

HAZARDS ANALYSIS BY THE TEST & POWER REACTOR SAFETY BRANCH

DIVISION OF REACTOR LICENSING

LOCKHEED AIRCRAFT CORPORATION

DOCKET NO. 50-172

CHANGES TO TECHNICAL SPECIFICATIONS

CHANGE NO. 4.

Introduction

By letter dated August 17, 1964, Lockheed Aircraft Corporation requested changes in the Technical Specifications appended to License R-86 of the Radiation Effects Reactor (RER) to (1) relocate the external fission counter which is used as a backup safety instrument during startup, and (2) operate with control rods of lower worth than currently authorized by the Technical Specifications. Additional information and calculations of startup accidents with lower worth rods were submitted on September 1 and October 15, 1964.

External Fission Counter

The RER has two fission counters, and it is required that at least one be operable during startup. One of the fission counters is located within the pressure vessel and one is located in a shield tank outside of the pressure vessel. Present limitations permit the external counter to be located in the shield tank 180° away from test car position 3/4, or to be temporarily located in the removable shield tank facing test car position 3/4. The former position has presented a problem during reactor servicing in that the tube in which the fission counter is mounted interferes with the removal of the upper closure of the equipment tank, and the latter position is not always available due to the installation of experiments. Lockheed has therefore requested authorization to relocate the external counter.

Current specifications require that the startup neutron source provide a neutron flux of at least 15 nv to the fission counters and that these counters register at least 3 cps before any rod withdrawal is permitted. This instrumentation is backed up by two power level safety channels during all operations. In order to assure that the external fission counter adequately performs its function, the internal fission counter is required to be operable whenever the external fission counter is relocated, and subsequent to relocation, the reliability will be demonstrated over the entire range of use by cross calibration with the internal counter. Furthermore, the external fission counter will be located in a normally water-filled section of the shield tank to preclude count rate variations due to filling and voiding of the shield tanks. We believe that these limitations regarding the relocation of the external fission counter provide adequate protection to the reactor and that the specific location of the counter need not be defined.

Total Reactivity Worth of Rods

The RER was reloaded and new control rods were installed prior to the initial ascent from one to three megawatts. Measurements performed subsequent to this

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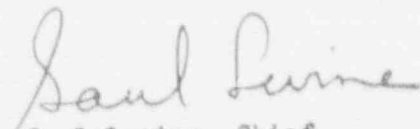
reloading indicated that the reactivity worth of the new control rods was 0.14 delta k/k, which is below the present limitation of 0.16 delta k/k. Lockheed has reanalyzed the potential accidents for this facility using lower worth rods and has shown that operation with control rods worth 0.12 delta k/k would not result in damage to the fuel. Our independent calculations substantiate Lockheed's conclusions, indicating that the peak power and the total integrated energy for all credible transients will be below the threshold for fuel damage. In addition, the reduced rod worth will decrease the shutdown margin from 0.12 delta k/k to 0.10 delta k/k. However, the reactor will still be subcritical by at least 0.08 delta k/k with any one control rod in its most reactive position. We therefore believe that reduction of the total rod worth from 0.16 delta k/k to 0.12 delta k/k and the reduction of the shutdown margin from 0.12 delta k/k to 0.10 delta k/k will not significantly reduce the safety of the reactor.

Technical Specifications

A copy of the proposed changes in the Technical Specifications (as modified in discussions with Lockheed) is attached.

Conclusion

Based on our evaluation, we conclude that the relocation of the fission counter and the reduction of the total reactivity worth of the rods within the limitations described above do not involve significant hazards considerations different from those previously analyzed and that there is reasonable assurance that the health and safety of the public will not be endangered.



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Date:

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