HAZARDS ANALYSIS BY THE TEST & POWER REACTOR SAFETY BRANCH

DIVISION OF LICENSING AND REGULATION

LOCKHEED AIRCRAFT CORPORATION

DOCKET NO. 50-172

By application for amendment dated July 25, 1962, Lockheed has requested authorization to move rod seated limit switches, now located near the bottom of the core, to the hold down plate at the top of the core. The switches in their present location are quite inaccessible, and the proposal to relocate them on the hold down plate would facilitate maintenance thereby enhancing the reliability of the switches.

The design function of these switches is to act as a warning device during the removal of the control rod drive unit from the pressure vessel prior to a refueling operation. The switches initiate the flashing of lights in the control room and the sounding of an annunciator horn if the control rods are being pulled out of the pressure vessel along with the rod drives. The switches serve as an extra safety device since removal of control rod drives is a blind operation.

As they are presently installed, the switches also provide a warning signal for the eventuality of inadvertent manual removal of a control rod during refueling. This function will not be available when the switches are relocated, since the hold down plate is removed to gain access to the core. However, with the present limitations on core excess reactivity it would be impossible to make the reactor critical on withdrawal of any one rod to its most reactive position. Further removal of a rod from this optimum position would reduce reactivity, since fuel on the lower section of the rod would be removed from the core. Thus, even if one were to postulate that one or even two rods were completely removed from the loaded core in violation of procedures, the reactor would remain subcritical. In view of this, we are of the opinion that removal of this secondary function when the hold down plate is not in place will not substantially alter our previous conclusion that adequate safeguards against accidental criticality during refueling have been provided.

There will be a total of four switches relocated to the hold down plate. The new switches will be identical in construction and function to the switches now located near the bottom of the core. The magnets, which actuate the switches will be installed in the control rod knobs.

Due to the fact that part of the control rod knob and hold down plate will be milled and a hole will be drilled in the aluminum can to accommodate the magnets and switches, the applicant has considered the possibility of structural failure in the components which will be so modified. The staff concurs in the applicants view that the structural integrity of the hold down plate and control rods will not be compromised by the proposed modification.

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The change in reactivity introduced by the presence of the new conduit alongside the core was found to be only -0.036% $\Delta k/k$ which will be of negligible importance to reactor operation. The flexible conduit inside the core will not interfere with coolant flow since it will be inside a flow baffle. The fuel elements in the region of the conduit cannot be loaded unless the conduit is in its proper place. The switch housing although causing some reduction in open area in the hold down plate will not have a deleterious effect on cooling flow.

Conclusion

It is our opinion that the proposed modification as described in the application will in no way compromise the function of the switch nor the structural integrity of any part of the system. Consequently, we conclude that the proposed modification will not present any significant change in the hazards to the public from those reviewed in connection with previously authorized operations, and that the reactor can be modified as proposed and operated without undue risk to the health and safety of the public.

FOR THE ATOMIC ENERGY COMMISSION

Original Signed by

S. Levine

Saul Levine, Chief
Test & Power Reactor Safety Branch
Division of Licensing and Regulation

Date: AUG 8 1962