

UNITED STATES  
ATOMIC ENERGY COMMISSION  
WASHINGTON, D.C. 20545

Docket Nos. 50-172  
50-176

MAR 1 8 1964

Lockheed Aircraft Corporation  
Dawsonville, Georgia

Attention: Mr. R. I. Mitchell  
Vice President

License No. R-86  
Change No. 1

Gentlemen:

This refers to your requests dated December 17, 1963 and February 21, 1964 for AEC authorization to (1) modify the external shield tanks on the Radiation Effects Reactor (RER), and (2) to use a Plutonium-Beryllium source in place of the normal Antimony-Beryllium source during gamma ray spectrum measurements. Action is being deferred on the additional request contained in the February 21, 1964 request for authorization to operate the RER at power levels up to 4.5 MW(T) for 5 minutes per month to enable checks of operation of safety channel electronic scram circuits. Your requests have been designated as Proposed Change No. 1 to License No. R-86, as amended, and have been considered pursuant to the Provisions of Section 50.59 of 10 CFR Part 50.

We have reviewed the Proposed Change and have found that it does not present significant hazards considerations not described or implicit in the hazards summary report, and that there is reasonable assurance that the health and safety of the public will not be endangered. A copy of our related hazards analysis is enclosed.

Accordingly, pursuant to Section 50.59, 10 CFR 50, the Technical Specifications of Facility License No. R-86 are amended as set forth in Attachment A to this letter.

Sincerely yours,

Original Signed by  
R. Lawrence

Director  
Division of Licensing and Regulation

Enclosures:

1. Attachment A
2. Hazards Analysis

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ATTACHMENT A

CHANGES TO TECHNICAL SPECIFICATIONS

Delete the first sentence of Section G and substitute the following:

"The reactor vessel is surrounded by segmented shield tanks. The shield tanks in the quadrant 180° away from car position 3/4 will be approximately 20 inches thick. The shield tanks in any of the other three quadrants may be either 8 inches or 20 inches thick."

Delete the third paragraph of Section I.1 and substitute the following:

"The external fission counter is normally mounted in the 20-inch thick shield tank section 180° away from car position 3/4 and is approximately 6-inches outside the pressure vessel. For specific experimental purposes the external fission counter may be temporarily mounted in front of car position 3/4; when the external fission counter is so mounted, however, the internal fission counter must be operable during any reactor start-up."

Add to Section H.5.c:

"For specific experiments to be conducted at power levels under 200 watts thermal with fuel elements containing negligible decay heat, a Pu-Be Source may be used in place of the normal start-up source provided that:

- (a) The source is of such strength as to give a neutron flux of at least 15 nv at the fission chamber location, and
- (b) The source capsule is mechanically fastened in the source holder. When the Pu-Be Source is in use the reactor will be operated without coolant pressurization and without forced coolant circulation."

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ATTACHMENT A

CHANGES TO TECHNICAL SPECIFICATIONS

Delete the first sentence of Section G and substitute the following:

"The reactor vessel is surrounded by segmented shield tanks. The shield tanks in the quadrant  $180^\circ$  away from car position 3/4 will be approximately 20 inches thick. The shield tanks in any of the other three quadrants may be either 8 inches or 20 inches thick."

Delete the third paragraph of Section I.1 and substitute the following:

"The external fission counter is normally mounted in the 20-inch thick shield tank section  $130^\circ$  away from car position 3/4 and is approximately 6-inches outside the pressure vessel. For specific experimental purposes the external fission counter may be temporarily mounted in front of car position 3/4; when the external fission counter is so mounted, however, the internal fission counter must be operable during any reactor start-up."

Add to Section H.5.c:

"For specific experiments to be conducted at power levels under 200 watts thermal with fuel elements containing negligible decay heat, a Pu-Be Source may be used in place of the normal start-up source provided that:

- (a) The source is of such strength as to give a neutron flux of at least 15 nv at the fission chamber location, and
- (b) The source capsule is mechanically fastened in the source holder. When the Pu-Be Source is in use the reactor will be operated without coolant pressurization and without forced coolant circulation."

HAZARDS ANALYSIS BY THE TEST AND POWER REACTOR SAFETY BRANCH

DIVISION OF LICENSING AND REGULATION

LOCKHEED AIRCRAFT CORPORATION

DOCKET NO. 50-172

RADIATION EFFECTS REACTOR

TECHNICAL SPECIFICATION CHANGE NO. 1

By letter dated December 17, 1963, Lockheed Aircraft Corporation requested changes in the technical specifications of License No. R-86 which would permit modification of the external shield tanks on the Radiation Effects Reactor. By letter dated February 21, 1964 Lockheed requested, among other things, a temporary exemption to certain provisions of the technical specifications so that a Pu-Be Source could be used in place of the normal Sb-Be Source during gamma ray spectrum measurements which are planned. Inasmuch as the latter request involves, in part, the request of December 17 we have considered both requests to be related. An additional request, contained in the applicant's letter dated February 21, 1964, for operation of the RER at power levels up to 4.5 MW for 5 minutes per month to enable checks of operation of safety channel electronic scram circuits will be considered at a later date.

The proposed modification to the shield tanks entails decreasing the thickness of certain of the shield tanks in order to change the presently available neutron-to-gamma leakage flux ratios to meet the requirements of experiments to be located external to the reactor vessel. Initially, the applicant proposes to modify a 180° sector of the shield tanks, which surround the reactor vessel, by reducing the thickness of this sector from 20 inches to 8 inches. Present provisions for a removable shield tank quadrant will be eliminated when this modification is completed. At some later date, the applicant intends to modify a 90° sector of the remaining 20 inch thick 180° sector. The 90° sector 180° away from car position "3/4" will remain 20 inches thick.

These external shield tanks have compartments which contain water and some of these compartments can be remotely filled or drained to accommodate experimental needs. Consequently, varying degrees of eccentric loading can be imposed on the reactor support structure. The applicant will add counterweights, as necessary, to keep the eccentric loading on the support structure within the permissible eccentric loading specified in the technical specifications. Therefore, it is not expected that operability of the reactor lift will be affected by use of the modified shield tanks.

The shield tank modifications will entail changes in detector geometry and changes in the amount of water present around nuclear detectors. Consequently detector response will be altered. The applicant will experimentally determine the effects of the shield tank modifications on detector response to verify that adequate

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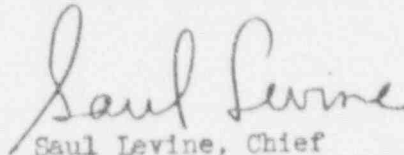
information will be provided by the various instrumentation channels to assure safe operation of the reactor for the various shield configurations involved. Verification that safety system trip points are properly set according to the technical specifications will also be provided through appropriate calibration of instrumentation. Because of the fact that nuclear instrumentation will be adequately checked out, there should be essentially no change from their present reliability as a result of the shield tank modifications.

The applicant proposes to use a 5 curie Pu-Be Source in the reactor in order to perform gamma spectral measurements which would be difficult to perform with the presently authorized Sb-Be Source. The Pu-Be Source capsule will be located in a fixture in the center of the reactor core. The experiments to be performed with the Pu-Be Source will be conducted at power levels under 200 watts with fuel elements containing negligible decay heat. Under these conditions natural convective flow through the core is adequate to cool the fuel and the source. The applicant proposes, therefore, that the requirements to pressurize and circulate the primary coolant be relaxed during these experiments in order to preclude the necessity of providing a source fixture designed for full flow conditions. The source holder described in the application has no provisions to secure the source capsule in its receptacle; hence it is possible that the source could be dislodged from its normal position in such a manner that it might fall back into place during later operations, giving a significant reactivity increase. However, Lockheed has agreed to mechanically fasten the source capsule in its receptacle so that this possibility will be eliminated. With this provision it is our belief that the proposed operations with a Pu-Be Source can be carried out safely if performed in accordance with the attached technical specifications.

#### CONCLUSION

It is our opinion that the applicant has given adequate consideration to possible effects on the reactor system associated with the proposed modifications, and that operation of the reactor under the conditions set forth in the modified proposed changes to the Technical Specifications (with which Lockheed concurs) does not involve significant hazards considerations not implicit or described in the Final Hazards Summary Report and that there is reasonable assurance that operation of the reactor in accordance with these revised specifications will not endanger the health and safety of the public.

FOR THE ATOMIC ENERGY COMMISSION



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

Attachment:

Attachment A, Changes to Technical Specifications

Date: March 18, 1964

ATTACHMENT A

CHANGES TO TECHNICAL SPECIFICATIONS

Delete the first sentence of Section G and substitute the following:

"The reactor vessel is surrounded by segmented shield tanks. The shield tanks in the quadrant 180° away from car position 3/4 will be approximately 20 inches thick. The shield tanks in any of the other three quadrants may be either 8 inches or 20 inches thick."

Delete the third paragraph of Section I.1 and substitute the following:

"The external fission counter is normally mounted in the 20-inch thick shield tank section 180° away from car position 3/4 and is approximately 6-inches outside the pressure vessel. For specific experimental purposes the external fission counter may be temporarily mounted in front of car position 3/4; when the external fission counter is so mounted, however, the internal fission counter must be oper ble during any reactor start-up."

Add to Section H.5.c:

"For specific experiments to be conducted at power levels under 200 watts thermal with fuel elements containing negligible decay heat, a Pu-Be source may be used in place of the normal start-up source provided that:

- (a) The source is of such strength as to give a neutron flux of at least 15 nv at the fission chamber location, and
- (b) The source capsule is mechanically fastened in the source holder. When the Pu-Be Source is in use the reactor will be operated without coolant pressurization and without forced coolant circulation."