

Y-12, ORNL and the origin of “work for others”

Added to the primary missions of Y-12 over the years has been significant work for other government agencies. There have been many unusual projects, such as the Moon Box and the Seawolf propulsor and others that have been brought to Y-12 because of the manufacturing capabilities here. It all began early in Y-12's history,

The first such work to come to Y-12 likely came from the Army Air Force (later changed to the United States Air Force) and its Nuclear Energy Propulsion of Aircraft project that began as early as May, 1946. This project, like many others over the years was a cooperative effort of more than one of the sites in Oak Ridge.

It is somewhat difficult to know exactly how the work was divided between Y-12 and the newly forming Oak Ridge National Laboratory that was named a national laboratory by March 4, 1948 when Carbide Carbon Chemical Company was given the contract to operate the laboratory by the Atomic Energy Commission. As the Y-12 buildings came available and floor space at the X-10 site was not available, the newly forming research laboratory moved in to available space at Y-12.

The transition of research based organizations at Y-12 to the laboratory was taking place quickly during the 1947 to early 1950's. It was these organizations that did this first work for others effort at Y-12.

The Nuclear Energy for the Propulsion of Aircraft (NEPA) project was started by the Army Air Force, the precursor of the United States Air Force created on September 18, 1947. This program lasted from May, 1946 until May, 1951. The NEPA program was replaced by a new term for the same effort. It was called the Aircraft Nuclear Propulsion (ANP) program. The ANP program lasted until 1957 when it was cut severely and finally in 1961 the whole effort was cancelled.

During these programs, two different types of nuclear-powered jet engines were studied. Plans were developed for two B-36s to be modified to study shielding requirements for an airborne reactor.

ORNL's Don Trauger, who wrote, *Horse Power to Nuclear Power: Memoir of an Energy Pioneer*, and who was indeed a pioneer in the world of nuclear energy, also wrote about the NEPA and ANP programs. He said, “the nuclear plane posed two formidable challenges: (1) Could a reactor manage to loft a plane laden with bombs, crew, and—mainly—itsself and its shielding? And (2) given the impractical weight of conventional shielding—7 feet of concrete—could the crew survive the radiation exposure?”

The S-50 Thermal Diffusion Plant building near the K-25 power house was available as the diffusion process equipment had been shut down and removed. So this building was made available in 1946 for the research to determine if nuclear energy could be used to propel an airplane. Among the major problems faced by the researchers was how to build a compact reactor small enough to fit inside an airplane designed as a bomber and yet powerful enough to lift the airplane into the air. Of course there was the huge problem of developing lightweight shielding to protect the crew from radiation.

The Fairchild Engine and Airplane Corporation moved into the S-50 building and arranged with the Clinton Laboratories for scientific support. Eugene Wigner was the director of the laboratory at the time.

In September 1949, the Oak Ridge National Laboratory appointed Alvin Weinberg to direct the ANP project. Soon after the Fairchild portion of the ANP project work being done in S-50 was taken over by General Electric. The work was relocated to Ohio. Many of the Fairchild scientists stayed with ORNL.

Lightweight shielding was the primary focus of ORNL's work on the project. To accomplish this research, two additional reactors were constructed at ORNL. The first, in 1950, was the Bulk Shielding Reactor, known also as the “swimming pool reactor” and the Tower Shielding Facility constructed in 1953. Later in 1954, a third reactor was constructed known as the “fireball” reactor and officially named the Aircraft Reactor Experiment.

The “fireball” referenced the fact that many of the reactor’s components operated at a temperature that made them red hot. This reactor drew visits by such dignitaries as General James Doolittle, Admiral Lewis Strauss, and Captain Hyman Rickover to see the red-hot reactor in action,

The following comes from The Oak Ridge National Laboratory’s Review:

“Three unique reactors were not the only hardware the Laboratory acquired as a result of its nuclear aircraft project. The project helped justify construction of a critical experiments facility to test reactor fuels and a physics laboratory to study the effects of radiation on solid materials. It also advanced Laboratory efforts to acquire its first nuclear particle accelerators and digital computers.

“Because the success of nuclear flight depended on expensive and complex hardware on the ground, the Laboratory benefited from being on the receiving end of a well-funded government project. However, the Laboratory’s ability to take advantage of this situation also depended on the skill of its research and support staff and the managerial expertise of its leaders. Internal administrative adjustments, including the merger of the Y-12 Plant’s research division with the Laboratory, also helped.”

So, work for others began early in the history of Y-12 and ORNL. It continues to be a strong element in the overall mission of the government’s research and manufacturing resources here in Oak Ridge.