

Part III:

eliminating the pilot plant stage. The S-1 Executive Committee approved these recommendations and agreed that the gaseous diffusion facility was of lower priority than either the pile or the electromagnetic plant but ahead of a second pile. The scientific committee also asked DuPont to look into methods for increasing American supplies of heavy water in case it was needed to serve as a moderator for one of the new piles.

A Brief Scare

Anxious as he was to get moving, Groves decided to make one final quality control check before acting of the decisions of November 12 and 14. This decision seemed imperative after a brief scare surrounding the pile project. While Fermi's calculations provided reasonable assurance against such a possibility, the vision of a chain reaction running wild in heavily-populated Chicago arose when the S-1 Executive Committee found that Compton was building the experimental pile at Stagg Field, a decision he had made without informing either the committee or Groves. In addition, information from British scientists raised serious questions about the feasibility of deriving plutonium from the pile. It took several days for Groves and a committee of scientists including Lawrence and Oppenheimer to satisfy themselves that the pile experiment posed little danger, was justified by sound theory, and would in all probability produce plutonium as predicted.

One Last Look: The Lewis Committee

On November 18, Groves appointed Warren K. Lewis of the Massachusetts Institute of Technology to head a final review committee, comprised of himself and three DuPont representatives. During the next two weeks, the committee traveled from New York to Chicago to Berkeley and back again through Chicago. It endorsed the work on gaseous diffusion at Columbia, though it made some organizational recommendations; in fact, the Lewis committee elevated gaseous diffusion to first priority and expressed reservations about the electromagnetic program despite an impassioned presentation by Lawrence in Berkeley. Upon returning to Chicago, Crawford H. Greenewalt, a member of the Lewis committee, was present at Stagg Field when, at 3:20 p.m. on December 2, 1942, Fermi's massive lattice pile of 400 tons of graphite, six tons of uranium metal, and fifty tons of uranium oxide achieved the first self-sustaining chain reaction, operating initially

at a power level of one-half watt (increased to 200 watts ten days later).²⁵ As Compton reported to Conant, "the Italian navigator has just landed in the new world." To Conant's question, "Were the natives friendly?" Compton answered, "Everyone landed safe and happy."²⁶ Significant as this moment was in the history of physics, it came after the Lewis committee had endorsed moving to the pilot stage and one day after Groves had instructed DuPont to move into design and construction on December 1.²⁷

No Turning Back: Final Decisions and Presidential Approval

The S-1 Executive Committee met to consider the Lewis report on December 9, 1942, just weeks after Allied troops landed in North Africa. Most of the morning session was spent evaluating the controversial recommendation that only a small electromagnetic plant be built. Lewis and his colleagues based their recommendation on the belief that Lawrence could not produce enough uranium-235 to be of military significance. But since the calutron could provide enriched samples quickly, the committee supported the construction of a small electromagnetic plant. Conant disagreed with the Lewis committee's assessment, believing that uranium had more weapon potential than plutonium. And since he knew that gaseous diffusion could not provide any enriched uranium until the gaseous diffusion plant was in full operation, he supported the one method that might, if all went well, produce enough uranium to build a bomb in 1944. During the afternoon, the S-1 Executive Committee went over a draft Groves had prepared for Bush to send to the President. It supported the Lewis committee's report except that it recommended skipping the pilot plant stage for the pile. After Conant and the Lewis committee met on December 10 and reached a compromise on the electromagnetic method, Groves's draft was amended and forwarded to Bush.²⁸

On December 28, 1942, President Roosevelt approved the establishment of what ultimately became a government investment in excess of \$2 billion, \$.5 billion of which was itemized in Bush's report submitted on December 16. The Manhattan Project was authorized to build full-scale gaseous diffusion and plutonium plants and the compromise electromagnetic plant, as well as heavy water production facilities. In his report, Bush reaffirmed his belief that bombs possibly could be produced during the first half of 1945 but cautioned that an earlier