

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
UNITED STATES ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

July 15, 1964

Honorable Glenn T. Seaborg
Chairman
U. S. Atomic Energy Commission
Washington, D. C.

Subject: REPORT ON RADIATION EFFECTS REACTOR

Dear Dr. Seaborg:

At its fifty-sixth meeting, July 9-11, 1964, at Brookhaven National Laboratory, the Advisory Committee on Reactor Safeguards reviewed a proposal by the Lockheed-Georgia Company that the Radiation Effects Reactor be used in irradiation tests of liquid hydrogen cooled materials. The Committee review included discussions with representatives of the Lockheed-Georgia Company and of the AEC Staff, and made use of the documents referenced below.

The Radiation Effects Reactor was previously considered at the Committee's thirty-second meeting in March 1961, and at its forty-eighth meeting in July 1963. These reviews led to letters recommending approval of operation at maximum reactor powers of 1 MW and 3 MW, respectively, provided that significant amounts of potentially explosive material not be irradiated without separate consideration. The present proposal is submitted in accordance with that recommendation.

The experimental design proposed involves the use of up to 1000 gallons of liquid hydrogen at a time, in close proximity to the Radiation Effects Reactor. While this is a substantial amount of potentially explosive material, such quantities have been used in other applications such as rocket propulsion. Design features that have been developed for the safe handling of liquid hydrogen are being used by the applicant. These features include double and triple containment of the liquid hydrogen bearing components, with barriers of vacuum and inert atmosphere between hydrogen and air, and an abundance of instruments to warn of the onset of potentially hazardous situations such as fire, excessive pressure buildup, and liquid hydrogen leaks. Those situations that could conceivably injure the reactor if allowed to persist lead to shutting down the reactor automatically and submerging it in its pool.

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In addition, the applicant has considered the result of unlikely accidents such as massive hydrogen leaks into the reactor building, with resultant explosion while the reactor is still exposed, and has concluded that, even in this event, the damage to the reactor would not be serious.

The applicant has stated that, for the present, the tests planned in accordance with this proposal will consist of irradiations of stationary samples such as insulating material. Proposals for similar tests involving vibration or rotary motion, and irradiations of materials that could possibly liberate appreciable amounts of oxidizing agents will be submitted separately to the AEC for review.

The Committee concludes that, if planned tests of capsule integrity under large hydrogen leaks from the test tank are successful, the liquid hydrogen cooled irradiations can be performed as proposed without undue hazard to the health and safety of the public.

Sincerely yours,

/s/
Herbert Kouts
Chairman

References:

1. LGD/173219, "Amendment Request No. 9 to License R-86 - Use of Liquid Hydrogen in Radiation Effects Reactor, Docket No. 50-172", dated December 17, 1963, with enclosures (a) through (c).
2. LGD/182962, "Use of Liquid Hydrogen in Radiation Effects Reactor, Docket No. 50-172", dated May 28, 1964, with enclosures.
3. LGD/183397, "Use of Liquid Hydrogen at Radiation Effects Reactor, Docket No. 50-172", dated June 4, 1964, with enclosure.
4. LGD/184106, "Use of Liquid Hydrogen at Radiation Effects Reactor, Docket No. 50-172", dated June 16, 1964, with enclosure.
5. LGD/184511, "Use of Liquid Hydrogen at Radiation Effects Reactor, Docket No. 50-172", dated June 22, 1964.