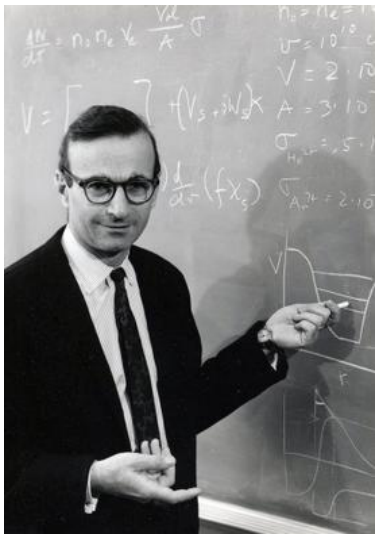
Just 'another day' at Y-12 plant, the National Lab



Alex Zucker had come to Y-12 in August of 1950 as a young Ph.D., hired to conduct experiments using the beta calutrons located in Building 9204-3. These calutrons had been a part of the effort to separate uranium 235 for the "Little Boy" bomb; but now, some five years later, they were being used for other unusual and first-of-a-kind research projects.

The 22-inch cyclotron inserted in one of the magnetic gaps of the beta calutrons was used to conduct a most critical experiment and young Alex Zucker was to be the person charged with a tremendous decision relative to the possibility that a bomb might be built that would literally destroy the earth's atmosphere. Right out of college, Alex stepped into what he would later call a "heady time" in 9204-3 from 1950 to about 1960.

The decision had been made and announced by President Truman on Jan. 31, 1950, that the U.S. was going to develop the hydrogen bomb, and Y-12 was a key manufacturing element in this process. The Oak Ridge plant was also the location where experimentation was taking place to determine if it would be safe for anyone on the planet ... if and when the highly powerful hydrogen or thermonuclear bomb was exploded.

Not long after Alex arrived at Y-12, he was asked to develop an ion source for triply charged nitrogen -- or nitrogen with three electrons removed. With the help of Royce Jones, he was able to get a satisfactory source running by November 1950. However, the problem Alex was asked to address was whether the very hot hydrogen bombs could heat up the atmosphere to a temperature that would ignite the earth's entire atmosphere through the reaction of a hydrogen bomb explosion and the nitrogen in the earth's atmosphere.

In the spring of 1951, the triply charged nitrogen source Alex and Royce had built and successfully tested was to serve as a key component in a new and most challenging experiment Alex was to conduct. This new cyclotron was based on the design of the 22-inch cyclotron that had been installed in one of the calutron magnetic gaps, but was a lot bigger.

Alex was asked to use the triply charged nitrogen source to build a nitrogen cyclotron into the Beta 3 calutron track using the triply charged ions. The installation took about nine months to design, build the parts and install the needed configuration inside the calutron magnetic gap. When the nitrogen cyclotron was completely operational, Harry Reynolds and Alex measured the cross section for the reaction and concluded that it was too small to make atmospheric ignition a credible threat, so the hydrogen bomb could be used without fear of destroying the earth's atmosphere.

The cyclotron Alex had designed and built was a huge 63-inch cyclotron inserted inside the magnetic field of the beta calutron "race track." After being used to make this historic and pivotal decision regarding the potential use of hydrogen bombs, the cyclotron continued to be used for other experiments, and one such use was the study of heavy ion-induced nuclear reactions. This was the first time in the history of nuclear physics such reactions had been studied.

Like so many other things being performed at Y-12 during this time of challenge and newly discovered science, this was done because it needed to be studied and no big deal was made of it. Just another "day at Y-12" or another "day at the Oak Ridge National Laboratory," where scientists were routinely accomplishing unheard of achievements. (It is interesting to note that heavy ion reactions are now a prominent part of nuclear and elementary particle experimental physics research.)

Alex went on from there to use the 63-inch cyclotron to observe 20 new nuclear reactions, such as the fusion of nitrogen nuclei and the formation of the heavier nuclei of fluorine, sodium and aluminum by bombardment of oxygen and carbon targets with beams of nitrogen nuclei. However, Alex soon became a manager who brought many ORNL projects to completion, including the Holifield Heavy Ion Research Facility and the High Temperature Materials Laboratory, and he was also instrumental in promoting the proposed Advanced Neutron Source -- which later evolved into the Spallation Neutron Source or SNS that sits atop Chestnut Ridge today.

Not only did Alex influence the direction of ORNL through his scientific and managerial skills, he contributed significantly to the scientific community at large. He served on many U.S. boards and advisory committees and was selected as a fellow of the American Physical Society and the American Association for the Advancement of Science.

Alex rose to the top of his profession before retiring in 1993, and continues his enthusiastic leadership in volunteer organizations. He promotes the appreciation of music for all, and he is still full of creative ideas and abounds with energy.

"Beta 3" gave him a good start on a great career.