## Brief Chronology of the German Program

- 1938
  - Dec. 22 Otto Hahn sends paper to Lise Meitner containing experimental results that are interpreted by Meitner and nephew Otto Frisch as nuclear fission.
- 1939
  - Jan. 6 Hahn and assistant Fritz Strassmann publish their results.
  - Jan. 26 Niels Bohr, informed by Frisch, announces the discovery in Washington, D.C.
  - Feb. 11 Meitner and Frisch publish a theoretical interpretation of the Hahn-Strassmann results as nuclear fission.
  - June-July Heisenberg visits the United States.
  - Aug. 2 Einstein signs letter to President Roosevelt alerting him to the possibility of a bomb and urging government-sponsored research.
  - Sept. 1 Bohr and John Wheeler publish a comprehensive theory of nuclear fission.
  - Sept. 3 War breaks out in Europe.
  - Sept. 16 The German Army Weapons Bureau assembles scientists to begin fission research.
  - Oct. 5 The Weapons Bureau takes control of the Kaiser-Wilhelm Institute for Physics in Berlin-Dahlem.
  - Dec. 6 Heisenberg submits to the Weapons Bureau the first part of a two-part comprehensive report on the prospects and methods for exploiting nuclear fission.
- 1940
  - Feb. 29 Heisenberg submits the second part of his report to the Weapons Bureau.
  - May 3 German troops occupy Norway, seizing the world's only heavy-water production plant at Vemork.

- May 19 Frisch and Rudolf Peierls submit a memorandum to the British government estimating the critical mass of 235 U needed for an atomic bomb and urging a bomb research project.
- June 15 Using the Berkeley cyclotron, Philip Abelson and Edwin McMillan demonstrate that neutrons captured by 238U lead to the creation of elements 93 and 94, neptunium and plutonium.
- July 17 C. F. von Weizsäcker suggests to the Weapons Bureau that neptunium bred in a reactor can be used as the explosive material in a fission bomb.
- 1941
  - Jan. 20 Walther Bothe and Peter Jensen report results on neutron absorption in graphite indicating, mistakenly, that graphite cannot be used as a moderator.
  - Mar. 28 American physicists confirm that plutonium is fissionable, thus usable for a bomb.
  - June 22 Germany invades the Soviet Union. August Fritz Houtermans reports to German authorities the possibility of using plutonium in a bomb.
  - Dec. 5 In the wake of total mobilization Erich Schumann, head of research in the Army Weapons Bureau, orders a review of all research projects.
  - Dec. 6 The Manhattan Project to build the bomb is launched.
  - Dec. 7 Japan attacks Pearl Harbor; America enters the war.
- 1942
  - February The Army Weapons Bureau decides to withdraw almost entirely from fission research and relinquishes the Kaiser-Wilhelm Institute for Physics.
  - Feb. 26 Heisenberg, Hahn, and other scientists deliver a lecture series on nuclear research to the Reich Education Ministry in Berlin, gaining ministry backing for the project under the Reich Research Council.
  - April The first neutron multiplication is obtained in a Leipzig test reactor.

- June 4 Heisenberg reports on fission research to Albert Speer, Germany's Minister for Armaments and War Production, and other senior officials.
  - June 9 Hitler issues a decree, placing the Reich Research Council under Goring and Speer.
  - July 1 Heisenberg becomes acting head of the Kaiser- Wilhelm Institute for Physics, Germany's main reactor research laboratory, and lays plans for the construction of a working reactor containing heavy water and uranium metal plates.
  - July Kurt Diebner, supported by the Weapons Bureau, begins reactor construction using the alternative design of metal cubes suspended in heavy water, achieving positive neutron multiplication over the following year.
  - Nov. 5 Construction of a uranium isotope separation plant begins at Oak Ridge, Tennessee.
  - Dec. 2 Enrico Fermi and collaborators in Chicago achieve the first self-sustained chain reaction in a pile consisting of uranium spheres embedded in graphite bricks.
- 1943
  - January Planning begins for construction of reactors at Hanford, Washington to breed plutonium for a bomb.
  - May 6 Heisenberg, Hahn, and other scientists deliver lectures on fission research before Göring's German Academy of Aerodynamical Research.
  - Autumn Berlin research institutes begin moving to southern Germany for safety against Allied bombing raids. The Kaiser- Wilhelm Institute for Physics is split between Berlin and the neighboring southern towns of Hechingen and Haigerloch.
- 1944
- Jan. 1 Walther Gerlach is appointed "plenipotentiary" of all fission research sponsored by the Reich Research Council.
  - June 6 D-Day invasion of Europe.

- August The Alsos Mission, an American science intelligence unit, arrives Europe.
- November The Alsos Mission determines that no German atom bomb exists.
- 1945
  - January Gerlach orders the remainder of the Heisenberg and Diebner teams to move south.
  - March The Heisenberg team in Haigerloch begins war time Germany's last attempt to achieve a critical reactor.
  - Apr. 23 The Alsos Mission captures scientists and equipment in Hechingen, Haigerloch, and nearby Tailfingen.
  - May 1-3 The Alsos Mission captures Diebner and Gerlach in Munich and Heisenberg in German-held Bavaria.
  - May 7-8 Germany surrenders.
  - July 3 Ten of the captive German scientists are flown from Belgium to England and interned at Farm Hall.
  - July 16 The first atomic bomb, fueled by plutonium, is detonated in the New Mexico desert.
  - July 17 Truman, Stalin, and Attlee meet at Potsdam near Berlin to discuss the future of Germany and the former Axis and Axisoccupied nations.
  - Aug. 6 A uranium fission bomb destroys Hiroshima.
  - Aug. 9 A plutonium fission bomb destroys Nagasaki.
- 1946
  - Jan. 3 The ten captive German scientists are returned to Germany and released under Allied supervision within the British zone of occupation.