

A brief overview of some historical details of Oak Ridge, part 2

This second part of the material created to serve as background information for historical documentary videos continues by describing some of the operations of the Manhattan Project, with the focus on Oak Ridge.

General Leslie Groves decided that having all of the Manhattan Project elements in one location was not a good idea. He selected Hanford, WA as the site to build reactors that were patterned after the Graphite Reactor at Oak Ridge National Laboratory (ORNL), but where water cooled instead of air cooled. These reactors would produce the plutonium needed for the Gadget, Fat Man, and all the rest of the nation's nuclear weapons.

But the Graphite Reactor would have a second life at ORNL after the war ended. It operated for another 20 years and produced the world's first medical isotopes using target materials separated in the calutrons at Y-12.

The Y-12 calutrons were no longer needed for separating uranium because the K-25 gaseous diffusion process came on line in March 1945 and was producing weapons-grade enriched uranium by December 1946. However, the Y-12 calutrons operated for several more years – 34 of them until 1974 and 30 of them until 1998. These 30 calutrons are still on standby today.

The majority of the highly enriched uranium in the weapons program today was enriched at the K-25 Building of the K-25 Gaseous Diffusion Plant. It operated until 1964 and almost all of it was demolished within the past few months. A small section of the East Wing remains at this time; however, it is slated to be demolished as well. Eventually there will be a small replica building designed to appear as a section of the original building would have looked.

The K-25 Building was a large "U" shape. Each leg of the "U" was a ½-mile long and the building covered 44 acres. It was said to be the largest building under one roof in the world in 1945.

As soon as World War II ended, the Cold War began. The Soviet Union had the plans for Fat Man given to them by Klaus Fuchs before it was even used. By August 29, 1949, the Soviet Union exploded its first nuclear weapon, which was essentially a duplicate of Fat Man. The shock to the United States created an immediate push to build a thermonuclear weapon or "hydrogen bomb" that would be much larger and more destructive than the atomic bomb.

Y-12 was brought into this herculean effort by being asked to use some of the empty buildings left over from the removal of 1080 of the 1152 calutrons to separate the lithium-6 that was needed for the thermonuclear weapon. Buildings 9201-4 and 9201-5 were used for that purpose from 1955 to 1963.

Building 9201-4 still has the COLEX (column exchange) process equipment in it. Demolition of the building has been postponed for years because it is in the middle of Y-12, but eventually this building – along with others in Bear Creek Valley at Y-12 that are contaminated with mercury – will be demolished at significant expense.

In addition to the lithium-6 separation, Y-12 took on the mission to machine uranium parts for all nuclear weapons and to provide the highly enriched uranium fuel for the Navy's nuclear reactor

powered ships and submarines. Other missions came to the three sites, including a Nuclear Energy Powered Aircraft and the National Aeronautics and Space Administration's Apollo Lunar Sample Return Container, or "Moon Box."

ORNL built 13 nuclear reactors and became the world's leading authority on nuclear energy, starting the first nuclear reactor training school in 1946.

Y-12 continued its maximized operations throughout the Cold War years and ultimately played a large role in the defeat of the Soviet Union as they attempted to match the output of Y-12 one for one. Meanwhile work of other government agencies continued to grow at Y-12 and the ORNL.

By 1983, the K-25 Gaseous Diffusion Plant was approaching the end of its mission. Y-12 was in the height of the Cold War (a reduction in mission would come in the early 1990s), ORNL was struggling to maintain funding for basic research, and the facilities were deteriorating.

Not until the turn of the century would ORNL see a huge upswing in basic research, neutron science, computing, and other programs and become the U.S. Department of Energy's largest and most complex research facility. The arrival of UT-Battelle as the managing and operating contractor brought a new era to the laboratory.

Y-12 would go through significant operational issues in the 1990s which led to a shutdown of operations on September 23, 1994. It took Y-12 ten years to return to full operation in some cases. The end of the Cold War brought tremendous change to Y-12.

While the primary mission remained focused on nuclear weapons component manufacturing for refurbishment, that mission was considerably smaller in scope than it had been during the Cold War. The mission to supply the Nuclear Navy's reactor fuel has remained through the years, and during the 1990s there was a strong work-for-others effort shared between ORNL and Y-12 called Oak Ridge Centers for Manufacturing Technology.

Y-12 continues to maintain its uranium mission as the shift to disassembly of nuclear weapons components and storage of special nuclear materials has grown with the reduction of the nation's active nuclear weapons. New missions to provide specialized training for protecting nuclear materials and detecting nuclear materials are growing.

The K-25 Gaseous Diffusion Plant is now the East Tennessee Technology Park, which is primarily an industrial park. Substantial environmental remediation has been accomplished in the years following the shutdown of uranium enrichment operations at K-25.

Next we will look at the transitions over the years to the current missions of each site.