

## The Manhattan Engineer District in Operation

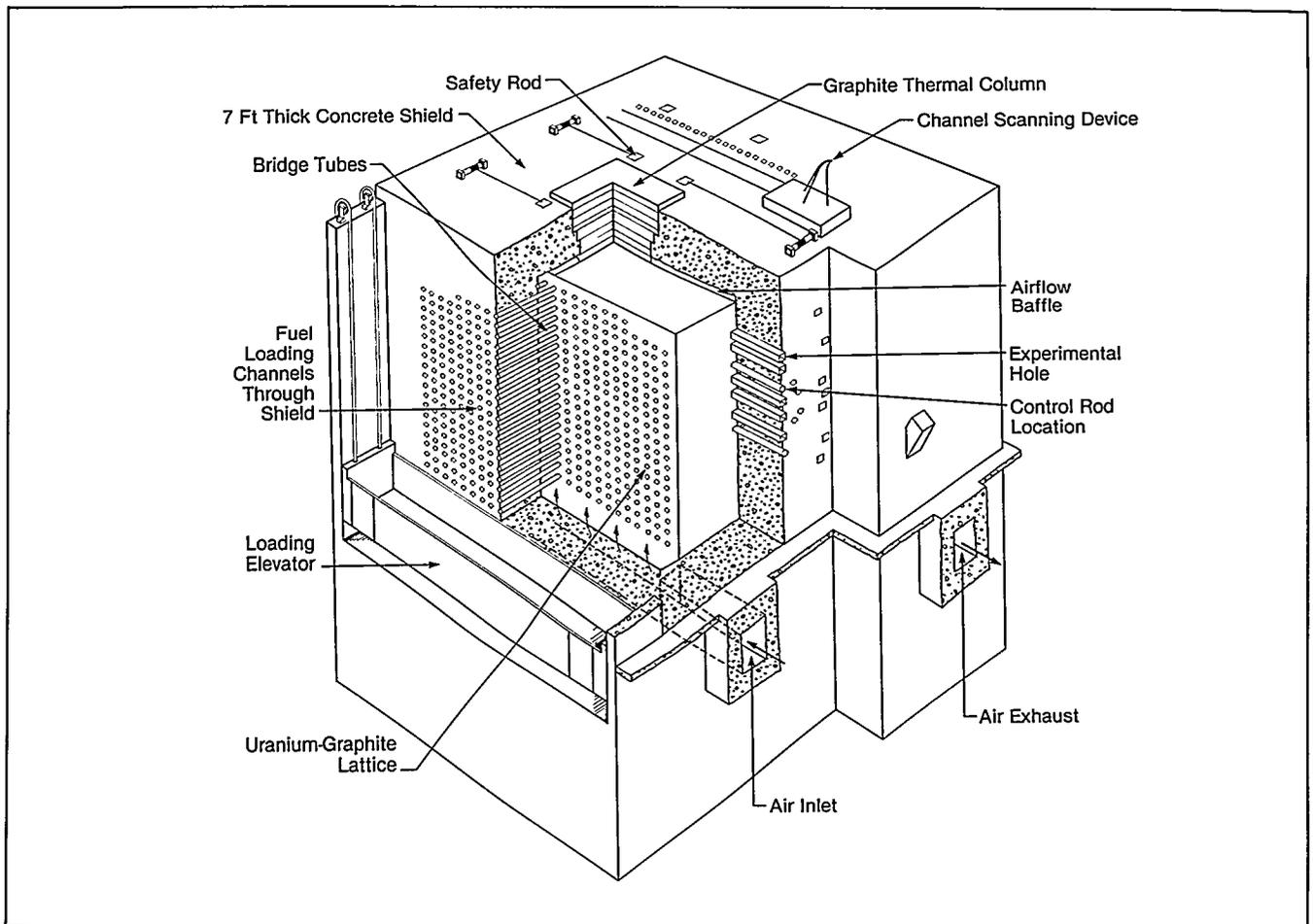
the corrosiveness of lanthanum fluoride and on Seaborg's guarantee that he could extract at least fifty percent of the plutonium using bismuth phosphate. DuPont began constructing the chemical separation pilot plant at Oak Ridge, while Seaborg continued refining the bismuth phosphate method.

It was now Cooper's job to design the pile as well as the plutonium extraction facilities at Clinton, both complicated engineering tasks made even more difficult by high levels of radiation produced by the process. Not only did Cooper have to oversee the design and fabrication of parts for yet another new Manhattan Project technology, he had to do so with an eye toward planning the Hanford facility. Safety was a major consideration because of the hazards of working with plutonium, which was highly radioactive. Uranium, a much less active element than plutonium, posed far fewer safety problems.

In July 1942 Compton set up a health division at the Met Lab and put Robert S. Stone in charge. Stone established emission standards and conducted experiments on radiation hazards, providing valuable planning information for the Oak Ridge and Hanford facilities.

### Construction at Oak Ridge

DuPont broke ground for the X-10 complex at Oak Ridge in February 1943. The site would include an air-cooled experimental pile, a pilot chemical separation plant, and support facilities. Cooper produced blueprints for the chemical separation plants in time for construction to begin in March. A series of huge underground concrete cells, the first of which sat under the pile, extended to one story above ground. Aluminum cans containing uranium slugs would drop into the first cell of the chemical



Air-Cooled Pile Built in X-10 Area at Clinton. Reprinted from Richard G. Hewlett and Oscar E. Anderson, Jr., *The New World, 1939-1946*, Volume I of *A History of the United States Atomic Energy Commission* (University Park: Pennsylvania State University Press, 1962).