Clarence Larson: only ORNL director to be AEC commissioner

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Carolyn Krause brings us insights into Clarence Larson, a capable and key contractor leader of the early Union Carbide days in Oak Ridge.

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The only director and employee of Oak Ridge National Laboratory to become a commissioner on the U.S. Atomic Energy Commission (AEC) was Clarence Edward Larson. After serving as director of the Oak Ridge Y-12 Plant starting in 1948, he moved to ORNL in 1950 when he was appointed director there by the AEC operating contractor, Carbide and Carbon Chemical Division, Union Carbide Corporation, later to become the Union Carbide Nuclear Division. He remained ORNL director until 1955.

Larson replaced Nelson "Bunny" Rucker as ORNL director. As associate director Alvin Weinberg "also decided that Bunny Rucker really should be replaced by a person with more technical understanding of nuclear energy, a view with which Clark Center (Union Carbide Nuclear Division president) concurred. As a result, Clark appointed Clarence Larson director of ORNL, and I became research director." (Source: Weinberg's "The First Nuclear Era.")

A native of Minnesota who completed undergraduate work in chemistry and chemical engineering at the University of Minnesota, he received his Ph.D. degree in biochemistry in 1937 from the University of California at Berkeley, where he studied blood clotting. While a graduate student, he experimented with cyclotron-produced isotopes obtained from cyclotron inventor Ernest O. Lawrence.

In 1937 Larson joined the College of the Pacific's chemistry department and later became its chairman. Also on the faculty there at the time was Irving Goleman, brother-in-law of Weinberg, Larson's successor as director of ORNL.

Larson continued experiments using cyclotron-produced isotopes and, as a result of this work, joined Lawrence in the Manhattan Project in 1942. Larson's job was to head chemical development at the Y-12 Plant, where fissionable uranium-235 was electromagnetically separated from the more abundant uranium isotope U-238. The calutrons used for producing uranium enriched in U-235 for the atomic bomb were designed and built at Y-12 under Lawrence's leadership.

At ORNL Larson presided over the $20-million expansion program involving completion of nine new buildings, large-scale modification of four buildings and acquisition of space for ORNL activities at the Y-12 Plant. Under his administration, the Bulk Shielding Reactor, the Homogeneous Reactor Experiment, and the Aircraft Reactor Experiment began operation. The Tower Shielding Facility was completed for the Aircraft Nuclear Propulsion Program.

ORNL's first large computer was installed; it was called ORACLE, an acronym for Oak Ridge Automatic Computer and Logic Engine. An ORNL reactor exhibit received rave reviews at the first international Atoms for Peace conference in Geneva, Switzerland.

In the early 1950s ORNL's Chemical Technology Division built a pilot plant for AEC to demonstrate plutonium recovery and extraction from spent nuclear fuel. In 1954 Eugene Wigner, ORNL research director in 1946-47, returned to ORNL to help design a processing plant that can recover uranium-235 from spent fuel for reuse in reactors at a much lower cost than that of extracting uranium from ore.

Summarizing the effect of the nation's postwar aims on ORNL's work, Larson said, "1954 has witnessed the transition that many of us have hoped for since the war. The increasing emphasis on peacetime applications of atomic energy has been a particular source of gratification."

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In 1955, Larson left Oak Ridge to become vice president of the National Carbon Division of Union Carbide Corporation. Later he became deputy manager of corporate research there.

In 1961, he returned to Oak Ridge, where he served as president of Union Carbide Nuclear Division until 1969. In this capacity, he oversaw management of ORNL, the Y-12 Plant, and the Oak Ridge and Paducah gaseous diffusion plants for the AEC.

He served as commissioner from 1969 to 1974, a time of great uncertainty for the nuclear industry when larger nuclear power plants were being built and operated. The AEC commissioned a series of public hearings on the nuclear reactor safety, especially concerning emergency cooling. The AEC turned to researchers from ORNL, Larson's former employer, to provide testimony based on relevant data obtained in Oak Ridge. The hearings led to new nuclear safety regulations.

During his tenure on the AEC, Larson served under Chairman James Schlesinger (who left to head the CIA) and Dixy Lee Ray, the first woman to chair and the last person to chair the AEC. Larson, who lacked the policymaking ability of Ray, supported her work in reorganizing AEC's reactor development division after Milton Shaw, who disliked Weinberg and ORNL's molten salt reactor concept, resigned as division director when Ray insisted that the division's budget be audited. (Source: "Is It True What They Say about Dixy?" by Louis Guzzo)

Concerning his earlier uranium research, Larson tackled a couple of tough chemical problems. First, the calutrons directed the uranium beam against the walls of the steel-and-graphite receivers with such energy that the uranium atoms buried themselves in the stainless steel, greatly reducing the amount of enriched uranium that could be recovered.

Larson suggested that the embedded uranium could be easily recovered from the receiver walls if they were first plated with copper. Lawrence liked the idea. He asked Larson to assemble a team to apply copperplate to the receivers and put the process into operation in one day. "Fortunately," Larson said, "the equipment was available and, on the next day, the operations started successfully."

Another problem was to recover the uranium scattered all over the calutron interiors. Because of the extremely corrosive conditions, large amounts of impurities entered the solutions, making recovery of the uranium difficult. It was known that uranium could be precipitated selectively by hydrogen peroxide, but this recovery system, said Larson, "was almost explosively unstable because of the catalytic effects of the impurities."

Larson knew that decomposition of many unstable biological compounds can be prevented by subjecting them to frigid conditions. So he devised double-walled vessels containing a cooling system for the uranium precipitation system.

"This system," Larson said, "worked successfully throughout the project. By fortunate coincidence I was able to solve both of these process problems by applying the electrochemical and separations techniques I used in my graduate research."

In 1973, Larson was elected to the National Academy of Engineering for "the development of processes for recovery and purification of uranium and leadership in nuclear plant design."
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Thanks Carolyn for yet another excellent treatment of one of the strong personalities who served as a contractor leader in Oak Ridge's early days and went on to serve at a national level as well.

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Clarence Edward Larson, both a local contractor leader and a national presence as an Atomic Energy Commission member