



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 27 TO

AMENDED FACILITY LICENSE NO. R-103

THE UNIVERSITY OF MISSOURI-COLUMBIA

DOCKET NO. 50-186

1.0 INTRODUCTION

By letter dated March 28, 1994, as supplemented on September 2, 1994, the University of Missouri-Columbia (UMC or licensee) submitted a request for amendment to the Technical Specifications (TS), Appendix A, of Amended Facility License No. R-103 for the University of Missouri Research Reactor (MURR). The licensee has requested that the TS be changed to provide for replacement of two existing 50% heat rejection capacity pool system heat exchangers (HXs) with a single 100% capacity HX.

2.0 EVALUATION

UMC has requested a change to the TS for the MURR to allow replacement of two existing 50% capacity pool system HXs with a single 100% capacity HX. UMC has also requested that the reactor trip setpoint for minimum pool HX flow be changed to correspond to the use of one HX.

In the MURR, the pressure vessel, reflector, control rods, and flux trap sit in a large pool that is separately cooled from the reactor core. The pool cooling system is used to cool the reactor pool, reflector, control rods, and flux trap during reactor operation. The reactor core has a separate cooling system. This arrangement exists because the MURR reactor core is in a pressure vessel that allows the reactor cooling system to be pressurized and allows for closed loop cooling of the reactor. The MURR was originally operated at 5 MW with one pool HX installed. When reactor power was upgraded to 10 MW, a second pool HX was installed in parallel with the original HX to reject the additional waste heat from 10 MW operation. There is no safety reason for the existence of two HXs.

The licensee has requested this change because the existing pool HXs are approaching their design operational lifetime and the licensee desires to replace the two existing HXs with one HX that uses current technology.

The new HX is a plate type design. Plate type HXs have been installed successfully at other non-power reactors. The design parameters of the new HX will be based on existing HX parameters for 10 MW operation. The materials of construction of the new HX meets the requirements of the TS. Each of the two current HXs receive one-half of the total pool 10 MW flow. The TS currently

require a reactor scram if the flow rate in either HX drops below 425 gpm. Each of the two current HXs has an orifice plate to measure flow. The new HX will have one orifice plate downstream of the HX with four sets of pressure taps (of which two are needed) and two flow transmitters. This arrangement will maintain the existing redundancy in the flow measuring channels. The proposed TS will require a scram if the flow through the new HX drops below 850 gpm as measured by either flow transmitter. This is equivalent to the current TS requirement for the two HXs.

Because the date of modification of the pool cooling system is not certain, the licensee has proposed wording that allows the reactor to be operated with either the two existing HXs or the proposed new HX. This is acceptable to the staff.

The licensee has proposed changes to TS 3.3 a. which stipulates the number of safety system or measuring channels required for the three modes of reactor operation and the trip setpoint of the safety system or measuring channel. For the existing dual 50% capacity HXs, two flow measuring channels are required for Mode I operation (up to 10 MW), one channel is required for Mode II operation (up to 5 MW), and no flow measuring channels are required for operation in Mode III (up to 50 kW natural convection cooling operation). As stated above, the scram setpoint is 425 gpm minimum for each loop. The licensee has proposed for the single 100% capacity HX that two flow measuring channels are required for Mode I and Mode II operation and no flow measuring channels are required for Mode III operation. The scram setpoint is proposed at 850 gpm minimum. This change is acceptable to the staff because pool heat removal is maintained at acceptable levels.

The licensee has proposed changing Note 4 to TS 3.3 a. The note current reads:

- (4) Flow orifice ΔP (psi) in each operating heat exchanger leg corresponding to the flow value in the table.

The licensee has proposed changing this to:

- (4) Flow orifice ΔP (psi) corresponding to the flow value in the table.

This change makes the note applicable to either one or two HXs. Because the meaning of the note is not changed, this change is acceptable to the staff.

The licensee has proposed a change to TS 4.4 a. concerning the reactor coolant system. TS 4.4 a. currently reads:

- a. The reactor coolant system shall consist of not less than a reactor pressure vessel, two primary system pumps, primary pressurizer, two primary heat exchangers, two pool system pumps, two pool system heat exchangers and one pool system hold-up tank plus all associated piping and valves.

The licensee has proposed this be changed to:

- a. The reactor coolant system shall consist of not less than a reactor pressure vessel, two primary system pumps, primary pressurizer, two primary heat exchangers, two pool system pumps, one 100% capacity or two 50% capacity pool system heat exchanger(s), and one pool system hold-up tank plus all associated piping and valves.

This changes the description of the reactor coolant system to add the option of one 100% capacity HX and is acceptable to the staff.

The staff concludes that pool heat removal will be maintained at acceptable levels, the new HX meets the materials of construction requirements of the TS, and that redundancy in reactor scrams will be maintained. The staff, therefore, concludes these changes are acceptable.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves changes in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or changes in inspection and surveillance requirements. The staff has determined that this amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and there is no significant increase in individual or cumulative occupational radiation exposure. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no Environmental Impact Statement or Environmental Assessment need be prepared in connection with the issuance of this amendment.

4.0 CONCLUSION

The staff has concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously evaluated, or create the possibility of a new or different kind of accident from any accident previously evaluated, and does not involve a significant reduction in a margin of safety, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed activities, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or the health and safety of the public.

Principal Contributor: A. Adams, Jr.

Date: November 4, 1994