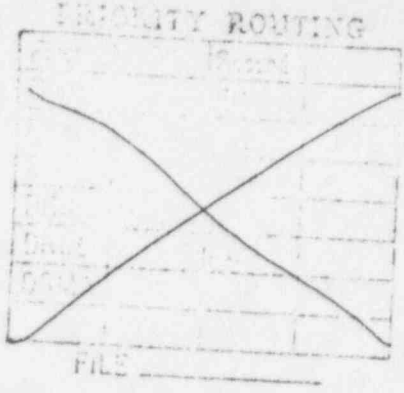

UNIVERSITY OF MISSOURI RESEARCH REACTOR

OPERATIONS MONTHLY SUMMARY

July 1995

Prepared by:
Operations Staff

AUG 2 3 1995

E115

July 1995

The reactor operated continuously in July with the following exceptions: five shutdowns for scheduled maintenance and/or refueling; two unscheduled shutdowns.

On July 13, a reactor scram occurred due to the loss of site electrical power. The University Power Plant experienced several grid-wide interruptions. Power was eventually restored and the reactor was refueled and returned to normal operation.

On July 24, a manual scram was initiated when the reactor operator observed the Channel 4 indication spike up 15% and return to its previous indication while another operator was closing the Channel 5 instrument drawer after a gain potentiometer change. The power level indications for Channel 5 and 6 dropped about 15%. Review of the Intermediate Range Monitor (IRM) chart indicates that the IRM indication also dropped about 15%.

Electronics technicians checked the nuclear instrument cabinet cabling to the power range drawers to ensure no cabling was pinched when the Channel 5 drawer was closed. They checked each NI drawer to ensure that the voltage regulator and feedback and test modules were seated. They also checked the voltage from the common power supplies 2PS1 and 2PS2.

The picoammeter module in the WRM (Channel 4) drawer appeared to not be fully seated. The module plug and the drawer pins were engaged, but the module could slightly rock. The Channel 4 problem could be duplicated by the physical vibration of shutting the Channel 5 drawer, until the picoammeter module was reseated. When this module was fully seated, the "up" spike problem on Channel 4 could not be duplicated.

The spurious power level spike on Channel 4 was most likely caused by a momentary open or high resistance in the plug-pin interface for the picoammeter feedback module. The picoammeter feedback module and the Channel 4 range switch provide the feedback loop for the D.C. amplifiers that provide the Channel 4 meter and trip unit output. These amplifiers are operational amplifiers which are very sensitive to the resistance of the feedback loop. Any high feedback loop resistance or momentary open would cause a spike to occur at the output of the amplifier.

The drop in indication on Channels 5 and 6 and the IRM chart were most likely the result of regulating blade response to the spurious spike on Channel 4. Channel 4 output is delivered to the Servo Amplifier which drives the regulating blade. The Servo Amplifier detects the error between Channel 4 indicated power and the power demand set point potentiometer and activates the regulating rod to withdraw or insert based on the direction of the error, to reduce the error to zero.

In this particular case, the "up" spike on Channel 4 would cause the regulating blade to drive in, reducing reactor power. The cause of this spurious spike on Channel 4 indication is similar to previous problems associated with problems of momentary opening or high resistance in the Channel 4 amplifier feedback loop associated with the WRM (Channel 4) range switch and the picoammeter relays themselves which resulted in spurious scrams or rod run-ins. Electronics technicians will add a precaution to their maintenance procedure for Channel 4 to include verification that all modules are firmly seated.

Major maintenance items for the month included: installing an 8" valve on the secondary side of pool heat exchanger 521; loading new pool deionization bed 'F'; shipping eight depleted fuel elements in the BMI-1 cask; replacing the control power fuse on primary pump 501A breaker; replacing the belts on the alpha lab exhaust fan.

UNSCHEDULED SHUTDOWNS

Date	Number	Type	Cause
7/13/95	1036	Scram	Loss of site electrical power
7/24/95	1037	Manual Scram	Spurious indication on Channel 4

OPERATION SUMMARY

HOURS OPERATED THIS PERIOD	650
TOTAL HOURS OPERATED	189,607
HOURS AT FULL POWER THIS PERIOD	649
TOTAL HOURS AT FULL POWER	186,630
INTEGRATED POWER THIS PERIOD	270 MWT
TOTAL INTEGRATED POWER	71,910 MWD

MAINTENANCE ACTIVITY

7/3/95 Refueled - removed core 95-26, loaded core 95-27.

7/10/95 Refueled - removed core 95-27, loaded core 95-28. Installed 8" valve on the secondary side of pool HX 521.

7/13/95 Refueled - removed core 95-28, loaded core 95-29.

7/14/95 Loaded new pool deionization bed 'F'.

7/16/95 Refueled - removed core 95-29, loaded core 95-30.

7/17/95 Shipped eight depleted fuel elements in BMI-1 cask.

7/24/95 Refueled - removed core 95-30, loaded core 95-31.

7/31/95 Refueled - removed core 95-31, loaded core 95-32. Replaced control power fuse on P-510A breaker. Replaced belts on alpha lab exhaust fan.