A look back at *Union Carbide's first 20 Years in Nuclear Energy [The Oak Ridge National Laboratory]*

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, OH, 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 which provides some insights into technological advances and substantial manufacturing accomplishments that were 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.

This article covers the introductory section discussing the Oak Ridge National Laboratory:

"WORK WITH THE PEACEFUL ATOM"

"Emphasis on peaceful applications of nuclear energy increased under the Atomic Energy Commission, which was organized in 1946. The Clinton Laboratories, which had been a pilot plant for research and development on plutonium production, became, in 1948, the Oak Ridge National Laboratory; a vigorous program of fundamental research, radioisotopes production, and nuclear power development was undertaken at the enlarged laboratory. Union Carbide became the operating contractor in March, 1948.

"WORLD'S OLDEST – The Graphite Reactor is the second reactor built and the first with a sizeable power output. It has been in continuous operation at Oak Ridge National Laboratory since November 4, 1943, mostly for research and radioisotope production. It has achieved a performance three times greater than its original design rating.

"ONE OF THE NEWEST – The Oak Ridge Research Reactor uses pure water for shielding from radiation and thus offers a clear view of the fuel region where the nuclear reaction occurs. The water shield also offers easy access to the core, thereby facilitating experimentation in the reactor.

"REACTOR PROVING GROUND"

"ORNL developed the Material Testing Reactor, the first postwar nuclear reactor designed for research on high-performance materials to be used in reactors producing power. Work on this reactor led to the development of submarine propulsion reactors, the 'package' reactors for power at remote locations, and swimming pool research reactors. Advanced power-producing reactors now being developed at ORNL include those using fluid fuels and others with solid fuels and gaseous coolants.

"FUSION – the Direct Current Experiment-2 is a device for investigating the problems of achieving power from the fusing of light atoms under conditions of extremely high vacuum and within a strong magnetic field.

"SATELLITE SOURCES – Intensely radioactive pellets glow from the energy of their radioactivity. Such fission product sources will provide electricity to operate instruments for satellites.

"NUCLEAR SHIP – The NS Savannah has a propulsion system based on a pressurized water reactor designed with technical advice and assistance from ORNL.

“NEW SOURCES OF ENERGY”

“Electricity from nuclear energy is generated by ORNL’s radioisotopes in power sources used to operate automatic, unattended arctic weather stations and deep-sea oceanographic research data instruments.

“Power from nuclear energy is also the goal of fusion research at ORNL. The energy of atoms fusing at the temperature of the sun can provide power with a fuel from sea water – an almost limitless supply.

“PACKAGING AND SHIPPING – Because of the radiation they emit, radioisotopes are shipped in shielded containers. Nearly 100 radioisotopes and more than 250 stable isotopes are now routinely available from the laboratory.

“RADIOISOTOPES – From August 2, 1946, through 1962, ORNL has shipped more than 1,500,000 curies of radioisotopes and 5,000 grams of enriched stable isotopes throughout the world for use in industry, agriculture, training and medicine.

“RADIOISOTOPES FOR PEACEFUL USES”

“The first large-scale peaceful uses of nuclear energy came from radioisotopes produced at ORNL and made generally available beginning in 1946. Called ‘the most valuable new research tool since the invention of the microscope,’ radioisotopes have saved many lives through medical uses. They have also resulted in yearly savings of millions of dollars for the nation’s industries and consumers. Radioisotopes produced in Oak Ridge are now in use from pole to pole and to the ocean’s depths.

“FUNDAMENTAL RESEARCH”

“Fundamental research is performed at the Laboratory on materials made radioactive by neutron bombardment in nuclear reactors and by irradiation in cyclotrons. Research covers the effects of radiation on both living and non-living matter. Much of the work done at the Oak Ridge National Laboratory involves the detection and measurement of potentially hazardous radiations which human senses cannot detect. An over-riding consideration in all work is to assure safe working conditions and protection for employees.

“REPROCESSING SPENT NUCLEAR FUEL”

“Fuel from nuclear reactors is processed at the Laboratory to recover valuable radioisotopes, and to prepare the unconsumed uranium for re-use as reactor fuel. Processing research is concerned not only with providing better and cheaper products, but also with the safe and economical disposal of radioactive wastes. The transmutation of plutonium into even heavier elements – like californium and berkelium – will be accomplished in the High Flux Isotope Reactor now under construction.

“REMOTE CONTROL – Highly-radioactive fuel elements from reactors cannot be handled directly because of radiation hazards. Complex equipment to accomplish remote handling was designed to dejacket fuel elements prior to chemical processing for removal of fission production and the recovery of unused uranium. Such equipment is located behind shielded walls.

“FUNDAMENTAL RESEARCH – The new and highly versatile Oak Ridge Isochronous Cyclotron provides opportunities for research in medium–energy nuclear physics and transuranium elements. The ORIC uses a 220-ton magnet sheltered behind thick walls and the world’s heaviest (65 tons) doors.

“RESEARCH ON RADIATION”

“Research and development activities at ORNL are concerned generally with radiation and radioactive materials – the essential ingredients of nuclear energy. The Laboratory performs research in broad fields of science, including physics, metallurgy, chemistry and engineering, to advance knowledge of nuclear energy in all its aspects. The new tools are extremely helpful in biological research, and it is anticipated that the secrets of life processes may ultimately yield to the application of these tools and techniques.

“THE PROMISE OF THE NUCLEAR AGE”

“In an address before the Society of Nuclear Medicine on June 28, 1962, Dr. Glenn T. Seaborg, chairman of the U. S. Atomic Energy Commission, said, ‘Nuclear research today is varied and rewarding. Its future is so exciting that we cannot but envy the future scientists who will reach maturity two decades from now. But I trust that we may have the satisfaction of knowing that we have in a real sense paved the way for their achievements.’

Next we will review the milestones of the accomplishments at ORNL during the first 20 years of Union Carbide’s role in nuclear energy.