Y-12's reputation brings even more diverse missions

The Western Exclusion Area came into being during the 1960's with the added security measures of supplemental badges being required for access to this more secure part of the site. Within this area is where the uranium processing operations were located and where the in-process storage of special nuclear materials required additional security. This initial security addition has evolved over the years into what is now the area contained inside the Perimeter Intrusion Detection and Assessment System and now covers 150 acres.

A diamond turning machine made by Du Pont was installed in Building 9998 late in the 1960's as described by Joe Ryan in a previous article. The machine was driven at 500 revolutions per minute. The vertical spindle was an air-bearing one. Some of the most precise cuts ranged from 50 to 75 millionths of an inch, and at least once a depth of cut of only 10 millionths of an inch was taken.

Special coolant requirements and temperature controls were important at this level of accuracy and diamond turning. This is typical of the types of technical advances being made at Y-12 though the years…and continuing today!

On April 27, 1967, Y-12 Senior Staff Consultant (we now call him the Y-12 Scientist) John M. Googin was presented one of the Atomic Energy Commission's highest honors. He was awarded the E.O. Lawrence Memorial Award. The award was recommended by the AEC's General Advisory Committee and approved by the President Lyndon Johnson. John's award was for his "Outstanding contributions in the technological developments of processes for hafnium-zirconium and lithium isotope separations."

The lithium separation processes in Building 9201-4 and 9201-5 had completed the separation of lithium-6 in sufficient quantities to support the productions of thermonuclear weapons for the foreseeable future and were shut down in 1963. But not before being used to produce some very unusually high concentrations of lithium-7 (a reverse operation from the normal process to produce high enrichment of lithium-6).

The Atomic Energy Commission's Report to Congress for 1963 includes "…several thousand kilograms of 99.99% lithium-7 were separated at the Oak Ridge Y-12 Plant. This isotope of lithium, which occurs in natural lithium at a ratio of 925 atoms of Li-7 to 75 atoms of Li-6, is useful in reactor applications because of its low degree of neutron absorption."

The intended use of the highly enriched lithium-7 was in the fused salt reactor design, but eventually was put to good use as a benign alkali for use in adjusting and controlling the pH of the water used for coolant in nuclear power reactors, according to Harvey Kite and John Napier as noted in Bill Wilcox's *Overview of the History of Y-12, 1942–1992.*

One of the most visible and most highly acclaimed accomplishments of Y-12 during the late 1960's and early 1970's was the fabrication of NASA's "Moon Box" for the Apollo program. Paul Wilkinson was the lead engineer on the project and was sent to New York City to be interviewed on the major television networks when the first moon landing occurred. Paul recalled, on the occasion of the 40th anniversary of that July 20, 1969, landing of Apollo 11, the whirlwind tour between the TV networks as they all wanted to interview him.

The design and fabrication of the Apollo Lunar Sample Return Container (moon box) for NASA started in the late 1960's. So did the design of the Lunar Vacuum Receiving Module System to be built in NASA's Houston, Texas, Manned Spacecraft Center later named the Lyndon B. Johnson Space Center.

Fabricating moon boxes at Y-12 was a slow process. Those who recall the work talk of seeing one box on a machine that was cutting material away 24 hours a day at a steady pace for literally weeks on end. Y-12 made at least16 moon boxes and two boxes accompanied each of six Apollo flights to the moon.

Over 840 pounds of lunar material was returned in the boxes made at Y-12 on missions flown from 1969 through 1972. The moon boxes are now on display in various locations ranging from the Smithsonian Institute to the American Museum of Science and Energy and Y-12's own History Center in the New Hope Center. However, I have not located all 16 of them, so if you know where one is located, I would like to know about it.

In 1968 a new Kearney and Trecker five-axis machine tool with a Bendix control system, which was installed in Building 9212's A-Wing, could cut shapes beyond the capability of the best inspection machines to inspect. Advances in machining technology were coming fast, and the highly precision fabrication capability led to Y-12 being selected for several very difficult tasks, one of which was to fabricate a seamless moon box.

This caused Y-12's Inspection Group to start applying computer controls to inspection machines and to control the environment. It was imperative that inspection machines stay a step out in front of the state-of-the-art machines in the shops.

Production schedules were accelerated and numbers of weapons parts increased significantly. Seven different systems were being worked at Y-12 at the same time. The Cold War was heating up substantially, and Y-12 was at the forefront, as the components being manufactured here were needed both for weapons testing and to expand the active stockpile inventory.

By 1972, Y-12 was asked to take on an additional aspect of nuclear weapons work called "Surveillance." Sample weapons components were carefully dissembled and inspected to determine their condition, aging effects and any changes since the original manufacture.

These assemblies were the first of what would become a main mission of Y-12 to date, the disassembly of nuclear weapons secondaries. Y-12 stores and disassembles all the nation's nuclear weapons secondaries and places the special nuclear materials in storage.