

A look back at Union Carbide's FIRST 20 Years in Nuclear Energy [The Y-12 Plant Milestones]

Note: Union Carbide Nuclear Division, which started out as Carbide and Carbon Chemicals Company, operated the Atomic Energy Commission/Energy Research and Development Administration/Department of Energy sites in Oak Ridge, Paducah, Ky., and Portsmouth, Ohio, until 1984, some 40 years.

The articles in this series are taken from a publication produced by Union Carbide Nuclear Division in the early 1960s and provide some insights into technological advances and substantial manufacturing accomplishments made in Oak Ridge just 20 years after the Manhattan Project came to East Tennessee. Tim Gawne of Oak Ridge National Laboratory provided the publication to me when he found a copy in the ORNL Library archives.

The Union Carbide-produced report is not as comprehensive as the Y-12 chronology, *An Overview of the History of Y-12 1942-1992*, created by Bill Wilcox, and available through www.secretcitystore.com. Bill provides a great many more details of these years than what is summarized and included in this 1962 report.

This section of the Union Carbide report covers the milestones of the Y-12 Plant (now Y-12 National Security Complex) accomplished during the first 20 years of Union Carbide's role in nuclear energy:

"Y-12 PLANT MILESTONES"

"1941-1942 – Scientists at University of California Radiation Laboratory, Berkeley, began development of a magnetic separator which would function on the principle of the mass spectrograph, and would separate U-235 from natural uranium in appreciable quantities.

"1943-1946 – Ground was broken for the first building in the Y-12 area on February 1, 1943. Chemical operations for magnetic separator charge preparation began October 1943, and the first magnetic separator was started up in November 1943.

"The first production building went into operation January 27, 1944, and conversion of highly-enriched uranium-235 to UF₄ began in November. Ultimately, Y-12 employed 22,000 operating personnel and was the first plant to produce large quantities of enriched U-236. Uranium recovery began in January 1945. On September 22, 1945, all electromagnetic separators used to produce low-level enriched U-235 were shut down, since the K-25 gaseous diffusion plant was supplying a sufficient amount of partially-enriched feed for the product-level electromagnetic separators.

"1946 – All magnetic separators were discontinued December 23 as production units.

"1947 – Carbide replaced Tennessee Eastman Corporation as operating contractor of Y-12 on May 4, 1947.

"Enriched uranium-235 produced by the gaseous diffusion process was reduced to metal and fabricated at Y-12 in accordance with AEC requirements.

"1948 – Machining of enriched uranium on a small scale was started early in the year.

"1950 – Hafnium-free zirconium production was started in January for use in the naval reactor program. The casting and machining of uranium-aluminum alloy and the first large-scale precision machining of beryllium began.

"1953 – Additional uranium casting facilities and another uranium machining shop were installed and completed by fall. A hydraulic pressing facility was installed in October.

“1954 – An expansion of the enhanced uranium salvage facility was completed early in the year. Installation of equipment for a new method of UF₆ reduction was completed during the second quarter.

“1955 – Installation of additional uranium casting facilities was completed early in the year.

“1956 – An accelerated program of providing technical information and assistance to industry interested in uranium salvage and recovery began.

“1957 – Installation of a Primary Rolling Mill and further pressing facilities for fabricating uranium were completed during the third quarter.

“1958 – Installation of a heavy machine shop for uranium fabrication was completed in the first quarter. A second rolling mill for uranium processing was installed late in the year.

“1959 – Development and special fabrication service in pressing and machining of special materials was provided for the benefit of the missile program. Commission announced public sale of highly-enriched lithium-7.

“1960-1962 – Specialized development and preproduction fuel element fabrication for the nuclear-powered rocket (Rover) program was started in August 1960. AEC authorized Y-12 to provide specialized fabrication service for a missile nose cone in February 1962. During this period, there was continued operation of a plant developed at Y-12 for large-scale separation of lithium isotopes.”

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Substantial preparation was made during this last part of this period to equip Y-12 for its role in the winning of the Cold War. Machine tools were first computerized. Multiple redundancy was created as a strategy to meet ever-increasing production demands and single points of failure were eliminated to the extent possible by purchasing more than one of anything that was required to make production.

The coming years would see even more of this strategy implemented. Ultimately, the 1980s would culminate in the winning of the Cold War by the United States when the Soviet Union was unable to keep pace with the number of nuclear weapons being manufactured in the United States, all of which had some components made at Y-12.

Next we will look at a summary and conclusion of the Union Carbide Nuclear Division Report.