

Glossary

abnormal environment

Those environments as defined in a weapon's stockpile-to-target sequence and military characteristics in which the weapon is not expected to retain full operational reliability.

alteration

A material change to, or a prescribed inspection of, a nuclear weapon or major assembly that does not alter its operational capability but is sufficiently important to the user (regarding assembly, maintenance, storage or test operations) as to require controlled application and identification

atom

The smallest (or ultimate) particle of an element that still retains the characteristics of that element. Every atom consists of a positively charged central nucleus, which carries nearly all the mass of the atom, surrounded by a number of negatively charged electrons, so that the whole system is electrically neutral.

atomic bomb

A term sometimes applied to a nuclear weapon utilizing fission energy only.

atomic mass

The number of protons plus neutrons in the nucleus of an atom.

atomic number

The number of protons in the nucleus of an atom.

authorization

Legislation that establishes, changes, or continues a federal program or agency. Authorizing legislation is normally a prerequisite for appropriations. For some programs, primarily entitlements, the authorizing legislation itself provides the authority to incur obligations and make payments. Like Appropriations Acts, authorizing legislation must be passed by both Houses of Congress and must be signed by the president to become law.

ballistic missile

Any missile that does not rely upon aerodynamic surfaces to produce lift and consequently follows a ballistic trajectory when thrust is terminated.

blast wave

A sharply defined wave of increased pressure rapidly propagated through

a surrounding medium from a center of detonation or similar disturbance.

budget authority

The authority to incur legally binding obligations of the government.

channel

A joint arrangement between the United States and a foreign government for the exchange of specific project/program-type information.

component

An assembly or any combination of parts, subassemblies, and assemblies mounted together in manufacture, assembly, maintenance, or rebuild.

criticality

A term used in reactor physics to describe the state when the number of neutrons released by fission is exactly balanced by the neutrons being absorbed (by the fuel and poisons) and escaping the reactor core. A reactor is said to be "critical" when it achieves a self-sustaining nuclear chain reaction, as when the reactor is operating.

critical mass

The minimum amount of fissionable material capable of supporting a chain reaction under precisely specified conditions.

cruise missile

Guided missile, the major portion of whose flight path to its target is conducted at approximately constant velocity; a cruise missile depends on the dynamic reaction of air for lift and upon propulsion forces to balance drag.

Defense Acquisition System

The management process that guides all DoD acquisition programs. DoD Directive 5000.1, The Defense Acquisition System, provides the policies and principles that govern the defense acquisition system. DoD Instruction 5000.2, Operation of the Defense Acquisition System, establishes the management framework that implements these policies and principles.

Defense Planning Guidance

A document issued by the secretary of defense that provides firm guidance in the form of goals, priorities, and objectives, including fiscal constraints, for the development of the Program Objective Memorandums by the Military Departments and Defense agencies.

deuterium

An isotope of hydrogen with one proton and one neutron in the nucleus of each atom.

disassembly

The process of taking apart a nuclear warhead and removing one or more subassemblies, or components, or individual parts. Disassembly may be required to support quality assurance inspection, reliability testing, or subassembly / component exchange as a part of scheduled maintenance or refurbishment; it is normally done in a manner that permits reassembly with either the original or replacement subassemblies / components.

dismantlement

The process of taking apart a nuclear warhead and removing all

subassemblies, components, and individual parts for the purpose of physical elimination of the nuclear warhead. Dismantled subassemblies, components and parts, including nuclear materials, may be put into a disposal process, may be used again in another warhead, or may be held in strategic reserve.

dynamic pressure

The air pressure that results from the mass air flow (or wind) behind the shock front of a blast wave.

electromagnetic hardening

Action taken to protect personnel, facilities, and/or equipment by filtering, attenuating, grounding, bonding, and/or shielding against undesirable effects of electromagnetic energy.

electromagnetic pulse

The electromagnetic radiation from a strong electronic pulse, most commonly caused by a nuclear explosion that may couple with electrical or electronic systems to produce damaging current and voltage surges.

electron

A particle of very small mass with a negative charge.

element

Any of the more than 100 known substances (of which 92 occur naturally) that cannot be separated into simpler substances and that singly or in combination constitute all matter

enacted appropriations

Appropriations bills in which a definite

amount of money is set aside to pay incurred or anticipated expenditures.

enhanced nuclear detonation safety

System of safety features engineered into modern nuclear weapons resulting in a one in a billion chance of a weapon detonating in a normal environment and a one in a million chance of a weapon detonating in an abnormal environment.

expenditure

Charges against available funds. Expenditures result from a voucher, claim, or other document approved by competent authority. Expenditures represent the presentation of a check or electronic transfer of funds to the performer of work.

fallout

The precipitation to Earth of radioactive particulate matter from a nuclear cloud; also applied to the particulate matter itself.

fire-resistant pit

The primary in a thermonuclear weapon in which the fissile material is encased in a metal shell with a high melting point and is designed to withstand exposure to a jet fuel fire of 1,200 degrees Celsius for several hours. Fire-resistant pits are only used in weapons with insensitive high explosive.

fireball

The luminous sphere of hot gases that forms a few millionths of a second after detonation of a nuclear weapon or nuclear device and immediately starts expanding and cooling.

fissile

Capable of being split by slow (low-energy) neutrons as well as by fast (high-energy) neutrons.

fission

The process whereby the nucleus of a particular heavy element splits into (generally) two nuclei of lighter elements, with the release of substantial amounts of energy.

flag-level

A term applied to an officer holding the rank of general, lieutenant general, major general, or brigadier general in the U.S. Army, Air Force, or Marine Corps or admiral, vice admiral, or rear admiral in the U.S. Navy or Coast Guard. Also may be used for a government official in the senior executive level (SES) grades.

flash blindness

Impairment of vision resulting from an intense flash of light. It includes temporary or permanent loss of visual functions and may be associated with retinal burns.

fusion

The process whereby the nuclei of light elements, especially those of the isotopes of hydrogen, namely, deuterium and tritium, combine to form the nucleus of a heavier element with the release of substantial amounts of energy and a high energy neutron.

gamma rays

Electromagnetic radiations of high photon energy originating in atomic nuclei and accompanying many nuclear reactions (e.g., fission, radioactivity, and neutron capture).

gun assembly weapon

A device in which two or more pieces of fissionable material, each less than a critical mass, are brought together very rapidly so as to form a supercritical mass that can explode as the result of a rapidly expanding fission chain.

half-life

The time required for the activity of a given radioactive species to decrease to half of its initial value due to radioactive decay.

hydrogen bomb

A term sometimes applied to nuclear weapons in which part of the explosive energy is obtained from nuclear fusion (or thermonuclear) reactions.

igloo

An unofficial but common term to mean a munitions storage bunker, usually protected by several feet (or more) of earth on all sides except for the door, which is normally constructed from large amounts of thick, heavy, metal.

ignition

In theory, the conditions required to heat and compress a fuel of deuterium and tritium to pressures and temperatures that will ignite and burn the fuel to produce an energy gain.

implosion assembly weapon

A device in which a quantity of fissile material, less than a critical mass, has its volume suddenly decreased by compression, so that it becomes supercritical and an explosion can take place.

induced radiation

Radiation produced as a result of exposure to radioactive materials, particularly the capture of neutrons.

initial nuclear radiation

The radiation resulting from a nuclear detonation and emitted from the fireball within one minute after burst. Also called prompt nuclear radiation.

insensitive high explosive

Type of explosives used in the primary of some modern thermonuclear weapons that are remarkably insensitive to shock, high temperatures, and impact when compared to conventional high explosives.

ion

An atom that has gained or lost an electron and thus carries an electrical charge.

ionizing radiation

Electromagnetic radiation (gamma rays or X-rays) or particulate radiation (alpha particles, beta particles, neutrons, etc.) capable of producing ions directly or indirectly in its passage through, or interaction with, matter.

life-cycle

The total phases through which an item passes from the time it is initially developed until the time it is either consumed in use or disposed of as being excess to all known materiel requirements.

limited life component

A weapon component that decays with age and must be replaced periodically.

major assembly

A term for a complete nuclear warhead, usually used in the process of approving or revalidating the design.

markup

The process by which congressional committees and subcommittees debate, amend, and rewrite proposed legislation.

military characteristics

Those required characteristics of a nuclear weapon upon which depend its ability to perform desired military functions. Military characteristics include physical and operational characteristics but not technical design characteristics.

modification

A change in operational capability that results from a design change that affects delivery (employment or utilization), fusing, ballistics, or logistics.

mutual assured destruction

A U.S. doctrine of reciprocal deterrence resting on the United States and the Soviet Union being able to inflict unacceptable damage on the other in retaliation for a nuclear attack.

munition

A complete device charged with explosives, propellants, pyrotechnics, initiating composition, or nuclear, biological, or chemical material for use in military operations, including demolitions. Also called ammunition.

national security

A collective term encompassing both national defense and foreign relations

of the United States. Specifically, the condition provided by: a. a military or defense advantage over any foreign nation or group of nations; b. a favorable foreign relations position; or c. a defense posture capable of successfully resisting hostile or destructive action from within or without, overt or covert.

near-surface burst

A detonation in the air that is low enough for the immediate fireball to touch the ground.

neutron

A neutral particle (i.e., with no electrical charge) of approximately unit mass, present in all atomic nuclei, except those of ordinary (light) hydrogen.

nonproliferation

Those actions (e.g., diplomacy, arms control, multilateral agreements, threat reduction assistance, and export controls) taken to prevent the proliferation of weapons of mass destruction by dissuading or impeding access to, or distribution of, sensitive technologies, material, and expertise.

normal environment

The expected logistical and operational environments as defined in a weapon's stockpile-to-target sequence and military characteristics in which the weapon is required to survive without degradation in operational reliability or safety performance.

nuclear command and control

The exercise of authority and direction by the president, as commander in chief through established command

lines over nuclear weapon operations of military forces, as chief executive over all government activities that support those operations, and as head of state over required multinational actions that support those operations.

nuclear command, control, and communications system

The collection of activities, processes, and procedures performed by appropriate commanders and support personnel who, through the chain of command, allow for senior-level decisions on nuclear weapons employment to be made based on relevant information and subsequently allow for those decisions to be communicated to forces for execution.

nuclear command and control system

The facilities, equipment, communications, procedures, and personnel that enable presidential nuclear direction to be carried out.

Nuclear Posture Review

A legislatively mandated review that establishes U.S. nuclear policy, strategy, capabilities, and force posture for five to ten years into the future.

nuclear radiation

Particulate and electromagnetic radiation emitted from atomic nuclei in various nuclear processes. The important nuclear radiations, from the nuclear weapon standpoint, are alpha and beta particles, gamma rays, and neutrons.

nuclear threat device

An improvised nuclear or radiological

device, a foreign nuclear weapon of proliferation concern, or any nuclear device that may have fallen outside of a foreign nuclear weapon state's custody.

nuclear weapon

A complete major assembly (i.e., implosion, gun, or thermonuclear), in its intended ultimate configuration, or in a disassembled configuration for a temporary period of time, which, upon completion of the prescribed arming, fusing, and firing sequence, is capable of producing the intended nuclear reaction and release of energy.

nuclear weapon surety

Procedures and actions contributing to the physical security of nuclear weapons, and to the assurance that there will be no nuclear weapon accidents, incidents, or unauthorized weapon detonations, nor any degradation of weapon performance over target.

nuclear yields

The energy released in the detonation of a nuclear weapon, measured in terms of the kilotons or megatons of trinitrotoluene required to produce the same energy release.

Yields are categorized as follows:

- very low: less than 1 kiloton;
- low: 1 kiloton to 10 kilotons;
- medium: over 10 kilotons to 50 kilotons;
- high: over 50 kilotons to 500 kilotons; and
- very high: over 500 kilotons.

nucleus

The small, central, positively charged region of an atom, which carries essentially all the mass. Except for the nucleus of ordinary (light) hydrogen, which is a single proton, all atomic nuclei contain both protons and neutrons.

one-point safety

The probability of achieving a nuclear yield greater than 4 pounds TNT equivalent in the event of a one-point initiation of the weapon's high explosive must not exceed one in a million.

outlays

The liquidation of the government's obligations, generally representing cash payments.

peak overpressure

The maximum value of overpressure at a given location that is generally experienced at the instant the shock (or blast) wave reaches that location.

photon

A unit of electromagnetic radiation consisting of pure energy and zero mass.

project officers groups

Joint Department of Defense–Department of Energy groups associated with each warhead-type, created at the beginning of a weapon development program and charged with the responsibility to coordinate the development and assure the compatibility of a warhead-type with its designated delivery system(s).

prompt radiation

The gamma rays produced in fission and

as a result of other neutron reactions and nuclear excitation of the weapon materials appearing within a second or less after a nuclear explosion. The radiations from these sources are known either as prompt or instantaneous gamma rays.

proton

A particle of mass (approximately) unit carrying a unit positive charge; it is identical physically with the nucleus of the ordinary (light) hydrogen atom. All atomic nuclei contain protons.

Quadrennial Defense Review

A legislatively mandated review of Department of Defense strategy and priorities.

quality assurance and reliability testing

A quality assurance program that is part of a joint Department of Defense–Department of Energy stockpile evaluation program.

quality assurance and reliability testing replacement warheads

Warheads retained in the inactive stockpile to replace active stockpile warheads withdrawn for the Quality Assurance and Reliability Testing program.

radioactivity

The spontaneous emission of radiation, generally alpha or beta particles, often accompanied by gamma rays, from the nuclei of unstable isotopes.

refurbishment

All nuclear weapons alterations and modifications including life extensions, modernizations, and revised military requirements.

reliability

The probability, without regard to countermeasures, that a nuclear weapon, subassembly, component, or other part will perform in accordance with its design intent or requirements.

reliability replacement warheads

Warheads retained in the inactive stockpile that provide the assets to replace Active Stockpile Warheads should reliability or safety problems develop.

residual radiation

Nuclear radiation caused by fallout, artificial dispersion of radioactive material, or irradiation that results from a nuclear explosion and persists longer than one minute after burst.

special nuclear material

Plutonium, uranium-233, or uranium enriched in the isotopes uranium-233 or uranium-235.

staged weapon

A weapon in which energy from the primary initiates the explosion of a secondary.

stockpile flight test

Joint Department of Energy–Department of Defense flight tests conducted periodically on weapon systems randomly selected from the stockpile.

stockpile management

The sum of the activities, processes, and procedures for the design, development, production, fielding, maintenance, repair, storage, transportation, physical security, employment (if directed by the

president), dismantlement, and disposal of U.S. nuclear weapons and their associated components and materials.

stockpile-to-target sequence

1. The order of events involved in removing a nuclear weapon from storage and assembling, testing, transporting, and delivering it on the target.
2. A document that defines the logistic and employment concepts and related physical environments involved in the delivery of a nuclear weapon from the stockpile to the target. It may also define the logistic flow involved in moving nuclear weapons to and from the stockpile for quality assurance testing, modification and retrofit, and the recycling of limited life components.

subcritical

The state of a given fission system when the specified conditions are such that a less than critical mass of active material is present.

supercritical mass

The quantity of fissionable material needed to support a multiplying chain reaction.

surety

Material, personnel, and procedures that contribute to the security, safety, and reliability of nuclear weapons and to the assurance that there will be no nuclear weapon accidents, incidents, unauthorized weapon detonations, or degradation in performance at the target.

surveillance

The activities involved in making sure

nuclear weapons continue to meet established safety, security, and reliability standards.

thermal radiation

1. The heat and light produced by a nuclear explosion.
2. (DoD only) Electromagnetic radiations emitted from a heat or light source as a consequence of its temperature; it consists essentially of ultraviolet, visible, and infrared radiations.

thermonuclear

An adjective referring to the process (or processes) in which very high temperatures are used to bring about the fusion of light nuclei with the accompanying release of energy and high-energy neutrons.

thermonuclear weapon

A weapon in which very high temperatures are used to bring about the fusion of light nuclei such as those of hydrogen isotopes (e.g., deuterium and tritium) with the accompanying release of energy and neutrons.

TNT equivalent

A measure of the energy released from the detonation of a nuclear weapon or from the explosion of a given quantity of fissionable material in terms of the amount of TNT that could release the same amount of energy when exploded.

transient radiation effects on electronics

Effects on electronics that are exposed to transient gammas, neutrons, and X-rays.

tritium

A radioactive isotope of hydrogen,

having a mass of 3 units; it is produced in nuclear reactors by the action of neutrons on lithium nuclei.

two-person control

The continuous surveillance and control of positive control material at all times by a minimum of two authorized individuals, each capable of detecting incorrect or unauthorized procedures with respect to the task being performed and each familiar with established security requirements.

underground burst

The explosion of a nuclear (or atomic) weapon with its center more than $5W^{0.3}$ feet, where W is the explosion yield in kilotons, beneath the surface of the ground.

underwater burst

The explosion of a nuclear (or atomic) weapon with its center beneath the surface of the water.

use control

The positive measures that allow the authorized use and prevent or delay unauthorized use of nuclear weapons. Use control is accomplished through a combination of weapon system design features, operational procedures, security, and system safety rules.

warhead

That part of a missile, projectile, torpedo, rocket, or other munitions that contains either the nuclear or thermonuclear system, high explosive system, chemical or biological agents, or inert materials intended to inflict damage.

weapon surveillance

The activities involved in making sure nuclear weapons continue to meet established safety, security, and reliability standards.

weapon system

A combination of one or more weapons with all related equipment, materials, services, personnel, and means of delivery and deployment (if applicable) required for self-sufficiency.

X-ray

Electromagnetic radiations of high energy having wavelengths shorter than those in the ultraviolet region.

yield

The total effective energy released in a nuclear (or atomic) explosion. It is usually expressed in terms of the equivalent tonnage of TNT required to produce the same energy release in an explosion.