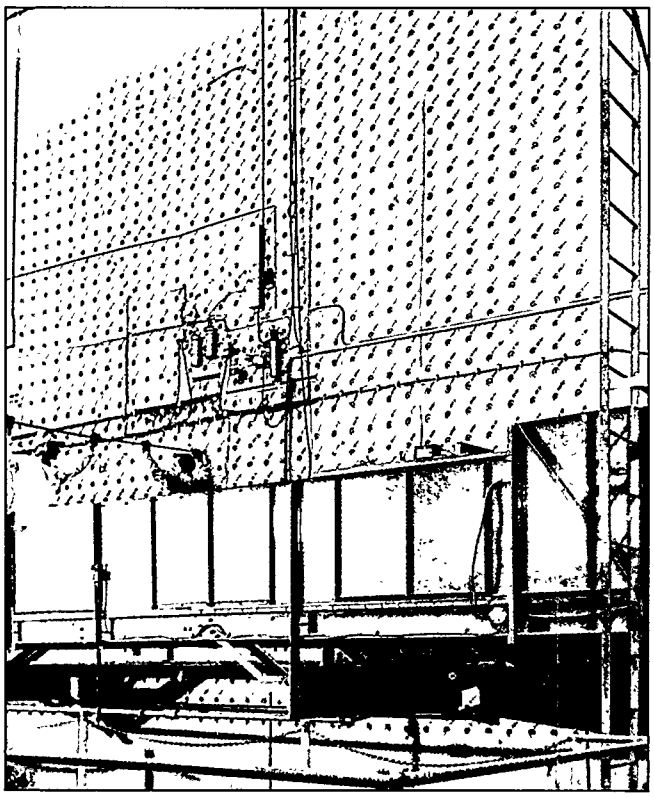
separation facility and dissolve and then go through the extraction process. The pile building went up during the spring and summer, a huge concrete shell seven feet thick with hundreds of holes for uranium slug placement. Slugs were to plutonium piles what barrier was to gaseous diffusion; that is, an obstacle that could shut down the entire process. The Aluminum Company of American (Alcoa) was the only firm left working on a process to enclose uranium-235 in aluminum sheaths, and it was still having problems. Initial production provided mixed results, with many cans failing vacuum tests because of faulty welds.



Workers Loading Uranium Slug Into Face of Air-Cooled Pile. 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).

X-10 in Operation: Fall 1943

The moment everyone had been waiting for came in late October when DuPont completed construction and tests of the X-10 pile at Clinton Engineer Works. After thousands of slugs were loaded, the pile went critical in the early morning of November 4 and produced plutonium by the end of the month. Criticality was achieved with only half of the channels filled with uranium. During the next several months, Compton gradually raised the power level of the pile and increased its plutonium yield. Chemical separation techniques using the bismuth phosphate process were so successful that Los Alamos received plutonium samples beginning in the spring. Fission studies of these samples at Los Alamos during summer 1944 heavily influenced bomb design.

Hanford Takes Shape

Colonel Matthias returned to the Hanford area to set up a temporary office on February 22, 1943. His orders were to purchase half a million acres in and around the Hanford-Pasco-White Bluffs area, a sparsely populated region where sheep ranching and farming were the main economic activities. Many of the area's landowners rejected initial offers on their land and took the Army to court seeking more acceptable appraisals. Matthias adopted a strategy of settling out of court to save time, time being a more important commodity than money to the Manhattan Project.

Matthias received his assignment in late March. The three water-cooled piles, designated by the letters B, D, and F, would be built about six miles apart on the south bank of the Columbia River. The four chemical separation plants, built in pairs, would be nearly ten miles south of the piles, while a facility to produce slugs and perform tests would be approximately twenty miles southeast of the separation plants near Richland. Temporary quarters for construction workers would be put up in Hanford, while permanent facilities for other personnel would be located down the road in Richland, safely removed from the production and separation plants.

During summer 1943, Hanford became the Manhattan Project's newest atomic boomtown. Thousands of workers poured into the town, many of them to leave in discontent. Well situated from a logistical point of view, Hanford was a sea of tents and barracks where workers had little to do and nowhere to go. DuPont and the Army coordinated efforts to recruit laborers from all over the country for Hanford, but even with a relative labor surplus in the Pacific Northwest, shortages plagued the project. Conditions improved significantly during the second half of the year, with the addition of recreational facilities, higher pay, and better overall services for Hanford's population, which reached 50,000 by summer 1944. Hanford still resembled the frontier and mining towns once common in the