HAZARDS ANALYSIS BY THE TEST & POWER REACTOR SAFETY BRANCH

DIVISION OF LICENSING AND REGULATION

LOCKHEED AIRCRAFT CORPORATION

DOCKET NO. 50-172

By application dated September 25, 1962, Lockheed Aircraft Corporation has requested that facility license number R-86 be amended to permit modification to shield tanks of the Radiation Effects Reactor (RER). The applicant proposes to reorient the shield tanks 180° from their present position in order to increase the available leakage neutron flux at a test position by a factor of 10. Secondly, they wish to replace the Conoseal type couplings on the tanks by a quick-disconnect couplings which will facilitate remote assembly and disassembly of drain and fill lines.

In normal use the RER is raised out of a pool by a hydraulic lift and provides gamma rays and neutrons for the irradiation of experiments located at various positions around the reactor. The shield which the applicant proposes to modify is in the form of tanks which are located peripherally about the outer wall of the reactor vessel. The tanks are used to obtain control over the leakage of neutron flux into the experimental area by adjusting the amount of water in the tanks. There will be no change in reactivity associated with tank reorientation due to the fact that the tanks are external to the reactor vessel and these are situated in regions of negligible worth. No modifications are being made on the reactor vessel. The tanks serve no purpose as biological shielding; consequently present shielding protection for personnel will be unaffected.

Present remote disconnect support brackets for drain and fill lines connected to the tanks will be changed in order that new quick-disconnect fittings can be accommodated. Also, a junction box housing a preamplifier for reactor instrumentation will be relocated to eliminate possible interference between the junction box and the test car when raising and lowering the reactor.

In its review of the proposed modification, the staff has found that reorientation of the tanks would have little effect on the operational safety of the reactor. However, three areas identified as having potential effect have been investigated in detail. These are: the tank support platform, the effect upon instrumentation due to the reorientation of the shield tanks (the instruments are located in the upper shield tanks), and the reliability of the quick-disconnects in relation to keeping the upper shield tanks filled.

Tank reorientation will not change the static loading nor the static loading distribution on the support structure; consequently, the operability of the reactor lift will be unaffected. The tanks themselves will be supported adequately in the reoriented position and no credible combination of circumstances can be foreseen that would cause them to come loose.

It is believed that there will be little change in instrument response (with the exception of the out of core fission chamber) due to the fact that there will be no change in instrument radial or axial position with respect to the center of

A-5C

the core. Also the amount of structure between the detectors and the core will not be changed significantly. The applicant will check instrument response over the full applicable range of each channel at various shield tank levels so that present calibration curves can be verified or corrected. The out of core fission chamber will be relocated and checked for response with a neutron source of known strength prior to the loading of fuel. Since both the in-core and out-core fission counters must indicate that neutrons are being counted before startup can proceed, the ability of the relocated detector to detect neutrons will be verified prior to initiation of a startup following the modification. Due to these facts it is our opinion that there is no change in the reliability of the instrumentation associated with the reorientation of the shield tanks.

Specifications and test data submitted by Lockheed on the quick-disconnect couplings have been reviewed by the staff. This information indicates that the quick-disconnect coupling will be as reliable as the joint that was used previously; hence, this modification raises no new questions with respect to inadvertent draining of water from the upper shield tanks where the instruments are located. Furthermore, machine calculations performed by Lockheed indicate that loss of water would cause instrument indicated power to increase by a factor of 1.84 while reactor power remained constant, and thus, the margin between reactor power and instrument trip settings would not be increased and the automatic control system would not cause rod withdrawal if such drainage should occur. After reorientation of the shield tanks, Lockheed will verify the indicated response by the draining of water from around instrumentation one tank at a time (always having some chambers with water around them).

After examination of Lockheed's hazards evaluation and supplementary information, we conclude that the operation of the reactor with the proposed modifications will not present significant change in the hazards from those presented by the previously authorized operation of the reactor, and that operation of the reactor with the proposed modifications will not result in undue hazard to the health and safety of the public.

/s/ Saul Levine

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

Date:

1763