NASA Glenn
Plum Brook Station

We Want You to Know

Plum Brook Station is a satellite of NASA's (National Aeronautics and Space Administration) Glenn Research Center (formerly NASA Lewis Research Center) situated on 6,400 acres of land, fifty-six miles west of Cleveland, near Sandusky, Ohio.

The Plum Brook Station facilities possess testing capabilities unmatched anywhere else in the world. Since 1958, NASA has used Plum Brook Station to test highly specialized space-bound hardware used in the Titan IV, the Mars Pathfinder Air Bag Landing System, and numerous other cutting edge technologies.

The purpose of this fact sheet is to provide a brief history of the Plum Brook Station facility and NASA Glenn's plan for decommissioning and cleanup of the Reactor Facility at Plum Brook Station.

NASA Glenn Plum Brook Station Complex

Space Power Facility
the world's largest thermal vacuum chamber for ground testing large equipment in a simulated space environment (i.e., surrounded by a vacuum and at very hot and cold temperatures) before taking the equipment into space

Spacecraft Propulsion Research Facility
the world's only facility that simulates the actual flight conditions of space on full-size rocket vehicles

Hypersonic Tunnel Facility
the United States' largest clean-air wind tunnel capable of performing tests up to seven times the speed of sound

Cryogenic Propellent Test Facility
tests cutting-edge technology for high-energy space propulsion systems of the future

Reactor Facility
two nuclear reactors which have been closed since 1973

History

In 1962, Plum Brook Station began operating a 60-megawatt nuclear test reactor and a 100-kilowatt mock-up reactor under a license from the U.S. Nuclear Regulatory Commission (NRC). The Plum Brook Reactor Facility supported NASA's nuclear rocket and nuclear electric power supply program. In 1973, after being faced with severe budget reductions from Congress, NASA decided to defer many of its longer term research and development programs and cease operations at several research facilities across the country, including those at Plum Brook Station. The major test facilities at Plum Brook were maintained in a standby mode, capable of being reactivated for future use. The smaller facilities were not maintained, and some were dismantled. NASA closed the Reactor Facility and, in compliance with their operating license, took a number of steps to safely take the facility out of service. The fuel from the reactors was removed to a U.S. Department of Energy (DOE) facility in Idaho for disposal or reuse. The reactors were then placed in a safe, secure and dry storage mode.

Since its closing in 1973, and to the present day, NASA has provided comprehensive maintenance and strict oversight of the Reactor Facility under the terms of its "Possess But Do Not Operate" license agreement with the NRC. NASA conducts ongoing environmental monitoring around the reactor. Test results indicate there have been no releases of radiation. In 1984, NASA performed an inventory of the radioisotopes remaining in the facility so that these levels could be monitored over time. In the twenty-five years since the reactor's shutdown, the level of radioactivity has continued to decrease because short half-life isotopes have already significantly decayed.

Radioactivity
The three types of radiation emitted by radioactive isotopes are alpha, beta and gamma radiation. In a radioactive substance, the atomic structure is changing. Emitting radiation is nature's way of reaching the right balance of protons and neutrons in an atom. This stabilization process is called radioactive decay. Depending on the kind of radioactive elements, decay can take a fraction of a second, or thousands or millions of years. The time it takes to decay an isotope is referred to as its half-life.

Plum Brook Station
Sandusky Ohio

Last year, NASA applied for a renewal of its "Possess But Do Not Operate" license. In response to that request, the NRC asked NASA to complete decommissioning of the Reactor Facility. In the past, unavailability of reliable radioactive waste disposal sites caused NASA to delay decommissioning. Given that reliable radioactive waste disposal sites now exist that can take material from the Reactor Facility, NASA officials agreed with the NRC that there is no reason to delay decommissioning. NASA has committed to proceed with the decommissioning process with the goal of completion by 2007.

Where Are We Now

In 1997, NASA began an evaluation of alternatives for decommissioning. The alternatives were evaluated on the basis of regulatory compliance and cost. For each alternative, NASA looked at two options, A and B. Under Option A, all decontaminated buildings would be left in place. Under Option B, above ground portions of buildings would be demolished after decontamination and waste would be put in below ground level portions of buildings. A summary of the primary alternatives follows:

Alternative 1

(Decontamination/All Offsite Disposal) , would include removing loose items, equipment and structures for offsite disposal and decontaminating building surfaces where necessary. All contaminated waste would be removed and disposed of offsite at a licensed facility.

Alternative 2

(Consolidation/Offsite Disposal of Some Waste) , the reactor tank would be removed and disposed of offsite. The reactor building would be demolished and that waste, along with any contaminated waste from outside the building, would be placed in the below ground portions of the containment vessel. The containment vessel is a concrete/steel barrier that encloses the reactor. The material contained in the vessel would then be covered with a two-foot concrete cap and topped with soil. All other buildings would either be left in place or placed in the below ground portions and filled.

Alternative 3

(Consolidation/No Offsite Disposal) , is the same as Alternative 2 except that all contaminated materials would be consolidated inside the containment vessel and there would be no offsite disposal.

NASA wants to ensure that the facility will not pose a threat to public health and the environment at any time in the future. Therefore, NASA's preferred alternative for decommissioning is to reduce residual radioactivity in structures, soils, groundwater, and other environmental media at the site so that it is indistinguishable from background radiation levels. To meet this goal, NASA has chosen Alternative 1, Option A, as the preferred alternative.

Next Steps

NASA has asked the U.S. Army Corps of Engineers to prepare a detailed Decommissioning Plan that describes NASA's preferred alternative and the steps involved to implement it. The comprehensive Decommissioning Plan will include information on schedules, organization and responsibilities, procedures for managing and disposing of radioactive waste, an Occupational and Public Health and Safety Plan and a Final Radiation Survey Plan. Following these guidelines will ensure that the facility can be decommissioned in a safe manner and show that the facility meets the strict criteria for safe use of the area for any purpose. NASA and the U.S. Army Corps of Engineers will be working with a team of decommission experts and the Ohio Environmental Protection Agency to outline the work and safety measures involved in different stages of the decommissioning process. NASA also wants to involve the public in this process and keep the community informed every step of the way.

When the Decommissioning Plan is complete, it will go to the NRC for approval. NASA's goal is to have a completed plan by December of 1999 and approval from the NRC by 2001. Once the plan is finalized, implementation of the decommissioning process will begin.

Decommission

A term used to describe the process of removing a facility or site safely from service and reducing residual remaining radioactivity to a level that permits:

1.Termination of the license (from NRC) and use of the property for any purpose; or

2. Termination of the license with restricted use of the property.

Background Radiation

Refers to the levels that occur naturally (from other than man-made sources) in the environment. Naturally occurring radiation comes from sources such as the Sun (cosmic rays), radon from the ground, elements in soil, water and food.

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The History of NASA'S Plum Brook Station

Today, Plum Brook Station is an active testing and research installation housing some of the world's most advanced space environment simulation facilities.

Plum Brook Station is a satellite of NASA's (National Aeronautics and Space Administration) Glenn Research Center (formerly NASA Lewis Research Center) situated on 6,400 acres of land, fifty-six miles west of Cleveland, near Sandusky, Ohio.

The history of Plum Brook Station dates back to 1941 when the War Department acquired about 9,000 acres of land to construct a munitions plant. The plant, then called the Plum Brook Ordinance Works—named after the creek running through the site— produced munitions, such as TNT, until the end of World War II. After the war, the land remained idle until 1956 when the National Advisory Committee for Aeronautics (later known as NASA) obtained 500 acres for the construction of a nuclear research reactor. The Reactor Facility, designed to study the effects of radiation on materials used in space flight, was the first of fifteen test facilities eventually built by NASA at Plum Brook Station. By 1963, NASA acquired the remaining land at Plum Brook for these additional facilities.

Plum Brook Station, a part of the Sandusky, Ohio community for over 35 years, provides jobs within the community, works with local schools, is a member of the local Chamber of Commerce, and supports the local economy by using materials from local businesses. Plum Brook Station's employment needs provide an opportunity for training the local work force in state-of-the-art technology and its presence provides a gateway to high technology in the Sandusky area.

In 1973, after successfully completing the objective of landing humans on the Moon and returning them safely to Earth, NASA was faced with budget reductions from Congress. These budgetary constraints caused NASA to defer many of its longer term research and development programs and cease operations at several research facilities across the country, including those at Plum Brook Station.

The major test facilities at Plum Brook were maintained in a standby mode, capable of being reactivated for future use. Smaller facilities were not maintained, and some were dismantled. The Reactor Facility was shut down and all of the nuclear fuel was removed and shipped offsite to a U.S. Department of Energy (DOE) facility in Idaho for disposal or reuse. NASA placed the facility in a safe, secure and dry storage mode and conducted strict oversight and ongoing environmental monitoring around the reactor.

Plum Brook Station's four "World Class" facilities currently in operation include:

Space Power Facility
the world's largest thermal vacuum chamber for ground testing large equipment in a simulated space environment (i.e., surrounded by a vacuum and at very hot and cold temperatures) before taking the equipment into space

Spacecraft Propulsion Research Facility
the world's only facility that simulates the actual flight conditions of space on full-size rocket vehicles

Hypersonic Tunnel Facility
the United States' largest clean-air wind tunnel capable of performing tests up to seven times the speed of sound

Cryogenic Propellent Test Facility
tests cutting-edge technology for high-energy space propulsion systems of the future

In 1987, NASA, along with several other government agencies and the private sector, expressed a renewed interest in the unique facilities in standby mode at Plum Brook Station. Because reactivating these facilities would be expensive and would take years to accomplish, NASA decided to perform this work in partnership with the potential users. Under a unique arrangement, users were required to pay for costs associated with their individual test programs at Plum Brook, including the "up front" cost of reactivating the facility from its standby mode. NASA civil servants who work at Plum Brook Station oversee all of the work performed and they continue to successfully operate in this manner today.

There are some facilities at Plum Brook Station that have remained closed, such as the Reactor Facility , which was designed to study the effects of radiation on materials used in space flight. NASA plans to completely decommission the Reactor Facility by 2007 and enable this area to be safely reused.

Over the years, research conducted at Plum Brook Station has significantly contributed to the development and growth of NASA's space program. In 1985, the Department of the Interior National Park Service declared Plum Brook Station's Spacecraft Propulsion Research Facility, the world's only facility that simulates the actual flight conditions of space on full-size rocket vehicles, as a national historic site. Plum Brook Station's more recent contributions include completing the testing of the fuel tank for the X-33 experimental spaceplane and operating the hypersonic wind tunnel used to develop high-speed propulsion systems that fly at more than seven times the speed of sound (more than 5000 mph).

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