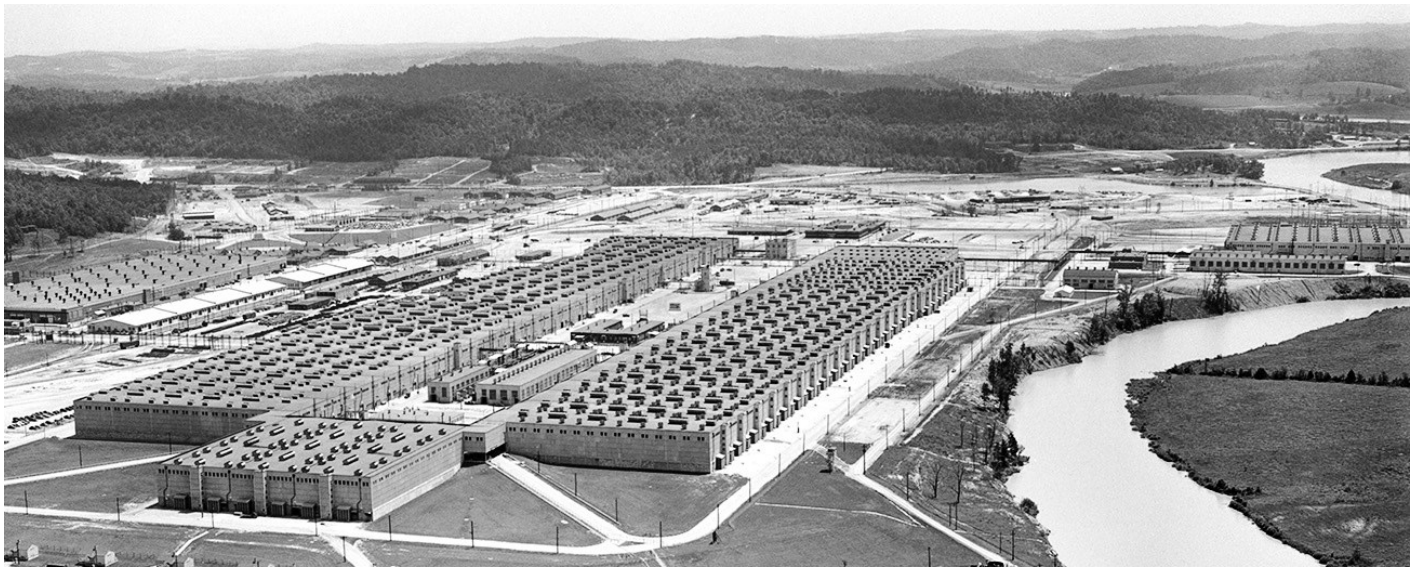
National Park Service

Manhattan Project

National Historical Park
NM, WA, TN

Enriching Uranium



An aerial view of K-25, one of three uranium-enrichment facilities in Oak Ridge, 1945.
US DEPARTMENT OF ENERGY/ED WESCOTT

The three massive Manhattan Project facilities at Oak Ridge—the Y-12 Electromagnetic Isotope Separation Plant, the K-25 Gaseous Diffusion Plant, and the S-50 Liquid Thermal Diffusion Plant—operated for one purpose: to enrich uranium for use in an atomic bomb. These three facilities separated the rare uranium-235 isotope from the more common uranium-238 isotope, each using a different mass separation method.

Though the three facilities began construction and went into operation at different points during World War II, they were designed to operate simultaneously, with uranium hexaflouride and uranium tetrachloride passing from S-50 to K-25 and

finally Y-12, each stage raising the concentration of U-235. Y-12 began operating in the fall of 1943, using calutrons to separate the uranium isotopes. S-50 went online in late fall of 1944.

By the spring of 1945, sections of the K-25 plant began using the more efficient gaseous diffusion method. When all plants were in operation, the uranium would be slightly enriched at S-50 (up to .9% U-235), enriched more at K-25 (1.1%, 7%, or 23% as more of the facility came online), and final enrichment at Y-12 (up to 90% U-235). The enriched uranium was transported to Los Alamos and used as fuel for Little Boy, the atomic bomb dropped on Hiroshima, Japan, August 6, 1945. Learn more about the uranium enrichment process at Oak Ridge below.

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Manhattan Project Science at Oak Ridge

(https://www.nps.gov/articles/000/manhattan-project-science-at-oak-ridge.htm)

Type: Article

(https://www.nps.gov/articles/000/manhattan-project-science-at-oak-ridge.htm)
The creation of Oak Ridge, Tennessee, called Kingston Demolition Range and Clinton Engineer Works during the Manhattan Project, centered around one main goal- the development of enriched uranium for atomic weapons. The three facilities that achieved this goal, the Y-12 Electromagnetic Isotope Separation Plant, the K-25 Gaseous Diffusion Plant, and the S-50 Liquid Thermal Diffusion Plant, did so in markedly different ways.

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Beta 3 at Y-12

(https://www.nps.gov/places/000/beta-3-at-y-12.htm)

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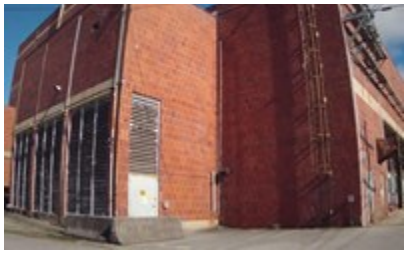

Beta-3 at Y-12 is where the well-known Calutron Girls worked. This building is within the highly secured Y-12 National Security Complex on US Department of Energy property and cannot be accessed by members of the public.

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K-25 Gaseous Diffusion Plant

(https://www.nps.gov/places/000/k-25-gaseous-diffusion-plant.htm)

Type: Place

(https://www.nps.gov/places/000/k-25-gaseous-diffusion-plant.htm)
The K-25 Gaseous Diffusion Plant was the largest building in the world during the Manhattan Project, longer than two Empire State Buildings laid side by side. The plant used the gaseous diffusion method, one of three methods the Manhattan Project used to produce enriched uranium. K-25 no longer exists. Visitors to the K-25 History Center are able to view the location where it once stood.

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S-50 Liquid Thermal Diffusion Plant

(https://www.nps.gov/places/s-50-liquid-thermal-diffusion-plant.htm)

Type: Place

(https://www.nps.gov/places/s-50-liquid-thermal-diffusion-plant.htm)
Built along the banks of the Clinch River in July, 1944, the S-50 Liquid Thermal Diffusion Plant was designed primarily to be the little sibling of K-25. Uranium would be slightly enriched at S-50 before being enriched further at K-25 and then receive its final enrichment at Y-12. Today, nothing remains of S-50 and the original site is difficult to access.

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Y-12 National Security Complex

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(https://www.nps.gov/places/000/y-12-national-security-complex.htm)

At Oak Ridge, Tennessee, Manhattan Project administrators developed three facilities to separate and enrich uranium as fuel for an atomic bomb. The Y-12 electromagnetic isotope separation plant, now named the Y-12 National Security Complex, was the first facility in Oak Ridge constructed solely for this purpose. This building is within the highly secured Y-12 National Security Complex on US Department of Energy property and cannot be accessed by members of the public.

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Y-12 Pilot Plant (Building 9731)

(https://www.nps.gov/places/000/y-12-pilot-plat.htm)

Type: Place

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The Y-12 Pilot Plant (Building 9731) housed the prototype equipment for the Calutron racetracks. Building 9731 was the pilot building where operations workers and cubicle operators trained to perform uranium separation. This building is within the highly secured Y-12 National Security Complex on US Department of Energy property and cannot be accessed by members of the public.

MANHATTAN PROJECT NATIONAL HISTORICAL PARK

The Calutron Girls

(https://www.nps.gov/articles/000/the-calutron-girls.htm)

Type: Article

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The Calutron Girls operated the arrays, or racetracks, at the Y-12 Electromagnetic Isotope Separation Plant in Oak Ridge during the Manhattan Project. These young women, many of whom were just out of high school, did not know that their work involved separating uranium for use in an atomic bomb.

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Was this page helpful?

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