

PLUM BROOK FACILITIES

With its 8,000 acres in farmland three miles south of Sandusky, Ohio, Plum Brook Station provides exclusion distance for potentially hazardous or noisy research and development activities. The Station contains a number of unique major facilities of great value to the development of propulsion and power technologies, and it also has a variety of test stands and laboratories for work on rockets and rocket components. Total floor area at Plum Brook exceeds 1 million square feet. Capital investment is about 120 million.

Reactor Facility - This 60 megawatt facility produces neutrons and gamma radiation for testing materials and components. Over 50 test positions are provided for research items. The test holes vary in size from 15 inches in diameter down to 2 1/4 inches.* A 100 KW mockup reactor of the 60 megawatt reactor, for reactivity and flux measurements, is located in one of the 25-foot water filled canals. The canals are used to transport radioactive materials from the reactor to the Hot Laboratory where there are seven cells for post-irradiation testing. Neutron radiograph facility; radiochemistry, chemistry, and metallurgy laboratories; auxiliary shops and offices.

Space Power Facility - The world's largest vacuum chamber. Is being used to test space power systems and spacecraft. 100 foot diameter, 121 foot high, unobstructed chamber. 50 x 50 foot entrance doors on each side of the test chamber. Three standard gauge railroad tracks run through the chamber from the adjoining high bay areas, 70 x 150 x 70 foot high. Pressures from atmospheric to 10^{-8} torr can be produced in the test chamber. Cryogenic cold walls provide controlled temperatures to -300°F. Control and data acquisition systems, 930 computer, minicomputers, support shops, offices, cryogenic storage, etc.

Hypersonic Tunnel Facility - Research programs on experimental hypersonic aircraft engines can be conducted here. Free-jet test area, 42-inch diameter, is supplied with clean air up to 3340°F. and velocities up to 4670 mph (Mach No.'s 5, 6, and 7 nozzles). 1200 PSIA, 4500°F nitrogen, graphite bed heater. Support shop, control and data recording equipment, computer, railroad, etc.

Rocket Systems Facilities - Eleven widely separated, individual test sites - three for full propulsion systems and eight for components. Sites are connected by hundreds of cables to two instrument and control buildings which provide remote control areas, high speed recording equipment, and computers for controlling systems, data manipulation, data display, program analysis work, etc. The sites are serviced with high pressure gases, steam and cryogenic fluids, have interconnecting railroad system, truck and rail dewars and high pressure gas tubers, shop areas, offices, etc. Designed for long-term use and can be used for a wide variety of research projects.

*NOTE: Six beam holes - five 6 inches in diameter and one 15 inches in diameter; two "through" holes - one 11 3/4 inches in diameter and one 9 inches in diameter; one 2 1/4 inch in-core test facility; 44 reflector test holes - 32 that are 2 3/4 inches in diameter and 12 that are 2 1/4 inches in diameter; two 8-inch diameter vertical test holes, plus other in-tank experiment positions.

Rocket Systems Facilities (Continued)

- o Spacecraft Propulsion Research Facility - A 38 foot diameter x 55 foot high chamber that can be used to "soak" a rocket vehicle at 5×10^{-8} torr and -320°F for two weeks or more. Fast-opening valve permits rocket engine to test fire while maintaining a moderate vacuum level. Steam ejector and exhaust cooling system can accommodate up to 100,000 lbs. thrust rocket. Storable and cryogenic propellant capability, dump tanks, 1.75 million gallon catch basin, etc.
- o Rocket Dynamics and Control Facility - Can test large rocket propellant systems and space vehicle structural loading (Titan/Centaur shroud tests were made here). 50 foot square x 210 foot high; has 27 1/2 x 32 x 136 foot high clear enclosed area. Three sides have roll doors for model installation and ventilation. Movable floors, 200,000 gallon LH₂ supply storage vessel, steam ejector, shop, railroad, etc.
- o High Energy Rocket Engine Research Facility - A 34 x 42 x 135 foot high stand where rocket engines up to 6,000 lbs. thrust can be test fired using steam ejector for vacuum altitude conditions. Shop, railroad, cryogenic piping, etc.
- o Dynamics Stand - Atlas Centaur size launch vehicles can be tested here. 144 foot high, 7 level structure, with 14 foot diameter well. Equipped with structural loading and vibrating equipment. Door height - 125 feet. Piping for cryogenic and non-cryogenic fluid supply system, shop, etc.
- o Liquid Hydrogen Pump Site - Test loops for LH₂ and LO₂ research pumps. Hot air drive turbines with gearboxes and bedplates for test hardware. LH₂ piping system for 20,000 gallons per minute at 1000 psi and LO₂ system for 1500 gallons per minute at 1000 psi. Shop, railroad, gas and air supply, etc.
- o Turbopump Site - Rocket turbopump and pump inducer test areas. Turbopump area served by roadable supply trailers and dewars. The pump inducer rig is located in a 2500 gallon vacuum jacketed stainless LH₂ tank. Air turbine drive, air heater, railroad, gas supply, shop, etc.
- o Controls and Turbine Test Site - Two turbine test areas and control test area, bedplates, gas generators, railroad, shop, etc.
- o Hydraulics Laboratory - 4,300 square foot area for cryogenic and non-cryogenic tests. High pressure LH₂ storage vessel, catch basin, instrument and control areas, shop, etc.
- o Materials Compatibility Lab - 38 foot diameter steel containment vessel enclosing a test area for testing materials in liquid fluorine under flowing and high pressure conditions. Control room, shop, safety showers, gas storage, etc.
- o Fluorine Pump Site - Can test liquid fluorine or fluorine and oxygen pumps for flow rates to 50 lbs per second, at speeds up to 20,000 r.p.m. Air drive turbine, safety showers and wash room, shop, etc.

Rocket Systems Facilities (Continued)

- o Cryogenic Propellant Tank Site - Can test insulated LH₂ tanks up to 18 feet in diameter. 25 foot diameter spherical test chamber with 20 foot diameter access door. Has a removable 13 foot diameter cylindrical environmental shroud to control temperatures from +300° to -423°F; 10⁻⁸ torr; shaker/vibrator; steam plant for research controlled heat exchanger system; control building, etc.