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On Tuesday, July 11, 2017, Alan Carr, Senior Historian at the Los Alamos National Laboratory presented a program titled, 75 Years of Creating Tomorrow, A Brief History of the Los Alamos National Laboratory, to a large audience at the Wildcat Den of the Midtown Community Center. He was the invited guest of the Oak Ridge Heritage & Preservation association and provided the monthly program for July that was open to the public. It was good to see such a large crowd for his presentation.

Alan is my counterpart at the Los Alamos National Laboratory. He arranged for me to be included in the Los Alamos National Laboratory's 70th Anniversary Public Lecture Series on February 13, 2013. I presented *Stories from the Secret City*, a multimedia presentation about the history of Oak Ridge that I have been privileged to be asked to provide in such locations as Las Vegas, NV., Los Alamos, NM., Richland, WA., Charleston, SC., as well as the University of Tennessee, Vanderbilt University, Chattanooga, TN., Madison, TN., and multiple locations around the Knoxville and Oak Ridge area.

75 Years of Creating Tomorrow, is a presentation Alan has prepared for similar opportunities to tell the story of the Los Alamos National Laboratory. He began by going back in history to Nazi Germany in 1938. He recalled when fission was first recognized in December 1938, by physicists Otto Hahn and Fritz Strassmann who had continuing experiments of bombarding uranium with neutrons that had earlier included Lise Meitner.

Meitner, being Jewish, had fled Berlin in July 1938, when forced to flee from the Nazis. Taking only two small suitcases, she went to Stockholm and took a position at the Nobel Institute for Physics. Hahn and Strassmann had found what appeared to be isotopes of barium among the decay products when uranium was bombarded with neutrons.

Hahn kept in communication with Lise Meitner through letters and when his letter arrived describing the barium, Meitner and her nephew Otto Frisch made a startling discovery that a uranium nucleus had split in two. Fricsh is the one who first used the term "fission," taking it from the biological term "binary fission" used by biologists to describe cell division.

This amazing leap of understanding was published first in *Nature* magazine by Meitner and Frisch and later published separately by Hahn and Strassmann, without crediting Meitner or Frisch.

Next, Alan introduced the story of how Albert Einstein, at the urging of Leo Szilard, in August 1939, warned President Roosevelt of Germany's interest in uranium ore and the potential to use uranium to create a bomb. This resulted in the formation of the Advisory Committee on Uranium in 1939.

He then proceeded to explain the expansion of World War II, the largest armed conflict in history, from the beginning of the war when the Germans and the Soviets invading Poland in September 1939 to the Japanese attack on Pearl Harbor on December 7, 1941. As Alan explained, this was a true turning point for the United States involvement in World War II.

The fact is that President Roosevelt realized that being drawn into the emerging world war was inevitable, but it was the attack on Pearl Harbor that gave him the support of the nation for doing so. The Advisory Committee on Uranium evolved into the Manhattan Project during 1942.

By September, 1942, General Groves was put in charge and selected first Oak Ridge and then Los Alamos (November 1942) and Hanford (January 16, 1943). Robert Oppenheimer is said to have spent the first three months of 1943 traveling the country selecting the very best scientists he could and convincing them to join him at Project "Y" in Los Alamos.

In April 1943, the first technical conference was held in Los Alamos. Oppenheimer had succeeded in convincing General Groves, who was most reluctant to allow it, to allow discussion between the scientist

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in Los Alamos. But that was the limit of it, they were not to venture outside the Project "Y" site with their discussions.

Alan noted that two types of atomic bombs were completed in approximately 28 months. All the efforts at Los Alamos and the supporting sites resulted in the first nuclear test on July 16, 1945, in the New Mexico desert.

Visiting the Trinity Site is an amazing experience. I was fortunate enough to be able to spend approximately four hours there with only the head of the White Sands Missile Range Public Relations Office and myself. We toured the site and the McDonald ranch house where the "Gadget" was assembled. Here is a link to photographs taken on that visit: https://photos.app.goo.gl/Vh0UCKUKFb86RLvd2

Alan pointed out that the Trinity test achieved a yield equivalent to 21,000 tons of TNT.

In addition to creating the world's first atomic bombs, the Laboratory at Los Alamos provided technical support in assessing the German nuclear weapons program. Two key individuals investigating the German nuclear program was William "Deak" Parsons and future Nobel Laureate Louis Alvarez.

Parsons was also the weaponeer on the Enola Gay and armed Little Boy in flight before the bomb being dropped on Hiroshima. He went on to participate in Operation Crossroads, in 1946, when the first atomic test of the Cold War was conducted in the South Pacific.

Alvarez estimated the minimum requirements for a German equivalent to Project "Y." Alan indicated that while fear remained that Germany might be working on an atomic bomb, there was no evidence seen at the time of an advanced nuclear program by the Germans.

Then he moved to the end of World War II and described the dropping of the Little Boy bomb on Hiroshima which was the equivalent to 15,000 tons of TNT. He noted that 64,000 had died by mid-November 1945.

Next, Russia declared war on Japan on August 8, 1945, and the Fat Man bomb was dropped on Nagasaki on August 9, 1945, with an equivalent of 21,000 tons of TNT. 39,214 had died by mid-November 1945. An armistice was declared on August 14, 1945.

Los Alamos received the Army-Navy "E" Award for excellence in wartime production on October 16, 1945. Of course, Oak Ridge facilities received that same award. Each individual who worked on the Atomic Bomb also received a lapel pin known as an "A" pin. I wish we still had at least one of the original "E" flags given to the Oak Ridge sites!

Norris Bradbury was the subject of Alan's next major point. Bradbury was Oppenheimer's successor. "He created a future for the Lab."

Here are the three goals Bradbury established for the Laboratory:

- 1) We will set up the most nearly ideal project we can.
- 2) We will not discontinue weapon research until it is clearly indicated that this can be done.
- 3) We will decrease the project in size so that it can be accommodated on the mesa on a civilian basis.

Bradbury served as the Director of Los Alamos National Laboratory from 1945 to 1970. He rebuilt the Laboratory physically and intellectually.

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Bradbury's leadership lead to a "Golden Age" of nuclear research and development. From 1945 to 1967, the nation's stockpile of nuclear grew from two to 31,255. More than 500 nuclear tests were conducted during that same time period.

The first nuclear test was conducted on October 31, 1952. The first tactical nuclear weapon was tested in May 1953. CASTLE-Bravo, the nation's largest test, achieved a yield equal to 15,000,000 tons of TNT.

In the late 1950's, the Laboratory began to diversify its mission. This is when the true nuclear science aspects of the laboratory came to the forefront. Nuclear powered rockets for space exploration, nuclear verification and thermonuclear fusion research as well controlled nuclear explosions for industrial applications are examples of the fields of research pursued.

The Cold War turned hot when on May 1, 1960, a US spy plane wa shot down over the Soviet Union. Next, in April 1961 the Bay of Pigs Invasion of Cuba failed. The Berlin Wall began to be constructed in August 1961.

A nuclear testing moratorium had been put in place, however, the Soviets ended it on September 1, 1961. They conducted 57 tests in 65 days! Then on September 15, 1961, the United States resumed testing. The Soviets tested the Tsar Bomba on October 30, 1961, resulting in the world's most powerful nuclear explosion at 50 megatons.

The Cuban Missile Crisis unfolded one year later. This may well be the closest the world ever came to a nuclear war during the Cold War.

During the 1970's Los Alamos National Laboratory doubled in size, growing from 4,000 to 8,000 employees. Harold Agnew became the director and a multi-disciplinary laboratory was born. Expansion into fields such as alternative energy sources and training of International Atomic Energy Agency inspectors was begun and thousands have now been trained.

In the 1980's and 1990's saw big, diverse project at the Laboratory. The Strategic Defense Initiative, two of the world's most powerful lasers, studies of the human genome, armor-piercing munitions and environmental restoration were among the scientific areas pursued. Nuclear testing was coming to an end.

The last United States nuclear test was conducted in September 1992. Since then world class science is used to assess the state of the US nuclear weapons. The results are reported to the President annually.

For the past 20 years the Stockpile Stewardship Program led by Los Alamos National Laboratory has ensured the safety and reliability of US nuclear weapons without full-scale testing. The new Trinity supercomputer will be 40 times faster than the historic Roadrunner machine (an early supercomputer).

Los Alamos National Laboratory scientists are exploring Mars while developing the next generation Curiosity Rover. Testing new drugs and nanotechnology are areas also being pursued at the Laboratory.

Alan closed with a quote from Norris Bradbury, "In contrast with almost every other field of human endeavor...the atomic bomb business seeks to put itself out of business. Our one object at Los Alamos has always been that bombs never get used; that the United states was always ahead both in technology and a willingness to discuss the abandonment of nuclear warfare."

Finally Alan left us with 32 significant scientific advances he labeled "A Tradition of Innovation" to demonstrate the wide range of endeavors where the Los Alamos National Laboratory excels.

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Thanks, Alan for bringing us a really informative presentation on the history of Los Alamos National Laboratory.



Alan Carr was excited to be able to have his photograph made with our local celebrity and hero, Ed Westcott, the famous Manhattan Project and DOE photographer

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