparation for a pulse today. Step 2 of the operating procedure (see attached) for pulse operation states *"Operate the reactor between 50 kW and 250 kW to ensure that the fuel temperature systems are operable. Compare the NM-1000, NP-1000 and NPP-1000 power indications for agreement."* Not performing this step in the procedure also creates a violation of Technical Specifications 4.3 (b) and (c) (see attached). These Technical Specifications require a channel check of the fuel temperature for pulse operation and a channel check of the power level measuring channels when the reactor is in operation respectively. This specification is normally met by taking the reactor to 50 kW or 250 kW and verifying that the fuel temperatures and power channels are in agreement and as expected for the indicated power. This specification is also met by the prestart checks performed by the control console computer prior to daily operations. The prestart checks introduce signals into the channels and verify proper response hence meeting the requirement of a *"...qualitative verification of acceptable performance..."* as defined in Technical Specification 1.20 Channel Check (see attached). The same signal is introduced into both channels and the operator compares the output of the channels for agreement thus meeting the second part of Technical Specification 1.20 *"...comparison of the channel with other independent channels..."*. Although the prestart checks perform the required function of a channel check, it is normal procedure to perform these checks with the reactor actually at power.

The prestart checks were performed on November 17 and 21 and the fuel temperature and power indications did respond normally during the pulses performed.

Root Cause

Operation of the reactor has been infrequent in the last six months and hence operators are not as intimately familiar with the procedures as they should be. The operator simply forgot to perform the checks mentioned.

Corrective Action

- Due to the infrequency of operations, procedures will be out and observed for all operations regardless of simplicity.
- The operator in question will deliver a lecture on procedural compliance, with particular attention to pulsing requirements.

4.3 Reactor Safety System

Applicability

This specification applies to the surveillance requirements for the measuring channels of the reactor safety system.

Objective

The objective is to assure that the safety system will remain operable and will prevent the fuel temperature safety limit from being exceeded.

Specifications

a. A channel test of each of the reactor safety system channels shall be performed prior to each day's operation or prior to each operation extending more than one day.

b. A channel check of the fuel element temperature measuring channels shall be performed daily whenever the reactor is in operation at power levels greater than 50 kw or when pulse operation is planned.

c. A channel check of the power level measuring channels shall be performed daily whenever the reactor is in operation.

d. A channel calibration by the calorimetric method shall be made of the power level monitoring channels semi-annually, but at intervals not to exceed eight months.

e. A calibration of the temperature measuring channels shall be performed semi-annually, but at intervals not to exceed eight months. This calibration shall consist of introducing electric potentials in place of the thermocouple input to the channels.

f. A verification of the original calibration of the temperature measuring channels shall be performed semi-annually, but at intervals not to exceed eight months. This verification shall consist of comparing the measured temperature in a reference core at a known power level with the temperature measured in the reference core during the initial startup of the reactor.

Deleted 12-Rev-pg. 3 12/21/73

Basis

The daily tests and channel checks will assure that the safety channels are operable. The semi-annual calibrations and verifications will permit any long-term drift of the channels to be corrected.

1.17 Measuring Channel - A measuring channel is the combination of sensor, lines, amplifiers and output device which are connected for the purpose of measuring the value of a process variable.

1.18 Reactor Safety System - The reactor safety system is that combination of measuring channels and associated circuitry that forms the automatic protective system of the reactor, or provides information that requires manual protective action to be initiated.

1.19 Operating - Operating means a component or system is performing its intended function in its normal manner.

1.20 Channel Check - A channel check is a qualitative verification of acceptable performance by observation of channel behavior. This verification shall include comparison of the channel with other independent channels or methods measuring the same variable.

1.21 Channel Test - A channel test is the introduction of a signal into the channel to verify that it is operable.

1.22 Channel Calibration - A channel calibration is an adjustment of the channel such that its output responds, with acceptable range and accuracy, to known values of the parameter which the channel measures.

1.23 Reference Core - A reference core is a core with a configuration similar to the core configuration existing at the initial startup of the reactor.

1.24 Hexagonal - A hexagonal is one of the six concentric hexagonal bands of fuel elements surrounding the central opening of the core. The hexagonals are designated by the letters B through G, with the letter B used to designate the innermost hexagonal band.

1.25 Shutdown Margin - Shutdown Margin is that increment of reactivity by which the reactor must be subcritical after the insertion of the shutdown reactivity starting from any permissible operating condition such that the reactor would remain subcritical without further operator action.

1.26 Shutdown Reactivity - Shutdown Reactivity is the minimum reactivity worth required in the control and safety rod system at all times, starting from any permissible operating condition, such that the reactor can be made subcritical by no less than the shutdown margin assuming that the reactor is in the cold, xenon-free condition with the highest worth rod fully withdrawn and with the highest worth non-secured experiment in its most reactive state.

1.27 Experiment Safety Systems - Experiment Safety Systems are those systems, including their associated input circuits, which are designed to initiate a scram for the primary purpose of protecting an experiment or to provide information which requires manual protective action to be initiated.

2. Remove the source, as above, if necessary.

3. The cooling system may be started at any time previous to operations above 1.0 MW.
REMINDER: The secondary system is started with the throttling valve closed, and the Primary system is started with the isolation valves closed.

4. Record the rod positions, fuel temperatures, and bulk water temperature for a power level of about 250 kW. Compare the NM1000, NP1000, and NPP1000 power indications for agreement.

5. If the cooling system is in operation, record the water temperatures and flow rates.

6. Compare the fuel temperatures and reactivity loss in step 4 with a previous operation for the same conditions. (This check is made to ensure that the fuel temperature systems are operable.)

7. When the operating power level is reached record the values for; rod position, fuel temperatures, water temperature, and flow rates.

8. For continuous operation at a given power level, all operating values are recorded at intervals no greater than 30 minutes, for the first two hours, then at intervals no greater than one hour.

9. Changes in the number of cooling towers, the flow to the cooling towers, and operation of the fans may be required to maintain a desired primary system temperature. These changes are logged, under remarks, as they are accomplished.

10. For changes in power level, all operating values are recorded, including any changes that are made in the flow to the cooling towers.

Pulsed Operation

NOTE:

*** Pulsed operation of the reactor is permitted by the Technical Specifications up to a power level of 250 kW, however, the Pulse Permissive Bistable is normally set at 1 kW. Resetting of this bistable requires the approval of the Reactor Administrator.

*** The use of 15 watts in the Pulsed Operation Section of this procedure is arbitrary, pulse worth determination and pulsing can be carried out at any power below the setting of the Pulse Permissive Interlock

*** Prior to pulse mode operation verify that the rods cannot be moved UP when in pulse mode.

1. With the power level at 15 W, set the transient rod(s) at the values determined for the pulse.

2. Operate the reactor between 50 kW and 250 kW to ensure that the fuel temperature systems are operable. Compare the NM-1000, NP-1000 and NPP-1000 power indications for agreement.