

## Development of the Mark II, a brief chronology

- 1929—Ernest Orlando Lawrence** invented the cyclotron that, in development, would contribute to World War II separation (enrichment) of the  $U^{235}$  isotope necessary to Mark II active material; Nobel Prize in Physics, 1939.
- 1931—Harold Clayton Urey** (Thanksgiving Day) discovered the deuterium isotope of hydrogen that would provide the deuterium component of the Mark II active; Nobel Prize in Chemistry, 1934.
- 1932—James Chadwick** discovered the neutron which was essential to achieve artificial nuclear fission in the Mark II uranium deuterium active; Nobel Prize in Physics, 1935.
- 1939—J. Robert Oppenheimer** (5 February) first proposed the uranium deuterium nuclear fission bomb concept subsequently developed as the Mark II.
- 1942—Edward Teller** first proposed use of the  $B^{10}$  isotope to achieve an autocatalytic assembly of the uranium deuterium nuclear fission bomb concept proposed by Oppenheimer.
- 1942—Harold Urey** and associates develop industrial scale processes to produce  $B^{10}$  and deuterium that would provide the  $B^{10}$  and deuterium components of the Mark II active.

**1943—April:**

**Frank Spedding** and his group at the University of Iowa, Ames, devised an industrial scale process to produce natural uranium metal and successfully produced the first uranium hydride compound that would provide the material of the Mark II active;

**Cyril Smith** begins uranium hydride metallurgy at Los Alamos;

**Robert Serber** delivers Los Alamos “Indoctrination Course” lectures, which describe the “boron bubble” concept of autocatalytic bomb assembly that would be developed as the Mark II autocatalytic uranium hydride lateral implosion experimental device.

**4 July: Seth Neddermeyer, with Captain William S. Parsons, USN** present, conducted the first experimental implosion of a cylinder at Los Alamos, which would be developed as the autocatalytic uranium hydride lateral implosion design of the Mark II.

**14-24 August:** British-American Quebec Conference, Quebec City, Canada.

**21 August:** In report to Vice President Wallace, Secretary of War Stimson and Chief of Staff General Marshall the Atomic Bomb Military Policy Committee accurately forecast the fair chance that the first atomic bomb, the (uranium) hydride bomb, would be available in the fall of 1944.

**21-24 August:** at the Quebec Conference, British and Canadian members of the Combined Policy Committee were informed of the fair chance that the first atomic bomb, the (uranium) hydride bomb, would be available in the fall of 1944. Prime Minister Winston Churchill was certainly also at that time informed of the fair chance that the first atomic bomb, the (uranium) hydride bomb, would be available in the fall of 1944.

**15 September:** James Conant requests Rear Admiral William R. Purnell of the Atomic Bomb Military Policy Committee to complete the transfer of 236 pounds (107 kg) enriched uranium hexafluoride from Philip H. Abelson's Naval Research Laboratory liquid thermal diffusion uranium isotope facility to the Manhattan Project, via General Leslie R. Groves, Military Policy Committee executive officer.

**1944—4 July:** James Conant informed General Groves, Atomic Bomb Military Policy Committee, and the Top Policy Committee by the memorandum, "Findings of Trip to L. A. [Los Alamos] July 4, 1944," that the Mark II was certain enough to be used by the Joint Chiefs of Staff for the purposes of operational planning, but the Mark II would necessarily be proof fired once before the design could be ready for use against the enemy.

**10 July:** at 11:00 A.M., General Groves' office log reports, "Gen. Groves held a telephone conversation with Dr. Oppenheimer at Los Alamos. Gen. Groves to talk to JBC [James Bryant Conant] and RCT [Richard Chace Tolman] re: 3 horsemen's visit."

**12 July:** at 10:45 A.M., the General's office log reports, "Gen. Groves called Dr. Oppenheimer, Santa Fe, N.M. re: visit of 3 horsemen to Y [Los Alamos]. To arrive July 31st and departure [sic] August 3rd. Gen. Groves to send written invitations to all three."

**13 July:** at 12:20 P.M., the General's office log reports, "Gen. Groves called E. O. Lawrence, Knoxville, Tenn. re: plans to be at Y to arrive on July 31st and to depart August 3rd in the [a].m."

**13 July:** at 12:40 P.M., "Gen Groves called Dr. Urey, Wabash, Indiana, to invite him to be present at Y on July 31st to stay until morning of August 3rd."

**17 July:** afternoon at the University of Chicago, Conant in conversation with J. Robert Oppenheimer advocates that a test

of Mark II be conducted as soon as possible which, if successful, would demonstrate the feasibility of nuclear fission weapons. Mark II could be put on the shelf, and work on the more powerful bombs could proceed with less nervousness.

**17 July:** at 10:30 P.M., Port Chicago explosion; Mark II successfully proof fired.

**17 July:** President Franklin D. Roosevelt was en route by train from Hyde Park, New York to San Diego, California. The *Presidential Special* at the time of the Port Chicago explosion was passing through New Mexico in the Santa Fe-Lamy-Los Alamos-Albuquerque area.

President Roosevelt certainly had been aware from 21 August 1943 that the uranium hydride Mark II was in development. In this author's opinion, the President would necessarily have provided the initial military and civilian authorization to conduct a proof detonation of the Mark II in circumstances determined by the Joint Chiefs of Staff and the Atomic Bomb Military Policy Committee best to assess the military potential of the Mark II as well as the military potential of large scale nuclear fission weapons, and that the President took upon his own responsibility the consequences to persons and property that would result inevitably from that proof when the Port Chicago Naval Magazine was named as the location that proof would be conducted.

Materials available in the Franklin D. Roosevelt Presidential Library, Hyde Park, New York, record that President Roosevelt sent a telegraph message from the *Presidential Special* to Generalissimo Josef Stalin after midnight 17 July 1944—the early morning of 18 July. If indeed President Roosevelt did send a telegraph to Generalissimo Stalin the early morning of 18 July that telegram would have passed through Washington, D.C., for retransmission to the USSR. I have not found any other reference to such a telegram from the President to the Generalissimo on that date, nor have I found any reference to a telegram received aboard the *Presidential Special* by which the

President would have been informed that the Mark II had been successfully proof fired the evening of 17 July 1944.

In Germany at the Potsdam Conference on 24 July 1945, following the successful 16 July 1945 Trinity Site test of the Mark IV gadget in New Mexico, President Truman informed Premier Stalin that the U.S. possessed “a new weapon of unusual destructive force.” Many books have been written that ponder Stalin’s stolid response to President Truman’s information about the U.S. atomic bomb. Stalin’s reported response was that he showed no special interest, but he is reported to have told President Truman he was glad to hear it and hoped we would make good use of it against the Japanese.

Did Stalin know prior to 24 July 1945 that the U.S. had successfully proof fired an atomic bomb? The published opinions of those men present at Potsdam 24 July 1945 who were aware of President Truman’s acknowledgment that the U.S. possessed “a new weapon of unusual destructive force” are available in summary at:

<http://www.dannen.com/decision/potsdam.html>

Unknown to everyone at the Potsdam Conference, except probably Premier Stalin, was the 16 March 1945 information analysis provided to NKGB chief Lavrenti Beria by Igor Kurchatov which suggested that the U.S. uranium hydride bomb had been tested prior to 16 March. The NKGB was certainly aware by 16 March 1945 that the U.S. was nearing a nuclear fission bomb capability, and that information soon thereafter would have been made available to Premier Stalin.

**1944—18 July:** nationwide morning radio news reports of the Port Chicago explosion and front page reports were published in all the metropolitan newspapers including the *Chicago Tribune*, the *New York Times*, the *Washington Post*, and the *San Francisco Examiner*. Radio and newspaper reports were available to James Conant and Gen. Groves, both in Chicago Illinois, Harold Urey at Wabash, Indiana, and Ernest Lawrence at

Knoxville, Tennessee. None of the three Nobel Laureates ever apparently mentioned the Port Chicago explosion.

**18 July:** President Roosevelt visited day-long at the San Diego Naval Base prior to departure for Hawaii; the evening of 18 July the President radio-broadcast acceptance of his nomination by the Democratic Party to a fourth presidential term. In that 18 July speech broadcast from the San Diego Naval Base the President did not mention the Port Chicago Naval Magazine disaster, nor did he apparently at any later date.

**20 July:** at 10:35 A.M., the General's office log reports, "Dr. Chadwick called JO'L [Jean O'Leary, General Groves' secretary] re: would like a priority 3 to travel by Flight 6:15 p.m. Friday [28 July] TWA [Trans World Airlines] from Wash. to Y."

**20 July:** at about noon Captain Parsons and Los Alamos scientists Maurice M. Shapiro and Ensign George T. Reynolds arrived at the Mare Island Navy Yard and, with Captain Parsons' brother-in-law Captain Jack S. Crenshaw, proceeded to Port Chicago.

**22 July:** at 3:00 P.M., the General's office log reports, "Gen. Groves talked to Mr. Oppenheimer in Santa Fe. Gen. Groves told O. that Greenewalt [Crawford Greenewalt, Dupont Chemical Co.] wanted him to come to W. [Wilmington, Delaware] and O. said he would arrange it after the visit of the 3 horsemen."

**24 July:** the first Los Alamos analysis of the Port Chicago explosion is completed by Captain Parsons at Los Alamos for transmittal to Atomic Bomb Military Policy Committee member Admiral Purnell, "Port Chicago Disaster: Preliminary Data."

**26 July:** 5:45 P.M., General Groves departed Washington airport for Los Alamos.

**27 July:** completion of Ensign Reynolds' blast damage assessment, "Report on Port Chicago July 20-24. 1944."

**27 July:** morning, General Groves arrived at Los Alamos from Washington.

**28 July:** morning, General Groves departed Los Alamos, returned to Washington and entered a meeting of the Military Policy Committee at 4:45 P.M.

**29 July:** John Burchard's "Damage Survey at Port Chicago, California," transmitted to U.S. Navy Coordinator of Research and Development Rear Admiral Julius A. Furer via National Defense Research Committee Chairman Vannevar Bush; blind copy to Los Alamos reviewed by Oppenheimer.

**29 July:** Nobel Laureate James Chadwick arrived at Los Alamos.

**31 July:** the Port Chicago Naval Magazine War Diary for July 1944 reports, "Among the officers and technicians not assigned to duty in the Twelfth Naval District who visited Port Chicago immediately after the disaster were:

Capt. J. C. Byrnes, Jr., of the Bureau of Ordnance

Capt. Radfor [?] Moses, of the Bureau of Ordnance

Comdr. M.G. Johnson, Bureau of Ordnance

Comdr. J. H. Sides, Bureau of Ordnance

Lt. Comdr. Dexter Bullard, Bureau of Ordnance

Capt. W.S. Parsons, from the Office of Chief of Naval Operations

Col. Crosby Field, of the Joint Army-Navy Ammunition Storage Board

Lt. Col. Ruel Stratton, of the Joint Army-Navy Ammunition Storage Board

Professor John F. Burchard, Chairman DOLOC Committee, Office of Scientific Research and Development

D. Max Beard, of the Naval Ordnance Laboratory, Navy Yard, Washington, D.C.

E. Moss Brown, Naval Ordnance Laboratory, Navy Yard, Washington, D.C.”

**31 July:** Nobel Laureates Ernest and Harold Urey arrived at Los Alamos.

**2 August:** General Groves present at Los Alamos; date of arrival unknown.

**3 August:** morning, General Groves, Nobel Laureates Chadwick, Lawrence and Urey depart Los Alamos.

**3 August:** Oppenheimer letter in response to James Conant’s letter of 27 July, addressed to 1530 F Street, N. W., Washington, D.C.: “We are looking forward to your visit on the seventeenth and will plan to meet you at the Chief at Lamy . . . We have had the first positive indications as far as our main program [the atomic bombs] goes, and although the results have not been checked, they do lend some encouragement. By the time you are out we should know pretty well how sound they are.”

**4 August:** Captain Parsons’ memorandum to Admiral Purnell, “Port Chicago Disaster: Second Preliminary Report.” Enclosures: (A) “Marked copy of layout of U. S. Naval Magazine, Port Chicago, California”; (B) “Notes on Enclosure (A)”; (C) “Copy of Ensign Reynolds, USNR, on Blast Damage”; (D) “Copy of Report of Dr. M. M. Shapiro on Observations on the Effects of the Tidal Wave, Port Chicago Explosion”; (E) “Copy of Report of Ensign Reynolds, USNR, on Seismic Evidence”;



(F) “Prints of Mark Island Navy Yard Photographs Nos. . . . [38 photos in total].”

**17 August:** “Report to Gen. Groves on Visit to Los Alamos on August 17, 1944.” In specific consequence of the 17 July 1944 Port Chicago Naval Magazine explosion, in which the Mark II was proof fired, James Conant informed General Groves by memorandum that the Mark II could be developed for combat use in 3 or 4 months time and the energy yield of the Mark II could be somewhat improved. The Atomic Bomb Military Policy Committee’s 21 August 1943 forecast that the first (uranium) hydride atomic bomb could be produced in the fall of 1944 was fulfilled.

**31 August:** Captain Parsons’ memorandum to Admiral Purnell, “Port Chicago Disaster: Third Preliminary Report.” Enclosures: (A) “Marked copy of Map of U.S. Naval Magazine, Port Chicago C-3075-1, dated 30 June 1944”; (B) “Copy of Map of U.S. Naval Magazine, Port Chicago C-3075-1, dated 30 June, 1944”; (C) “Photograph of print showing distribution of explosive cargo in S.S. E.A. Bryan”; (D) Report of Ensign G. T. Reynolds, USNR, consisting of ‘Analysis of damage due to air blast and earth shock’ ”; (E) “Report of Dr. M. M. Shapiro on Effects of the tidal Wave, with discussion and calculations”; (F) “Key to Plate Numbers”; (G) “Photographs constituting plate numbers . . . [26 photographs in total].”

**16 November:** Captain Parsons’ memorandum to Admiral Purnell, “Port Chicago Disaster: Final Report.” Enclosures: (A) “Discussion of Damage to Marginal Pier and Analysis of Fragment Distribution, by Ensign George T. Reynolds, USNR”; (B) “Analysis of Crater in Bottom near Ship Pier, by Dr. Maurice M. Shapiro”; (C) Prints showing Damage to Marginal Pier.”

**1953**—The uranium hydride bomb was twice experimentally detonated at the Nevada Proving Ground in 1953. Shot Ruth (Hydride I; 31 March) and shot Ray (Hydride II; 11 April) of the Upshot-Knothole series were designed and proof fired under the direction of Edward Teller and Ernest O. Lawrence of

the University of California Radiation Laboratory at Livermore. Ruth and Ray were essentially replications of the uranium hydride Mark II proof fired at the Port Chicago Naval Magazine, 17 July 1944. Review of the reported ionizing radiation consequences of shots Ruth and Ray provides sufficient data to conclude that no person suffered ionizing radiation consequences from the proof detonation of the Mark II at the Port Chicago Naval Magazine.

**1992—28 October:** Public Law 102-562, Title II, 102d Congress, signed by President George Bush, established the Port Chicago Naval Magazine National Memorial; said to have been President Bush's last official act as President of the United States.

**1994—17 July:** Port Chicago Naval Magazine National Memorial dedicated by the National Park Service on the Suisun Bay shoreline of the Concord Naval Weapons Station.

**2002—12 March:** House Resolution 3941 of the 107th Congress, Second Session, the "Port Chicago Naval Magazine National Memorial Study Act," has directed the Secretary of the Interior (Gale Norton) in consultation with the Secretary of the Navy (The Honorable Gordon R. England) to conduct a special resource study to determine the suitability and feasibility of including the Port Chicago Naval Magazine National Memorial as a unit of the National Park System. For current information on the bill, please see Congressman George Miller's "The Port Chicago Explosion" Web page at:

<http://georgemiller.house.gov/ptchicmain.html>

The Port Chicago Naval Magazine National Memorial lies within the Concord Naval Weapons Station, which is presently leased to the United States Army. Should the Port Chicago Naval Magazine National Memorial be established by the Congress as a unit of the National Park System the entire 12,000 acres of the essentially deactivated Concord Naval Weapons Station should be reserved by the Congress for eventual transfer

to the National Park System, to be included in the Port Chicago Naval Magazine National Memorial; 200 acres are presently discussed. The Concord Naval Weapons Station is the last large pristine undeveloped San Francisco Bay shore property and should be so preserved in perpetuity as a unit of the National Park System.