

UNITED STATES ATOMIC ENERGY COMMISSION
LOCKHEED AIRCRAFT CORPORATION, DOCKET NO. 50-172
AND THE GENERAL SERVICES ADMINISTRATION, DOCKET NO. 50-176
PROPOSED AMENDMENT TO FACILITY LICENSE

License No. R-86
Amendment No. 6

License No. R-86, as amended, issued to Lockheed Aircraft Corporation and General Services Administration, is hereby amended in the following respects:

1. In addition to the activities previously authorized by the Commission in License No. R-86, as amended, Lockheed Aircraft Corporation is authorized to conduct an irradiation program involving the use of liquid hydrogen as described in its application for license amendment dated December 19, 1963, and supplemental letters dated May 28, 1964, June 4, 1964, June 16, 1964, June 22, 1964 and September 21, 1964.

2. The Technical Specifications set forth in Appendix "A" to License No. R-86, as amended, are hereby modified as set forth in Addendum No. 1 to Appendix "A" attached hereto.

This amendment is effective as of the date of issuance.

FOR THE ATOMIC ENERGY COMMISSION

ADDENDUM NO. 1 TO APPENDIX "A", TECHNICAL SPECIFICATIONS

LICENSE NO. R-86, AS AMENDED

Add new paragraph 3 to Section J. "EXPERIMENTAL FACILITIES", as follows:

7. Liquid Hydrogen Experiments

Subject to the following conditions, irradiation experiments involving use of liquid hydrogen (LH₂) may be conducted utilizing liquid hydrogen and auxiliary equipment mounted on RER test cars.

Design Requirements For Liquid Hydrogen Equipment

- (1) All experimental equipment which contains LH₂ shall be mounted on a single test car and shrouded by an aluminum capsule. Leakage from this test car - capsule containment to the RER building shall not exceed 10 scfm of gaseous hydrogen for LH₂ spills of 125 gpm or less. The capsule shall be designed for an internal pressure of at least 5 psig and shall be provided with a poppet valve and a rupture disc installed in parallel which relieve to a 10-inch relief line. The poppet valve shall be set to open at a pressure of 12 inches of water or less and the rupture disc shall be rated to burst at 3 psig.
- (2) The inner container of the 1000 gallon storage Dewar shall be designed for an internal pressure of at least 75 psig and the outer container shall be designed for an internal pressure of at least 60 psig.
- (3) The test tank shall be designed for an internal pressure of at least 50 psig.
- (4) The storage Dewar and the test tank shall be bolted to the test car and shall be capable of withstanding a 2g load in any direction.
- (5) The test article, located in the test tank, shall have a maximum volume of 75 gallons and shall be designed for an internal pressure of at least 50 psig. This container shall have a siphon break in its fill line.
- (6) LH₂ transfer lines, vent lines and control valves shall be designed for an internal pressure of at least 100 psig.
- (7) All isolable portions of the system which normally contain LH₂ or could contain LH₂ as a result of leakage shall be protected by pressure relief valves and/or rupture discs set to relieve below system design pressure and having

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sufficient capacity to prevent overpressurization if vacuum insulation is lost. Relief lines shall join a common header inside the capsule and shall vent through a single 3-inch pipe penetration in the capsule.

- (8) The 3-inch vent line shall pass over the rear of the primary test car and shall mate (through a quick disconnect) with a 3-inch vent line outside the reactor building. This 3-inch vent line, in turn, shall vent to the atmosphere at least 15 feet above the reactor building roof, and the line shall be provided with a valve which shall prevent any backflow of air into the line.
- (9) A 10-inch vent line shall be provided which shall mate with the capsule vent line (through a quick-disconnect) and shall discharge to the atmosphere at least 15 feet above the reactor building. A valve shall be provided at the exit of this line to prevent backflow of air into the line.
- (10) A mechanical car puller shall be provided to effect remote removal of the test car from the reactor building. Two sets of controls for the car puller shall be provided; one set within the operations building and one beside the door of the reactor building. The car puller controls located in the operations building shall not be capable of moving the test car into the building. Interlocks shall be provided to prevent removal of the test car from the building if:
 - (a) the hydrogen concentration in the capsule is greater than 2.5%,
 - (b) the reactor is operating and above the surface of the pool,
 - (c) electrical mating boards in the reactor building are energized,
 - (d) the "fail-open" vent valves are not closed for the disconnect operation.

b. Instrumentation and Safety Systems

During the course of any irradiation experiment, sufficient instrumentation shall be kept in service to permit the test engineer to monitor the condition of all portions of the experimental equipment from the operations building.

The conditions specified in Table J-1 shall cause the reactor to automatically scram and be lowered into the reactor pool. Continuous control room read-out of the minimum instrumentation indicated in the table shall be maintained at all times during an irradiation run.

c. Operating Limitations

- (1) Helium shall be used for valve actuation and for inerting and pressurization operations. The helium supply shall contain no more than 8 ppm oxygen.
- (2) Whenever experimental equipment containing LH_2 is in the reactor building, at least two of the reactor building roll doors shall be fully open, all reactor building roof fans shall be operating, and the reactor building basement ventilation system shall be off.
- (3) All irradiation experiments shall be located in the test article. No experiments which involve moving parts or more than trace quantities of substances which may react chemically with hydrogen shall be performed.
- (4) When experiments are being conducted in the RER building with liquid hydrogen, the lithium hydride shield will be removed from the support structure and will be placed near the southwest wall of the RER building. During periods that the liquid hydrogen equipment is present in the RER building, the pressure in the lithium hydride shield will be continuously monitored. Should a drop in pressure indicative of a shield leak occur, the reactor will be shut down and lowered into the pool and the liquid hydrogen experiment will be shutdown and removed from the reactor building.
- (5) The Liquid Hydrogen Test Engineer shall have the authority to order the reactor shut down if in his opinion a condition exists which might compromise safety.
- (6) Leak rate of the capsule shall be verified to be less than one standard cubic foot per minute of Helium at 0.25 psig prior to each irradiation test.
- (7) One thermocouple located in the top of the 3-inch vent stack shall provide a continuous readout in the control room and shall initiate an alarm if the indicated temperature reaches $660^{\circ}F$. Upon such alarm the reactor shall be manually shut down and lowered into the pool.

TABLE J-1

Sensor	Location	Minimum Required	Set Points
Thermocouple	3" vent quick disconnect	1	660°R high 410°R low
"	Top of 10" vent stack	1	660°R high 410°R low
Hydrogen Gas Analyzer	Within capsule	2	3.5% H ₂ by volume
Hydrogen Gas Analyzer	3" vent quick disconnect	*	1.5% H ₂ by volume
Pressure Transducer	Supply Dewar	1	65 psig
"	System pressurization manifold downstream of regulator	1	190 psig
"	Valve actuation helium manifold upstream of regulator	1	130 psig
"	test article	1	65 psig
"	capsule	1	2 in. w. g.
"	capsule	1	16 in. w. g.
"	Capsule helium supply manifold,		
	a) upstream of regulator	1	500 psig
	b) downstream of regulator	1	220 psig

* May be off the line for short periods of time to permit recalibration.

- (8) No irradiations involving utilization of LH_2 shall be conducted without prior approval of the irradiation by the Reactor Safety Committee.
- (9) Irradiations involving utilization of LH_2 shall be conducted with detailed check lists and procedures which have been approved by the operating organization and the Reactor Safety Committee.
- (10) Prior to initiation of an irradiation run the LH_2 equipment will be checked out in place to verify that the capsule and 10-inch vent line are properly inerted, that instrumentation reads out properly in the operations building and that the system can be adequately controlled from the operations building.
- (11) Transfer of LH_2 to the experimental equipment shall be performed only at the LH_2 Test Facility.
- (12) All LH_2 to be used in the experiment shall be filtered through a 10 micron filter.