TECHNICAL FACILITIES RESUME

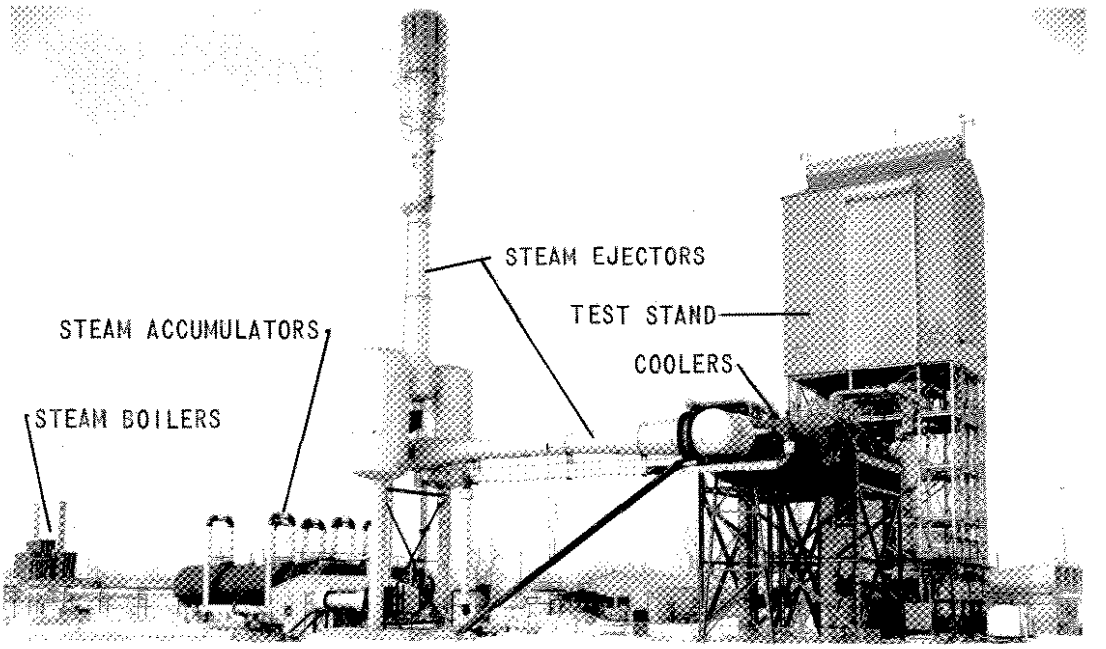
DATE OF RESUME:

FACILITY NO:

1. REPORTING INSTALLATION: Lewis Research Center
Cleveland, Ohio

2. FACILITY NAME: Altitude Rocket Test Facility (B-1)

3. LOCATION *(if other than in 1. above)*: Plum Brook Station
Sandusky, Ohio



4. FUNCTIONAL NAME: **Altitude Rocket Test Facility**

5. TECHNOLOGICAL AREAS SUPPORTED: Test firing under low pressure exhaust conditions of small rockets using high energy propellants.

6. NARRATIVE DESCRIPTION OF FACILITY CAPABILITIES & FUNCTIONS: This facility was designed fo testing hydrogen-fluorine rocket engines (6000 pounds thrust) with low pressure exhaust conditions. Prior to the complete installation of all the equipment the design was modified for conducting cold flow tests on some of the nuclear rocket components. Because of this some equipment required for testing rocket engines has not yet been installed. These are principally components which supply cooling water to the exhaust system. Also, an oxidant system must be added.

The test stand portion of this facility is a steel structure 34 ft. x 42 ft. at the base and 135 ft. high. The rocket engine under test is mounted at the 68 ft. level and discharges downward into a diffuser whose walls are surrounde by a water jacket. The test stand is enclosed above the 68 ft. level. Three roll-up doors (16 ft. wide x 42 ft. high) provide adequate ventilation when hydrogen is used as the fuel. A 2000 gallon LH_2 run tank is located at the 96 foot level.

(continued on reverse)

6. NARRATIVE DESCRIPTION *(continued from pg. 1)*

The exhaust gases from the rocket pass thru the diffuser to a water spray cooler into a two-stage steam ejector system. The spray cooler also acts as a gas scrubber. A condenser is installed between the 1st and 2nd stages but is not being operated at present. The pumping capacities of the ejectors are 10, 20, 30, and 48 pounds per second of gaseous hydrogen with exhaust nozzle exit pressures of 1.5; 4.0 8.0 and 14.7 pounds per square inch respectively.

Steam for the ejector system is generated in four boilers, each having a capacity of 25,000 pounds per hour at 500 psig. Three steam accumulators can be charged in approximately 3 hrs by the four boilers. This combination of equipment will permit blow-down operation for about four minutes.

Cooling water for the facility is stored in a clean water basin. It is pumped from this basin to the exhaust system diffuser and exhaust gas cooler to the waste retention basin. If the water has become contaminated by toxic products of combustion it is passed thru a water treatment plant and returned to the clean water basin. The present treatment plant was designed to remove hydrogen fluoride from the water.

All gaseous and cryogenic supplies are stored at the ground level in compressed gas cylinders semi-trailers, fixed compressed gas storage bottles, and liqui dewars mounted on trailers or railcars.

All operation of the test is done remotely from a reinforced concrete control buildi 2600 feet from the test structure.

Major Support Components or Equipment

Altitude exhaust connection.

7. POTENTIAL: The facility can be modified so as to be capable of testing hydrogen fluorine engines up to 75,000 pounds thrust by the addition of the following equipment: a) larger diffuser, b) additional exhaust gas cooling, c) ejector system interstage condenser installation must be completed, d) addition of a second propellant system, e) enlarge water treatment plant, f) additional exhaust gas scrubl capacity may be required. Longer tests firings can be obtained by the installation steam accumulators. A 20,000 gallon LH_2 run tank is available for installation.

8. PLANS: Two additional steam accumulators are being installed as a part of the construction of the Spacecraft Propulsion Research Facility, because the steam supply

9. BLDG. NO. 3111, 3131, 3161 10. YR. BUILT: 1961 11. FAC. CAT. CODE: 320-22 common both fa i

12. INITIAL COST: $ 2,201. K 13. NASA B.O.D. 1962 14. STATUS CODE: Inactive

15. ACCUM. COST: $ 2,415. K 16. LIFE EXPECT. Indef. 17. OWNER CODE: NASA

18. OPER. CODE: NASA 19. CONTRACTOR NAME *(if contr. oper.)*:*

20. OTHER SOURCES OF INFO:

Facility Brochure being prepared at LeRC.

21. COGNIZANT ORGANIZATIONAL COMPONENT:

Rocket Systems Division

22. LOCAL OFFICE TO CONTACT FOR FURTHER INFO:

Chief, Rocket Systems Division Org. Code: 6100

Phone: Area Code 419-625-1123 ext. 461

**LEAVE BLANK IF NOT APPLICABLE*