

Plum Brook: Lewis' Best Kept Secret

"In the days and years to come, when you are asked what you did during the war against the dictators, ...just say... 'TNT.'" The August 18, 1945, souvenir edition of *The Plum Brook News* heralded not only the end of World War II, but the closing of Plum Brook.

Wait a minute...TNT? The closing of Plum Brook in 1945?

The history of Plum Brook Station really begins long before the National Advisory Committee for Aeronautics (NACA) leased the land near Sandusky, Ohio, in 1956 to build a nuclear reactor facility.

In January 1941, the war de-

ally unused until officials of the NACA became interested in it while looking for a suitable location for a test reactor to study aircraft nuclear propulsion. Because nuclear testing could be potentially hazardous, the NACA needed a large, remote site away from the heavily populated Cleveland area.

Plum Brook was selected from 16 possible sites in Ohio and Pennsylvania because of several factors, including good drainage to Lake Erie and proximity to Lewis - about 50 miles.

The land was acquired from the Army through a gradual lease and then transfer process.

when needed.

Although work on nuclear propulsion and other programs was curtailed, Plum Brook was chosen as the site for testing the first 100-kilowatt-plus wind turbine. All the big wind turbines that can generate millions of watts of electricity from wind energy can trace their roots directly to the Mod-0, erected at Plum Brook in 1975.

Many of you may be unaware of the unique and historically significant facilities at Plum Brook, some of which are now being reactivated. The Nuclear Research Reactor Facility, the Cryogenic Propellant Tank Facility, the Hypersonic Tunnel Facility, the Spacecraft Propulsion Research Facility, and the Space Power Facility are all notable for their contributions to aerospace research.

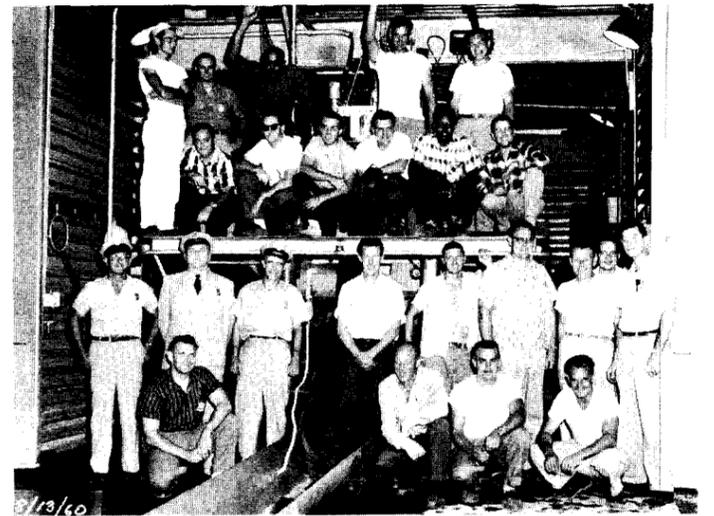
Construction on the Nuclear Research Reactor Facility was completed in 1961, and the reactor became operational in June 1961. Though it was originally designed for studies in aircraft nuclear propulsion, the 60-megawatt reactor was used to study materials and components under radiation conditions similar to those expected in nuclear rocket systems and space power systems for interplanetary space vehicles.

During reactor operation, three million gallons of highly purified cooling water were circulated per day through the core and the four water-filled shielding quadrants around it. A system of water canals 25 feet deep was used to move radioactive test materials from the reactor to storage areas and to laboratories for required testing. The reactor facility was shut down in 1973.

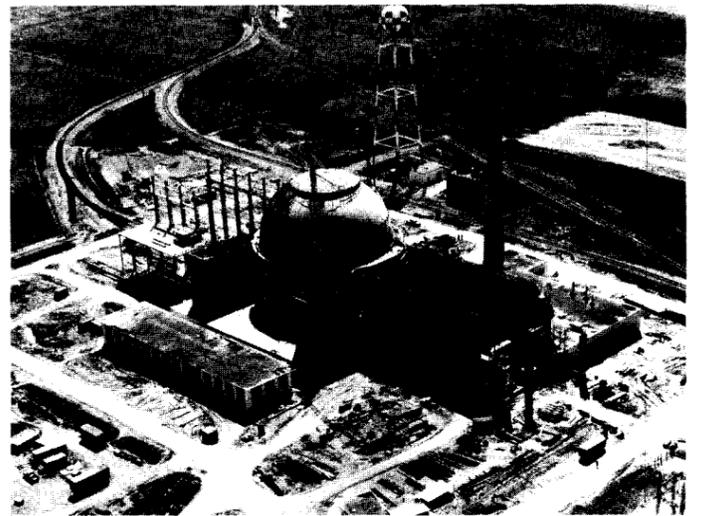
The Cryogenic Propellant Tank Facility, or K-Site, was used in the 1960's and '70's to study the pressurization and expulsion of liquid hydrogen from space vehicle tanks. After Plum Brook was shut down in the mid-'70's, K-Site was one of the facilities that was maintained in a standby condition.

Today, K-Site has a new life. Planners of the slush hydrogen research project for the National Aerospace Plane (NASP) found the 25-foot-diameter facility to be ideal for making large quantities of slush hydrogen, previously produced in laboratories only one or two liters at a time. In 1989, K-Site was equipped with a slush hydrogen generator system, and it is now possible to produce and store up to 800 gallons of -435 F semi-frozen slush hydrogen in one day.

The Hypersonic Tunnel Facility, built in 1966, was originally used to simulate the temperatures of a nuclear rocket reactor up to 3500 F. Converted to a hypersonic tunnel in 1971, the facility can simulate flight conditions of up to seven times



K-Site test crew, August 13, 1960.



Construction of the Space Power Facility in 1966.

the speed of sound at altitudes of more than 100,000 feet. The facility is now being reactivated for work with the National Aerospace Plane.

The Spacecraft Propulsion Research Facility, or B-2 Site, was used for test firings of space vehicles and upper stage rocket engines in a simulated space environment. The vacuum test chamber can accommodate space vehicles up to 22 feet in diameter by 50 feet long. Here,

largest nuclear-rated, controlled-environment test chamber, measuring 100 feet in diameter by 122 feet high. It was designed and constructed to safely handle both nuclear and non-nuclear experiments - the chamber is surrounded by a 7-foot-thick concrete enclosure and has 50-foot-tall doors that weigh 6 million pounds apiece.

Tests performed in the Space Power Facility (SPF) before it was shut down in 1974 include

"You fire this thing and the whole facility wants to come out of the ground and ride the rocket into the air."--Robert Kozar, Plum Brook manager

the Centaur rocket and the NERVA (Nuclear Engine for Rocket Vehicle Application) propellant feed system were tested.

Robert Kozar, Plum Brook manager, said in the Sept. 30, 1990, issue of the *Mansfield News Journal*, "You can actually do a full-blown test-firing of a Centaur rocket and maintain a full vacuum environment. You fire this thing and the whole facility wants to come out of the ground and ride the rocket into the air." The Facility was nominated for the National Register of Historic Places in 1984.

The Space Power Facility, built in 1969, is the world's

shroud jettison tests for Skylab and for the Titan/Centaur Viking Mars probe.

The SPF was reactivated in 1988. Payload fairing separation tests on the Atlas rocket in December 1989 were the first tests of major space hardware to be conducted in the SPF in more than 15 years. Fairing separation tests on the Titan IV have also been made.

Plum Brook Station has played a major role in the development of liquid hydrogen fuel and the success of the Centaur rocket, and has done pioneering work in space propulsion.

--By Sheree Sievert
Lewis Historian

Between the years of 1942 and 1945, the Trojan Powder Company's employees produced nearly one billion pounds of high explosives for the U.S. Army.

partment purchased nearly 8,000 acres in Erie County for a TNT plant to be run by the Trojan Powder Company. Plans for the Plum Brook Ordnance Works, named for a small creek running through the intended site, included buying farm land from an estimated 122 families and relocating 450 bodies from the Perkins Cemetery.

Between the years 1942 and 1945, the Trojan Powder Company's employees produced nearly one billion pounds of high explosives for the U.S. Army. At the height of operation, 6,000 people worked around the clock on 12 production lines. In 1944, a sound truck traveled throughout Ohio and Kentucky to recruit workers. A large sign painted on the side of the truck read "Highest Paid Jobs for Men and Women - Trojan Powder 'Today.'" According to *The Plum Brook News*, the Ordnance Works set a world's record on March 24, 1945, for government-owned, contractor-operated high explosives plants - 122 days without a lost-time accident.

When the war ended, production stopped, and the Ordnance Works was "mothballed" by the Army. The site remained virtu-

The first parcel --500 acres-- was leased to NACA by the Army in March 1956.

Ground was broken for the reactor on September 26, 1956. Later, rocket test facilities were built as additional parcels of the site were leased to the National Aeronautics and Space Administration, newly established in 1958. In March 1963, NASA assumed full control and title to the entire site.

Few remnants are left of the days when the site was an ordnance works, except for the ranks of concrete bunkers used to store munitions during World War II. Over the years, the TNT-era structures were replaced by test stands for nuclear and chemical rocketry work, the reactor complex, an engineering office building, and the Space Power Facility, a huge vacuum chamber used for simulating the space environment.

In 1974, Plum Brook was slated to close as long-range research projects such as nuclear-powered spacecraft were set aside to make way for the development of the space shuttle. Several of the test facilities, including the Space Power Facility, were placed in a standby mode, ready to be reactivated

Open House Information

Plum Brook will hold an Open House for the general public on Saturday and Sunday, September 14 and 15, from 1 to 5 p.m.; and for Lewis employees and their families on Saturday, September 21, 10 a.m. to 5 p.m.

Visitors will be able to take a self-guided tour through four facilities, including three unique test facilities that support major national aerospace programs:

- Space Power Facility
- Spacecraft Propulsion Research Facility
- Cryogenic Propellant Tank Research Facility (K-Site)
- Engineering Building

Visitors will receive a map and directions for the self-guided tour when they enter at the Main Gate.