

Buildings go up at Y-12

Earlier, we examined the design of the Y-12 Calutrons (named for the **CAL**ifornia **U**niversity **C**yclotron). Ernest O. Lawrence and his staff at The Radiation Laboratory of the University of California at Berkeley continued to make improvements even while the original design that General Groves had insisted be frozen was being built for Y-12. These improvements were such that they could be incorporated in the basic design after the equipment was installed.

Now, we will examine the decision of how large the electromagnetic separation plant was first intended to be, how the shape of the first calutron magnet arrangement came to be known as a “racetrack,” and learn why a very large quantity of silver was used as electrical conductors for the calutrons.

During the first weeks after General Groves was placed in charge of the Manhattan Project, there was extensive and heated debate about the size of the electromagnetic plant or if there was even reason to build it at all. The Lewis Committee, a group primarily made up of Warren K. Lewis and some DuPont engineers, who had hastily reviewed the research being done on all the available options for an atomic bomb, recommended against building a full production plant. They thought it would require possibly 22,000 calutrons to produce enough uranium 235 for a bomb. This turned out to be a huge miscalculation as only 1152 calutrons were eventually built at Y-12.

Of course, Ernest O. Lawrence and James B. Conant were in disagreement with the Lewis Committee recommendations. Lawrence thought the recent improvements being made at the Radiation Laboratory by his staff would enable the calutrons to separate enough uranium 235 for a bomb by July 1944. Conant was convinced that a bomb had to be completed in 1944 or the Germans would beat the United States to this most important weapon.

Conant felt that even a test explosion by the Germans would be psychologically devastating to the war effort. Likewise, he thought a test explosion by the United States would demoralize the enemy. Therefore, he desired the fastest method possible to get the needed uranium 235 for a test explosion. The plutonium path seemed less promising to him. Again, the influence of Lawrence’s strong argument for electromagnetic separation using calutrons may have encouraged this thinking.

After much discussion between Conant and the Lewis Committee, the electromagnetic separation process recommendation remained unchanged. The committee’s recommendation included a small electromagnetic plant capable of producing 100 grams of uranium 235 for testing purposes. They still held that the gaseous diffusion process should be the primary method pursued.

Now here is where we see the strength and savvy of Conant. On the next day he spent a great deal of time with the members of the Lewis Committee healing the wounds he created by his sharp criticism of the committee’s report in the discussions of the previous day. He also was aware that General Groves was drafting a summary and recommendation report for Vannevar Bush to send to President Roosevelt. This report was the key to the future direction of the Manhattan Project.

Later that same day there was a meeting of the Military Policy Committee - the committee Bush had formed when Groves was assigned to lead the Manhattan Project. At this meeting Conant succeeded in changing the section in Groves’s report that addressed the electromagnetic separation plant. Based on Conant’s suggestion Groves made the change from the Lewis Committee’s 100 gram plant to Conant’s 100 grams per day plant – a huge difference!

Again, Conant was the key to Y-12 being retained in the mix and while this step was not a full production plant, it was a beginning that let Lawrence continue the improvements to his calutron design. As we will see, it also was just the first of several changes in the scope of construction at the Y-12 site.

The first building started at Y-12, on February 18, 1943, was Building 9201-1 (Alpha 1). It was one of what would ultimately be nine major buildings intended to house calutrons. 1152 of them would eventually be installed. However, at the time of the first construction, only three buildings were intended to hold the huge 20-foot tall Alpha calutrons. Buildings 9201-1, 9201-2 and 9201-3 or Alpha 1, Alpha 2 and Alpha 3 as they came to be known.

Alpha 1 and Alpha 2 are basically identical with a huge high bay in the middle of the building and low bays on either side. Alpha 3, however, is only half the size as it was built for only one calutron racetrack.

The reason for the name “racetrack” being applied to the calutrons originated because of the oval shape of the first five Alpha calutron assemblies. This design proved problematic as the variations in the magnetic field in the curved portions of the oval made the calutrons located there more difficult to control.

The Beta calutrons which were approximately one-half the size of the Alphas, standing approximately 10 feet tall, were arranged in parallel rows with metal shunts across the ends of the two rows. The design for the second group of Alpha (Alpha II) calutrons was changed to a rectangular arrangement similar to the Beta calutrons. However, the term “racetrack” stuck and was used to describe all the calutron assemblies.

Although construction began on the first three Alpha buildings, in February 1943, Building 9731, was actually the first building completed on the Y-12 site. Being a smaller building at 37,300 square feet with a high bay, only smaller, much like the larger Alpha buildings, it was completed in less than two months. This oldest building at Y-12 was completed in March 1943 and is a candidate for Landmark status on the National Register of Historic Places. A nomination is being completed now to formalize this designation.

The first three Alpha buildings were completed respectively in August, October and November 1943. Installation of the calutron equipment began before the buildings were fully completed. Remember, this was a race with Germany; no opportunity was missed to speed up the process.

Next we will examine the arrangements made to bring 14,700 tons of silver to Y-12. What might seem a most unusual thing to do was merely an expedient to General Groves and Colonel Nichols. They seemingly thought nothing of asking for the loan of this huge amount of the nation's silver and fully expected to get it, as they did.