

## Today's Presentation

**Program:** Secret City

**Speaker:** Charles S. Shoup

**Introduced by:** Jeff Rasley **Attendance:**

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**Guests:** Sara Shoup, Bloor Reddens, Tom Hall, Clint Pletcher, Dave Humes, Prakesh N Jushi, Dan Green

**Scribe:** Joe Jones

**Editor:** William Elliott

This presentation was one of the best of the year. Your scribe will do his best but you had to be here.

In 1938-39, German scientists were making rapid progress in the study of nuclear fission. Enrico Fermi won the Nobel Prize in 1938, went to Oslo for the presentation, and he and his wife, Laura, never returned to Italy but continued his work in the US. In 1939, Einstein signed a letter to Pres. Roosevelt, telling him that the USA should study nuclear fission before Germany did it first.

Roosevelt approved research on uranium, particularly at 3 major universities. Several key issues had to be resolved at once, including:

- 1) Can a nuclear fission chain reaction be initiated, continued and controlled?
- 2) Can fissionable U-235 be separated from the other uranium isotope, U-238?
- 3) Can U-238 be converted to fissionable plutonium 239 by absorption of slow neutrons in a graphite reactor?

By September, 1942, enough had been learned to justify opening enormous facilities which would solve the remaining scientific problems and, very quickly and very secretly, develop production processes and equipment. Col. Leslie Groves, a very forceful man who was known for getting things done despite obstacles and bureaucracy, was appointed head of the project. The major scientific issues yet to be resolved were: demonstration of control of chain reactions; separation of large amounts of U-235; production of large amounts of Pu-239; and design and construction of atomic bombs.

K-25 Gaseous Diffusion

Oak Ridge, TN

The site for the facility had to be very large and provide abundant inexpensive electric power, abundant water, hilly terrain to isolate accidental blasts, and isolation from large populations but provide available labor. Ninety-three square miles of northeast Tennessee were chosen. All the land in the plot was purchased and the population was moved away in two months.

Pres. Roosevelt arranged with Congress to conceal the enormous expenses of the project by clever bookkeeping.

In December, 1942, the research group working under the stadium at the Univ. of Chicago successfully initiated a chain reaction, and stopped it by inserting cadmium rods in the pile. Thus, the success of the project became far more likely.

Reactor B  
Hanford, WA

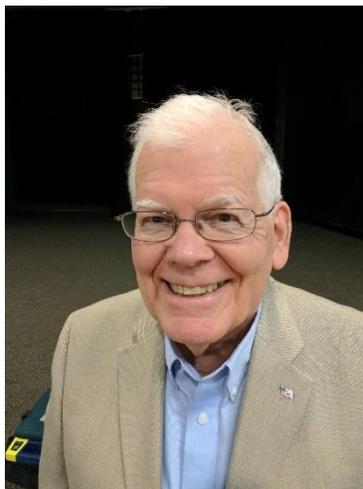
It was decided that two additional sites would be necessary; Hanford WA and Los Alamos NM were started up. Oak Ridge continued to be the most important, complex, and expensive secret city. It was called by 3 other names as well, for secrecy purposes, but some called it "Dogpatch" for its appearance.

The gates of Oak Ridge were closed in April, 1943, and extreme secrecy was observed even as workers were drafted and recruited from all over the country. Isolation and "need to know" were rigidly used to prevent knowledge from getting out. A hundred or more loaded freight cars a day came into the site, and left empty, and people were baffled, of course. A whole additional power plant was built nearby in complete secrecy (Oak Ridge used more power than NYC) as the TVA could not supply all that was needed.

Separation of U-235 was a huge challenge. Four different processes were considered, and two were pursued simultaneously. Electromagnetic separation required enormous equipment and amounts of power, and used nearly 15,000 tons of silver from Fort Knox for busbars for the calutrons. Gaseous diffusion required thousands of stages, and led to the construction of the largest plant in the world under one roof, all in complete secrecy. The porous barrier for gaseous diffusion was developed successfully in early 1945 and resulted in sufficient quantities of U-235 for Little Boy, the bomb that exploded over Hiroshima on August 6, 1945. The graphite reactor produced the initial quantities of plutonium-239 for Los Alamos and served as the pilot plant for the production piles in Hanford.

Many of the 80,000 employees were bused to work from the hills and hollows (the 6th largest US bus operation) but a great number of habitations, from hutments to 4-bedroom houses, were placed on site. Housing was segregated by color and by the standing and family size of the employees, but mud and dust were common to all neighborhoods as construction was continuous and housing demand always exceeded the supply.

The atomic bomb was built in time to end World War II. The ethics of its use continue to be discussed; however, it has been estimated that ending the war saved 2-4 million American casualties and perhaps 5-10 million Japanese deaths.



Charlie Shoup