

Sam Beall: director of two ORNL divisions

(As published in *The Oak Ridger's Historically Speaking* column on September 30, 2013)

In her continuing effort to bring you *Historically Speaking* columns featuring people who have had interesting careers in Oak Ridge and whose oral histories have been captured, Carolyn Krause tells Sam Beall's story of his work from the Manhattan Project to the Oak Ridge National Laboratory. His oral history was taken by Steve Stow in 2003 at ORNL. It is now available online at the Oak Ridge Public Library's Center for Oak Ridge Oral Histories, <http://cdm16107.contentdm.oclc.org/cdm/landingpage/collection/p15388coll1>

...

Sam Beall was well known at Oak Ridge National Laboratory for his roles as director of the Reactor Division (1963-71) and the newly formed Energy Division (1972-74).

He thrived in the company of many successful and sometimes famous people. He grew up in Plains, Ga. He had not met Jimmy Carter, another Plains native who was elected U.S. President in 1976, but he knew all his relatives. Carter's grandfather was the local postmaster when Beall was young.

In his 20s in Chicago, Beall joined the Manhattan Project. He became acquainted with Arthur Compton, Enrico Fermi and Eugene Wigner, who all eventually won Nobel prizes. He became good friends with Alvin Weinberg, director of ORNL for 18 years (1955-73).

In 1972 Beall's son Sandy started the Maryville-based chain of Ruby Tuesday restaurants. The first Ruby Tuesday opened near the University of Tennessee at Knoxville. Today Ruby Tuesday is in 850 locations in 16 countries.

While in high school in Plains, Beall learned electrical engineering from two Baptist electrical engineers. He earned a B.S. degree in Electrical Engineering at the University of Tennessee.

"I worked at a smokeless powder plant for DuPont after I got out of school," he told Steve Stow in an oral history interview in 2003. "DuPont was trying to recruit people for the Manhattan Project during World War II. So, they sent me to the University of Chicago in 1943.

"I worked with my mentor Arthur Rupp in the west stands of the football stadium where the original sustained nuclear reaction had taken place six months earlier. We developed formulas on smokestack dilution to predict the amount of radioactivity that would leave the stack from the pile of uranium and graphite blocks."

On his first day at Chicago, Beall had learned the Project's purpose was to accumulate enough plutonium from a "pile" to make an atomic weapon before Germany did. In September 1943 he and Rupp were sent to Oak Ridge to work as "technical backups" on the Graphite Reactor.

"We tested the stacks to make sure they were operating as predicted," Beall said. "We tested the uranium slugs to make sure they didn't leak.

"We invented some channel blockage devices that closed off some airflow to the pile, forcing the air coolant to the center," he continued. "As a result, the pile power level (total heat and neutrons produced) was increased three times."

In 1944 Beall and other DuPont employees in Oak Ridge were sent to Hanford, Wash. "That changed my assignment because then I worked on plutonium separation," he said.

Several months after two atomic bombs had devastated Japan, ending the war, Beall and other *Forty-Niners*, code word for plutonium (element #94), received a congratulatory letter from Compton.

Sam Beall: director of two ORNL divisions

(As published in *The Oak Ridger's Historically Speaking* column on September 30, 2013)

Beall returned to Oak Ridge to work for Miles Leverett, head of the reactor development group. In this role, Beall helped test fuel rods and fuel elements for a mockup of the Materials Testing Reactor designed under Jim Lane and Alvin Weinberg.

The MTR was built in Idaho. Weinberg asked the Oak Ridge researchers to convert the hydraulic mockup of the MTR into the first reactor to operate on enriched uranium. The fuel was enriched in uranium-235 at the Oak Ridge Y-12 Plant. What Wigner called the "Poor Man's Pile" became known as the Low Intensity Test Reactor at ORNL.

LITR was started up in February 1950. During its run of several months, the power level was boosted from 1,000 to 3,000 kilowatts. The LITR was the direct ancestor of the water-cooled reactors used in Navy submarines.

In a building next to LITR, in 1946, Captain Hyman Rickover received training for six months at the first class of the new Oak Ridge School of Reactor Technology. Rickover became the father of the nuclear submarine and ultimately led to the nuclear powered ships in the U. S. Navy.

The blue glow, or Cerenkov radiation, from the LITR "swimming pool" reactor appeared on the cover of *Scientific American* in 1951.

Beall recalled that the first fuel elements consisted of parallel plates (of enriched uranium clad with aluminum) between which the water coolant flowed. But flow differences caused dangerous bending of the plates that could restrict coolant flow. At Wigner's suggestion, the plates were curved in the same direction to maintain even spacing between them.

Beall was also involved in the development of the Homogeneous Reactor Experiment. The HRE-1 represented Weinberg and Wigner's concept of "a pipe, a pump and a pot." The idea was to eliminate the steps of fuel element fabrication and dissolution, simplifying reactor operation. The experiment was a success.

When HRE-1 reached full power in 1954 and, through a steam engine, generated 150 kilowatts for TVA's electric grid, Weinberg called for a toast of all participants. "Sam, when piles go critical in Chicago, we celebrate with Chianti," Weinberg said, holding a bottle. "When they go critical in Tennessee, we celebrate with Jack Daniels."

Beall expressed pride in the technical success of the LITR and HRE-1 reactor experiments. During his career, ORNL built and operated 13 reactors.

He also was proud of his work as a division director. "I'm a better people director than technical director," he said. As director of the Reactor Division, he divided programs –from nuclear desalination to gas-cooled reactors and molten salt breeders – into individual projects.

In 1972, as a follow-up to ORNL's first environmental program, ORNL Associate Laboratory Director, Murray Rosenthal asked Beall to start and head an ORNL Energy Division. It consisted of sociologists, economists and scientists who focused on energy efficiency, environmental impact statements for nuclear power plants, and solar energy and geothermal energy projects.

Beall is proud of the work of this division. It helped give ORNL and the nation "a view of what's called the green world," he said.

Beall's son Sandy has embraced the message: His Ruby Tuesday restaurant chain is committed to reducing waste and pollution through its program "Going Green."

...

Sam Beall: director of two ORNL divisions

(As published in *The Oak Ridger's Historically Speaking* column on September 30, 2013)

Thank you Carolyn for another look inside the vast storehouse of oral histories being created and made available online by the Oak Ridge Public Library.



Sam Beall, ORNL division director