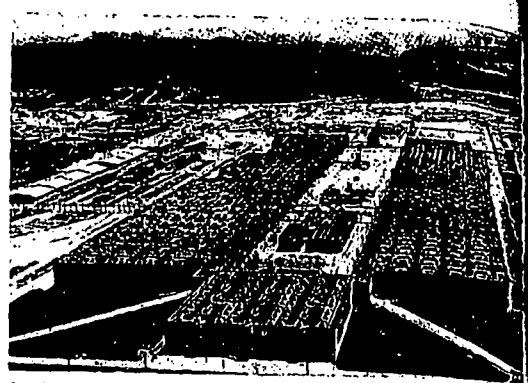
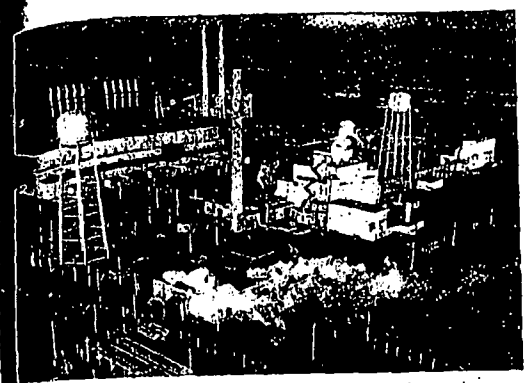
ATOMIC ENERGY



1 Gaseous diffusion plant at Oak Ridge, Tenn., extracts the fissionable U235 from natural uranium, and discards the far more plentiful nonfissionable U238



2 One of the main production areas in the Hanford Plutonium factory. Its process converts the plentiful U238 into the fissionable element known as plutonium

Is America moving ahead on atomic energy? Facts are hard to come by. Production rates, costs and resources are all 'top secret'—even the nature of problems ahead and technical reasons for policy decisions are, too. In this situation, our Washington Bureau reexamines the whole atomic-energy program. We think we have as clear a picture as is available to an outsider

POWER Reports—Where America Stands in 1948

By ROBERT COLBORN
POWER'S Washington Bureau
Photos, courtesy Atomic Energy Commission

▶ NUMBER ONE JOB of the Atomic Energy Commission is to keep the war-built plants running, to maintain the bomb production achieved by the Manhattan District. On this there has been no faltering, no interruption of production.

At Oak Ridge, efficiency in the separation of fissionable uranium has been greatly stepped up. At Hanford, production of plutonium has been maintained in the face of great obstacles.

Equally important with operation of existing plants, for the long haul, is the job of advancing the atomic art.

In military terms, this means: Does the U. S. wait for the rest of the world to catch up with its wartime achievements, or does it push ahead with the development of more and better weapons?

In technical terms: Are Americans learning more about what goes on in the atomic nucleus, about how to control atomic reactions; are the theoretical possibilities being reduced to engineering practice?

The Limping Start. At this level, no such unqualified endorsement can yet be given to the government's program.

Six months or so ago it would have been necessary to report that the forward-thrusting phase of atom work was in a state of near stagnation. Preparations for a new and bigger plutonium plant were enmeshed in engineering and personnel difficulties. Weapons research was at loose ends.

Construction of new types of atomic reactors was being held up by vacillation and indecision in the AEC.

Throughout the atom project morale was low. Many technical people were leaving; many of those who remained were discouraged and uncertain.

But last summer the year-old AEC began to get a grip on its huge job. Things began to improve. Today the situation is still spotty—good here, bad there, but everywhere on the mend.

Now Off Dead Center. The program that AEC has now taken off dead center and is beginning to push along is above all an armament program. The way the world goes now, the commissioners figure that production of bombs takes precedence over everything else.

Atomic power problems in general are being tackled in a conservative, *step-by-step way. The wartime method* of bulling ahead has been dropped.

Not only is AEC's program a military one—it is a rather narrowly military one. Even such projects as atomic propulsion of warships, bombing planes, and missiles are subordinated to production of explosives.

The Atom Plants. The first atomic bomb was completed early in July 1945. It was charged with plutonium and was detonated on the sixteenth at Alamogordo, N. M. Two weeks later a uranium bomb was dropped on Hiroshima, and three days after that another plutonium bomb was dropped on Nagasaki. At that point, the U. S. had exhausted its supply of bombs.

For nearly three years, since then, the atom bomb plants have been running day and night building up a stockpile of bombs. How fast? People who have any information refrain from guessing. But a common view among men who only know what they read in the Smyth Report is that talk of production rates in the hundreds or thousands of bombs is fantastic.

Whatever the rate actually may be it is scheduled to be maintained until late next year or early 1950. At that time, new facilities at Hanford, Washington, will begin to bring in additional production. By 1952, when these facilities are completed, total bomb production should be substantially increased.

The U. S. came out of the war with a bomb *industry* consisting of four major plants: two at Oak Ridge to separate the natural explosive, uranium 235; one at Hanford to produce the synthetic explosive, plutonium; one at Los Alamos to assemble bombs using these explosives.

Oak Ridge Plant. In plant K-25 at Oak Ridge, uranium, combined with fluorine to form a gas, is forced through thousands of stages of porous membranes. The lighter fissionable isotope, U235, goes through the "sieve" a little more easily than the heavier U238. So what comes out at the far end is enriched U235.

K-25 has been by far the most successful of the atom plants. Almost from the start it ran without serious difficulties. Nevertheless, AEC holds that, technically, K-25 is a blind alley. For one thing, K-25 is the most expensive and difficult to build of all the plant types. More important, it is intrinsically wasteful of nuclear fuel. It extracts the naturally fissionable 0.7% from uranium and discards the nonfissionable U238.

The Hanford process, on the other hand, offers the promise of utilizing the plentiful U238 by transmuting it into the artificial, and fissionable, element plutonium.

So there are no plans for additional facilities of the K-25 type. But K-25 itself will be kept running indefinitely—certainly as long as accumulation of bombs has a top priority. And even after that, there'll be uses for concentrated U235. Production of enriched fuel, for instance, for reactors.

What About Hanford? No such postwar increase in output has been achieved at the third explosive plant—the Hanford Engineer Works. As a matter of fact, it is a technical miracle that production has been held up to the wartime level.

The three Hanford units utilize processes that had never occurred on earth until December, 1942.

At Hanford no effort is made at the tough separation of U235 from U238. Instead, the U235 is "burned up" in a chain-reacting pile. In its burning, it transmutes a little of the inert U238 into another element, plutonium, never found in nature.

Plutonium is fissionable. And—very important—it differs chemically from uranium. So then the plutonium can be separated by comparatively straightforward chemical methods.

Each of the Hanford piles is essentially a stories-high block of ultra-pure graphite encased in some feet of concrete shielding. Into this block are inserted slugs of metallic uranium sealed into aluminum cans to protect them from corrosion. A fission chain reaction takes place in the U235 content of the uranium.

After a while, the uranium slugs are removed, dissolved in acid and put through a series of precipitations and resolutions which finally separate out the plutonium—the end product of the process.

The plutonium leaves a problem behind it—in the form of tons and tons of a mixture of working chemicals, water, uranium and fission products. These last possess radioactivity, which takes years to die away and is so intense it breeds contamination to the point where the whole mass must be handled from behind lead or concrete.

At present this deadly mass is simply stockpiled for later extraction of the uranium. But proper storage is tough. For example, leakage could contaminate the water supply of a whole region, but AEC is confident that the measures it takes obviate any danger.

Despite all its difficulties, the plutonium process is the one on which everyone banks for the future. So AEC has started a tremendous expansion program at Hanford as its major move to step up bomb production.

One part of the program is just to modernize the three existing units—particularly, one assumes, in their chemical phases.

New Plutonium Plant Planned. But the really big job is the construction at the Hanford site of a complete plutonium plant. The new plant isn't going to differ fundamentally from the old one. It'll use fairly conventional graphite-moderated piles with natural,