

The 105 B Facility was the world's first full-scale production reactor. The historical significance of the 105 B Reactor has entitled it to numerous declarations, including National Historic Mechanical Engineering Landmark by the American Society of Mechanical Engineers in 1976, and the Nuclear Historic Landmark Award. Because of its historical significance, the 105 B Facility was listed in the National Register of Historic Places in 1992, designated a National Historic Civil Engineering Landmark in 1994, and became a National Historic Landmark in August, 2008. Since the late 1980s, guided tours have been led through portions of the 105 B Facility. The Department of Energy (DOE) committed in 2008 to increase the frequency and number of public tours and directed the Mission Support Alliance Contractor (MSA) to enhance the tour program. Interpretive items and historical displays are exhibited in the facility along the current tour route.

The 105 B Reactor project was commissioned under the Manhattan Project, during World War II, to develop the first nuclear weapons. The reactor was designed and built by the DuPont company based on experimental designs tested by Dr. Enrico Fermi at the University of Chicago, and tests from the X-10 Graphite Reactor at Oak Ridge National Laboratory. The reactor was graphite moderated and water cooled. It consisted of a 28 by 36-foot, 1,200-ton graphite pile, penetrated through its entire length horizontally by 2,004 aluminum process tubes containing uranium fuel slugs. Cooling water was pumped through the aluminum tubes around the uranium slugs. This design allowed the reactor to produce plutonium-239 by irradiating uranium-238 with neutrons.

Construction of B Reactor began in October of 1943 and fuel was loaded into B Reactor on September 13, 1944. B Reactor went "critical" a few minutes before midnight on September 26, 1944 and reached full power on December 28, 1944.

B Reactor was initially shutdown at the end of 1946. However, amid growing tension between the United States and the former Soviet Union, B Reactor was restarted in 1948. B Reactor supported "Cold War" production of plutonium from 1948 to 1967. The Atomic Energy Commission ordered the shutdown of B Reactor on January 29, 1968. B Reactor was actually shutdown on February 12, 1968.

B Reactor support buildings and structures were dismantled and removed from 1969 through 2006. B Reactor originally had 32 permanent buildings and 22 service facilities. All buildings and service facilities have been dismantled and removed with the exception of the reactor building (105-B), main exhaust stack (116-B), and the river pump house (181-B).