

S-1 Uranium Committee

The S-1 Uranium Committee was a Committee of the National Defense Research Committee (NDRC) that succeeded the Briggs Advisory Committee on Uranium and later evolved into the Manhattan Project.



S-1 Committee at the Bohemian Grove, September 13, 1942. From left to right are Harold C. Urey, Ernest O. Lawrence, James B. Conant, Lyman J. Briggs, E. V. Murphree and Arthur Compton

World War II begins

World War II began with the German invasion of Poland on September 1, 1939, prompting Albert Einstein and Leó Szilárd to complete the letter to U.S. President Franklin D. Roosevelt they had been working on over the summer. This Einstein–Szilárd letter was signed by Einstein on August 2, and it was hand-delivered to Roosevelt by the economist Alexander Sachs on October 11, 1939. The letter advised Roosevelt of the existence of the German nuclear energy project and warned that it was likely the Germans were working on an atomic bomb using uranium, and that the U.S. should be concerned about locating sources of uranium and researching nuclear weapon technology. At this time the U.S. policy was neutral in the war.

Experiments with the fission of uranium were already going on at universities and research institutes in the United States. Alfred Lee Loomis was supporting Ernest Lawrence at Berkeley Radiation Laboratory and Enrico Fermi at Columbia. Vannevar Bush was also doing similar research at Washington, DC-based Carnegie Institution. After the April 29, 1940 spring meeting of the American Physical Society, the *New York Times* reported that conferees argued "the probability of some scientist blowing up a sizable portion of the earth with a tiny bit of uranium." The idea that a uranium-235 nuclear fission chain reaction could be used to make a bomb was sweeping the nation.

Briggs Advisory Committee on Uranium

As a result of the letter, Roosevelt asked Lyman James Briggs, director of the National Bureau of Standards, secretly to organize the Briggs Advisory Committee on Uranium. The committee's first meeting was on October 21, 1939, in Washington, D.C.; \$6,000 was budgeted for conducting neutron experiments conducted by Fermi and Szilárd at Columbia.

Four aspects of uranium seem to be critical from the start:

- Finding reliable sources of uranium ore in places where the supply cannot be interfered by other countries.
- Developing mass production methods of extracting uranium-235 from ore and/or creating plutonium.
- Making uranium (fission) chain-reaction bombs
- Generating heat from controlled fission to power machines and for creating isotopes.

The MAUD committee

In England, Otto Frisch and Rudolf Peierls, two researchers at Birmingham University, issued the Frisch–Peierls memorandum in March 1940. The memorandum contradicted the common thinking of the time that many tons of uranium-235 would be needed to make a bomb, requiring delivery by ship. The calculation in the memorandum showed that a bomb might be possible using as little as one pound of uranium-235, and could be quite practical for aircraft to carry.

Frisch and Peierls's professor, Marcus Oliphant, passed the memorandum on to Henry Tizard, chairman of the Committee on the Scientific Survey of Air Defence who requested the MAUD Committee be established secretly. The first meeting was on April 10, 1940 and the committee consisted of Sir George Paget Thomson as chairman and Marcus Oliphant, Patrick Blackett, James Chadwick, Philip Moon, and John Cockcroft as members. Ralph H. Fowler was also asked to send the progress reports to Lyman Briggs.

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The MAUD Committee completed the MAUD report on July 15, 1941, and disbanded. The report had two parts: the first concluding that a uranium-235 bomb would be feasible using 26 pounds of active metal with a yield equivalent to 1800 tons of trinitrotoluene (TNT). The second concludes that the controlled fission of uranium-235 could be a source of heat energy for powering machines and a source of radio-isotopes.

On April 14, 1941, Lyman Briggs received a note from Eugene Wigner, stating:

It may interest you that a colleague of mine who arrived from Berlin via Lisbon a few days ago, brought the following message: a reliable colleague who is working at a technical research laboratory asked him to let us know that a large number of German physicists are working intensively on the problem of the uranium bomb under direction of Heisenberg, that Heisenberg himself tries to delay the work as much as possible, fearing catastrophic results of a success. But he cannot help fulfilling the orders given to him, and if the problem can be solved, it will be solved probably in the near future. So he gave the advice to us to hurry up if U.S.A will not come too late.

In the meantime, in the United States, the NDRC under the leadership of Vannevar Bush was also exploring the possibility of using nuclear power for peaceful energy. A favorable report by Arthur Compton and the National Academy of Sciences was issued May 17, 1941, and after consultation with Roosevelt, Bush created the Office of Scientific Research and Development (OSRD). On July 1, 1941, Bush assumed responsibility for all fission research and the Advisory Committee became the S-1 Project of the NDRC with Lyman Briggs reporting to Bush.

Marcus Oliphant came to the United States from England in August 1941 to find out why Briggs and his committee were apparently ignoring the MAUD Report. Oliphant discovered to his dismay that the reports and other documents sent directly to Briggs had not been shared with the Advisory Committee. Oliphant then met with the Uranium Committee and his colleagues Ernest Lawrence, James Conant and Enrico Fermi to explain the urgency. In these meetings Oliphant spoke of a "bomb" with certainty and explained that Britain did not have the resources to undertake the project so it was up to the United States.

S-1 Project

On December 6, 1941, Vannevar Bush held a meeting to organize an accelerated uranium-235 research project managed by Arthur Compton, with Harold Urey researching gaseous diffusion for uranium enrichment and Ernest Lawrence researching electromagnetic enrichment techniques.

The next day, the Japanese Empire's attack on Pearl Harbor led to the United States entry into the war. Four days later, Germany declared war on the United States. At a meeting on December 18th the S-1 Project was dedicated to development of a uranium bomb.

As a result of the MAUD Report, the British had started a uranium bomb program referred to by the codename Tube Alloys. Perceived slowness on the part of the United States had become a contentious issue between American and British scientists. Upon entry into the war, the U.S. placed increasing importance on working cooperatively with the British program. Roosevelt wrote a note to Winston Churchill that outline increased US–UK cooperation, but was rebuffed by Churchill. Apparently the British felt the U.S. could add little to the effort at that point. This rebuff turned out to be a major blunder as the U.S. effort quickly caught up with the British effort, and the British realized that their pioneering effort would have no value if it were not quickly capitalized. Leadership of the American atomic (uranium) bomb project was transferred to U.S. Army General Leslie Groves in September 1942.

On June 17, 1942, Roosevelt approved a proposal by Bush to dissolve the original S-1 Section and created the S-1 Executive Committee, chaired by James B. Conant, with the membership of Briggs, Compton, Urey, Lawrence, and Edgar Murphee. The program entered into increased cooperation between the OSRD and the U.S. Army.

On August 13, 1942, the Manhattan Project was created by the U.S. Army Corps of Engineers, and on September 17, 1942, command of the district was given to Groves. The S-1 Executive Committee created two more secret sites: "Site X" in Tennessee (Oak Ridge), where uranium-235 isotope separation was carried out at the Y-12, K-25, and S-50 sites, and "Site Y," a secret laboratory at Los Alamos in northern New Mexico (later Los Alamos National Laboratory), where the bomb design was developed.

As the Army role in the project grew larger, the role of the OSRD became more advisory. Eventually, in May 1943, the Army took full control over the OSRD's research and development contracts, and as such the S-1 Executive Committee became essentially inactive though never formally dissolved. Bush, Conant, and other OSRD insiders continued their influence in the Manhattan Project through their participation in the Military Policy Committee.

References

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