Marshall's deputy, Colonel Kenneth D. Nichols, and arranged for Nichols to work as his chief aide and troubleshooter throughout the war.

Bush, with the help and authority of Secretary of War Henry L. Stimson, set up the Military Policy Committee, including one representative each from the Army, the Navy, and the Office of Scientific Research and Development. Bush hoped that scientists would have better access to decision making in the new structure than they had enjoyed when DSM and S-1 operated as parallel but separate units. With Groves in overall command (Marshall remained as District Engineer, where his cautious nature proved useful in later decision making) and the Military Policy Committee in place (the Top Policy Group retained broad policy authority), Bush felt that early organizational deficiencies had been remedied.[24]

During summer and fall 1942 technical and administrative difficulties were still severe. Each of the four isotope separation processes remained under consideration, but a full-scale commitment to all four posed serious problems even with the project's high priority. When Groves took command in mid-September, he made it clear that by late 1942 decisions would be made as to which process or processes promised to produce a bomb in the shortest amount of time. The exigencies of war, Groves held, required scientists to move from laboratory research to development and production in record time. Though traditional scientific caution might be short-circuited in the process, there was no alternative if a bomb was to be built in time to be used in the current conflict. As everyone involved in the Manhattan Project soon learned, Groves never lost sight of this goal and made all his decisions accordingly.

Isotope Separation Methods: Fall 1942

Groves made good on his timetable when he scheduled a meeting of the Military Policy Committee on November 12 and a meeting of the S-1 Executive Committee on November 14. The scientists at each of the institutions doing isotope separation research knew these meetings would determine the separation method to be used in the bomb project; therefore, the keen competition among the institutions added to the sense of urgency created by the war. Berkeley remained a hotbed of activity as Lawrence and his staff pushed the electromagnetic method into the lead. The S-1 Executive Committee even toyed with the idea of placing all its money on Lawrence but was dissuaded by Conant.

Throughout the summer and fall, Lawrence refined his new 184-inch magnet and huge cyclotron to produce calutrons, as the tanks were called in honor of the University of California, capable of reliable beam resolution and containing improved collectors for trapping the enriched uranium-235. The S-1 Executive Committee visited Berkeley on September 13 and subsequently recommended building both a pilot plant and a large section of a full-scale plant in Tennessee.

The centrifuge being developed by Jesse Beams at the University of Virginia was the big loser in the November meetings. Westinghouse had been unable to overcome problems with its model centrifuge. Parts failed with discouraging regularity due to severe vibrations during trial runs; consequently, a pilot plant and subsequent production stages appeared impractical in the near future. Conant had already concluded that the centrifuge was likely to be dropped when he reported to Bush on October 26. The meetings of November 12 and 14 confirmed his analysis.

Gaseous diffusion held some promise and remained a live option, although the Dunning group at Columbia had not yet produced any uranium-235 by the November meetings. The major problem continued to be the barrier; nickel was the leading candidate for barrier material, but there was serious doubt as to whether a reliable nickel barrier could be ready in sufficient quantity by the end of the war.

While the centrifuge was cancelled and gaseous diffusion received mixed reviews, optimism prevailed among the pile proponents at the Metallurgical Laboratory in Chicago. Shortages of uranium and graphite delayed construction of the Stagg Field pile—CP-1 (Chicago Pile Number One)—but this frustration was tempered by calculations indicating that a completed pile would produce a chain reaction. With Fermi's move to Chicago in April, all pile research was now being conducted at the Metallurgical Laboratory as Compton had planned, and Fermi and his team anticipated a successful experiment by the end of the year. Further optimism stemmed from Seaborg's inventive work with plutonium, particularly his investigations on plutonium's oxidation states that seemed to provide a way to separate plutonium from the irradiated uranium to be produced in the pile. In August Seaborg's team produced a microscopic sample of pure plutonium, a major chemical achievement and one fully justifying further work on the pile. The