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**NUCLEAR WEAPONS  
CHRONOLOGY**



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## NUCLEAR WEAPONS CHRONOLOGY

- 500 BC Anaxagoras postulated atomic theory
- 1789 Klaproth discovered uranium
- 1800-08 Dalton experimentally established atomic theory of matter
- 1811 Avogadro distinguished between atoms and molecules
- 1895 Roentgen discovered X-rays
- 1896 Becquerel discovered unstable (radioactive) atoms
- 1897 Thomson identified existence of electrons
- 1905 Einstein postulated equivalence of mass and energy ( $E=mc^2$ )
- 1907 McCoy and Ross recognized existence of isotopes, or chemically inseparable elements
- 1911 Rutherford recognized nucleus of atom
- 1919 Rutherford achieved transmutation of one element (nitrogen) to another (oxygen)
- Bohr postulated theory of atom
- 1932 Chadwick and Joliot-Curies identified neutrons
- Urey, Brickwedde, and Murphy discovered heavy hydrogen (deuterium)
- 1934 Fermi produced, by neutron bombardment of uranium, radioactive substances possibly having atomic numbers greater than 92; at University of Rome
- Tritium, isotope of hydrogen, discovered
- 1938 Gamow called conference at George Washington University to discuss thermonuclear problems and theories in detail
- Nier discovered uranium-235 isotope, at University of Minnesota
- Hahn and Strassmann produced uranium fission, at Kaiser Wilhelm Institute

- 1939 Frisch and Meitner confirmed meaning and subsequent theory of nuclear fission
- Article appeared in Naturwissenschaften, by Flugge, on the use of Hahn's discovery to produce an explosive of great power
- Bohr and Wheeler postulated explanation of fission process in uranium
- Article appeared in Discovery, by C. P. Snow, on the possibility of a nuclear weapon
- Article appeared in Nature entitled "Liberation of Neutrons in the Nuclear Explosion of Uranium," by Von Halban and Kowarski
- First successful chain reaction in a pile (but not self-sustaining), by Joliot-Curie; process patented in France. France then began to make plans for developing a nuclear weapon
- Germany's War Office began "uranium research program," under Harteck
- Fermi approached the Chief of Naval Operations saying that since the Axis powers were preparing to exploit nuclear fission, the U. S. should do likewise
- Einstein's letter to President Roosevelt detailed likelihood that Germany would try to develop an atomic bomb that would certainly lead to world conquest
- Presidentially appointed Advisory Committee on Uranium Research recommended that Government give financial assistance to American universities engaged in uranium research
- 1940 Britain's MAUD (Military Application of Uranium Detonation) Committee formed under Thomson. Its report, Statements Relating to the Atomic Bomb, concluded that a nuclear bomb was feasible and would be a decisive weapon
- Second Einstein letter to President Roosevelt warned urgently of the danger from Germany because of its interest in uranium
- First interchange of information on uranium among Britain, Canada, and U. S.
- First American government grant for uranium research
- Advisory Committee on Uranium reconstituted as a subcommittee of the National Defense Research Committee (NDRC)
- Uranium Problem Commission announced by Soviet Academy of Sciences
- 1941 Critical mass determinations begun at Liverpool by Frisch, Peierls, and Pryce

British decide to construct nuclear bomb

Plutonium discovered by McMillan and Seaborg, at University of California, although knowledge of its probable existence known earlier

Calculations based on Bohr-Wheeler theory of fission, showed that plutonium would undergo fission when bombarded by thermal neutrons; by Turner, Bretscher, and others

Special Committee of the National Academy of Sciences (U. S.), under Compton, reported that a bomb using uranium-235 could be made within three or four years

Article by Kapitza in many Soviet newspapers stated "calculations prove that an atom bomb can easily destroy a large city"

Theoretical knowledge in Germany that plutonium could be produced in an atomic pile and that it would have same explosive properties as uranium-235; postulated by Houtermans

Pegram and Urey visit Britain and Tube Alloys (organization for developing bomb) to gather data and status for U. S.

Advisory Committee for Uranium Research, under NDRC, transferred to Office of Scientific Research and Development

1942 Manhattan Project established, under Brigadier General Groves

First successful German pile to obtain a positive neutron production (but not self-sustaining), at Leipzig, under Doepel and Heisenberg; eleven months before the first self-sustaining reactor

Los Alamos Scientific Laboratory established, under Oppenheimer

Oak Ridge (Tennessee) established for uranium-235 separation

Hanford (Richland, Washington) established for plutonium production

Neddermeyer proposed implosion nuclear device; at Los Alamos

First self-sustaining nuclear pile (or reactor), at University of Chicago, under Fermi and associates

Teller began research on "Super" (or thermonuclear) bomb at Los Alamos

Quebec Agreement: interchange of high-level American and British scientists, and collaboration of the bomb project

1943 Slow-neutron project at Cambridge University moved to Montreal, Canada; under the

general direction of the National Research Council of Canada, and the directorship of Halban (replaced shortly afterward by Cockcroft)

German intelligence first reported American work on manufacture of "uranium bomb" using uranium-235

1944 Site selected on the Ottawa River, near Petawawa, Ontario, for the construction of a pilot plant pile using heavy water as the moderator; became a joint British-Canadian American enterprise

Germans researched thermonuclear reactions and conducted experiments using an explosive sphere around a hollow silver sphere containing deuterium

1945 First test of a nuclear device (Trinity), near Alamogordo, N. M., followed by dropping of "Little Boy" on Hiroshima and "Fat Man" on Nagasaki; each was about 20 kt

1946 Atomic Energy Commission (AEC) established, with Lilienthal its first chairman; PL 585, an act of the development and control of atomic energy, enacted by the Senate and House of Representatives (known as the Atomic Energy Act); established framework for present day nuclear weapons program

Sandia Laboratory (Albuquerque) construction began

Able (surface shot) and Baker (underwater shot) tests at Bikini Atoll

Allan Nunn May arrested in England for providing Soviets with samples of uranium isotopes, and information on constructing plutonium piles

Manhattan Project disestablished

1947 Armed Forces Special Weapons Project (AFSWP) established

1949 First detonation of a Soviet nuclear device

471st, 802d, and 1233d Navy Special Weapons Units (NSWUs) established; homebased at Sandia Base, Albuquerque, N. M.

1950 Arrest of Klaus Fuchs in England for providing Soviets with detailed nuclear weapon design information

President Truman directed AEC to develop thermonuclear technology

1951 First on-continent nuclear test since Trinity, at Nevada Test Site

Special Weapons Supply Annex, Naval Supply Center, San Diego, established

Marine Corps acquired nuclear weapons capability

- 1952 First detonation of a thermonuclear device; MIKE event (about 10 mt); at Eniwetok Atoll
- Lawrence Radiation Laboratory (LRL), Livermore, California established
- First detonation of a British nuclear device, at Monte Bello Islands, Australia
- Antecedent to Navy Liaison Officer, Joint Atomic Weapons Publication System, assigned to Sandia Base
- Special Weapons Supply Depots at Norfolk and San Diego established
- 1953 First detonation of a Soviet thermonuclear device
- AEC-DOD Agreement on Development, Production and Standardization of Nuclear Weapons
- Rocky Flats (Denver, Colo.), AEC's plutonium fabrication plant, opened
- Joint Atomic Weapons Publication Board (JAWPB) established
- Special Weapons Units (SWUs) Atlantic and Pacific established from NSWUs
- Naval Air Special Weapons Facility (NASWF), Albuquerque, established
- Special Weapons Division of the Ordnance Supply Office (OSO), Mechanicsburg, Pa., established
- 1954 Atomic Energy Act of 1946 amended to allow certain nuclear weapons data to be provided to foreign countries
- OSO assigned inventory control responsibility for base spares
- 1955 First one-point safety test, at Nevada Test Site
- Naval Ordnance Test Station (NOTS), China Lake, California established Nuclear Weapons Branch at Kirtland AFB, Albuquerque
- First Special Weapons Equipment List published by OSO
- Navy nuclear weapons vulnerability program established
- 1956 Nuclear Weaponsman (NW) rating established by Bureau of Naval Personnel (BUPERS)
- 1957 Unsatisfactory Report (UR) Digest (in SWOP 5-8) first established
- 1958 Nuclear test moratorium became effective

Human reliability committee established by Office of the Secretary of Defense

NOTS Albuquerque group redesignated Naval Nuclear Ordnance Evaluation Unit (NNQEU)

NAD McAlester began distributing SWCPs to Navy-Marine Corps activities

Bureau of Ordnance (BUORD) delegated UR administration to NAD McAlester

1959 AFSWP redesignated Defense Atomic Support Agency (DASA)

First Navy nuclear safety study convened

SWUs redesignated Nuclear Weapons Training Centers (NWTCS)

Navy quality evaluation program on nuclear weapons materiel initiated at Quality Evaluation and Engineering Laboratory (QEEL), NAD Oahu

1960 Two-man rule established

First detonation of a French nuclear device, in the Sahara Desert; about 60-70 kt

Special Weapons Supply Depots redesignated Nuclear Weapons Supply Annexes (NWSAs)

USS GEORGE WASHINGTON, First POLARIS missile submarine on patrol

1961 Project NOUGAT; first underground nuclear test series, at Nevada Test Site

Largest thermonuclear device tested, by Soviets; about 58 mt, fired at about 12,000 ft. altitude

NWSA San Diego transferred to Oakland, California

First joint Navy-AEC stockpile laboratory testing (SLT) of Navy nuclear weapons materiel conducted

1962 U. S. resumed atmospheric testing in the Pacific, after Soviets abrogated test moratorium

First joint UK-US nuclear device tests, at Nevada Test Site

USS ETHAN ALLEN fired POLARIS missile in Pacific, as part of test series

Navy Nuclear Weapons Bulletin (NNWB) superseded UR Digest

NNQEU and NASWF consolidated into Naval Weapons Evaluation Facility, because

- of consolidation of BUORD and BUAER into Bureau of Naval Weapons (BUWEPS)
- NW rating redesignated Gunners Mate Technician (GMT) by BUPERS
- Personnel Reliability Program established by DOD Directive 5210.42
- 1963 Treaty banning nuclear tests in the atmosphere, in outer space, and underwater (U. S. UK, and Soviets were among signatories; Communist China, France, and India were not)
- 1964 First detonation of a Chinese nuclear device, near Lop Nor; about 20 kt
- President Johnson announced cutbacks in production of nuclear material
- Nuclear Weapons Safety (NWS) periodical first published
- 1965 President Johnson announced cutbacks in production of nuclear weapons
- Joint Atomic Weapons Publication System (JAWPS) superseded JAWPB
- First joint Navy-AEC quality assurance service test (QAST) program flight test conducted
- First Navy-Marine Corps nuclear weapons safety symposium held
- 1966 NAVORD and NAVAIR formed from BUWEPS
- Reliability assessment of Navy nuclear weapons based on actual test data first published by QEEL, NAD Oahu
- 1967 First detonation of a Chinese thermonuclear device
- AEC-DOD Stockpile Agreement (on custody, reliability, safety, and security)
- First tri-service nuclear weapons safety symposium
- 1968 Treaty on non-proliferation of nuclear weapons
- Protocol II to the Treaty for the Prohibition of Nuclear Weapons in Latin America (Treaty of Tlatelolco)
- QEEL, NAD Oahu, conducted quality assurance testing of POLARIS reentry body components owned by the UK
- 1969 Sandia Base Atomic Museum first opened to public
- \$45 million fire (contained) at Rocky Flats



- 1970 Blue Ribbon Panel, on DOD organization, recommended disestablishment of DASA
- President Nixon recommended private ownership of facilities for production of fissionable materials
- Announcement of studies to change responsibilities of AEC to (1) transfer nuclear weapons development responsibilities to the DOD, and (2) become a regulatory agency for all energy resources
- Strategic Arms Limitation Talks (SALT) begun, at Helsinki, Finland
- NWTCs redesignated Nuclear Weapons Training Groups (NWTGs)
- 1971 President Nixon recommended certain AEC functions be transferred to several government departments
- Treaty banning nuclear weapons from sea bottom
- DASA renamed Defense Nuclear Agency (DNA); RDT&E functions, except for nuclear weapons effects, assumed by the services
- First POSEIDON missile on patrol
- LRL renamed Lawrence Livermore Laboratory (LLL, or L<sup>3</sup>)
- NNWB and NWS consolidated into the Navy Nuclear Weapons Digest (NNWD)
- Naturally occurring plutonium-244 discovered by Los Alamos Scientific Laboratory
- Chairman JCS given direct responsibility over FBM submarines and SAC missiles and bombers
- 1972 Sandia Base absorbed by Kirtland AFB
- NWTGs (and other services) assumed weapon training responsibilities from DNA
- Navy policy established that SWOP format and content will be tailored to the needs of the Type Command users
- Recommended SWOP Allowance Lists (RALs), listing minimum SWOPs to assure adequate nuclear safety and weapon reliability, appeared in SWOP 0-1B
- Planned Maintenance System implemented within Navy nuclear weapons program (except for depots)
- 1973 NWSAs absorbed into Naval Supply Centers, Norfolk and Oakland

SPCC differentiated between combat and garrison (peacetime) requirements in certain Marine Corps COSALs

Program restructured and streamlined so that (1) technical operations with projectiles and atomic demolition munitions at Marine Corps user unit level not appreciably different from operations with conventional ordnance, and (2) Nuclear Ordnance Platoons no longer expected to provide both direct support (combat) and Theater Depot functions

1974 Generic name of nuclear weapons inspections defined in new SWOP 25-1 as "Nuclear Weapons Technical Inspections." OPNAV established policy that FCDNA-conducted NWTIs may suffice for technical operations portion of NTPIs

"Verification inspections" became mandatory upon change of accountability

President Nixon and Soviet Premier Breshnev agreed to further defensive missile (ABM) limitations. Also agreed (1) that nuclear devices having a yield greater than 150 kt will not be tested underground after 30 March 1975, and (2) to limit number of all other underground tests

Britain announced it considered itself bound by American-Soviet agreement limiting underground nuclear testing

Proposed Energy Reorganization Act calls for dividing AEC into the Energy Research and Development Administration (ERDA) and the Nuclear Safety and Licensing Commission (NSLC)

First detonation of an Indian nuclear device

Standby permissive action link (PAL) capability implemented for Marine Corps ground-delivered nuclear weapons

QEEL, NAD Oahu's reliability assessment functions and personnel transferred to QEEL, NWS Seal Beach. QEELs subsequently redesignated "Weapons Quality Engineering Centers"

NAVORD and NAVSHIPS consolidated into Naval Sea Systems Command (NAVSEA)

AEC disestablished, Energy Research and Development Administration (ERDA) and Nuclear Regulatory Commission (NRC) established in its place.

GMTSN Patricia FITE designated first GMT (female) upon completion of "A" School on 13 December 1974 at NUWPNTTRAGRUPAC.