

Phase 1 -- Concept Definition

- Initiation:** Informal agreement between participants to undertake study
- Purpose:** Study a service requirement or DOE technological breakthrough/innovation for weapon application.
- Organization:** Joint DoD/DOE Study Group with appropriate working groups. (Note: it can be a DOE or DoD-only study group.)
Working Groups: surety, requirements analysis, mission analysis, warhead design, and systems engineering
- Deliverables:** Phase 1 study report [In some cases: Draft Military Characteristics (MCs) & Draft Stockpile-to-Target Sequence (STS)]
- Duration & Cost:** Normally 1 year and low cost

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Phase 2 -- Weapon Feasibility

- Initiation:** Formal request from DoD [ATSD (AE)] to DOE to participate with DoD in study.
- Purpose:** Develop various weapon alternatives to fulfill service requirements.
- Organization:** Joint DoD/DOE Study Group with appropriate working groups. [Sometimes a Project Office Group, (POG) is formed.] Working Groups: Surety, requirements analysis, mission analysis, warhead design, and systems engineering.
- Deliverables:** Phase 2 study report with warhead alternatives
Draft Military Characteristics (MCs)
Draft Stockpile-to-Target Sequence (STS)
Nuclear Safety & Use Control Themes
Major Impact Report (MIR)
Decision Cost Estimates
- Duration & Cost:** Normally 2 years and low cost.
- Parallel DoD Activities:** Milestone 1 Concept Demonstration Approval precedes Phase 2.

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Phase 2A -- Design Definition & Cost

- Initiation:** Normal included as part of Phase 2 authorization. If not, then formal ATSD (AE) request to DOE is required
- Purpose:** Develop a definitive cost estimate of the selected warhead design
- Organization:** Formal Project Officers Group with appropriate subgroups. Subgroups: Safety & Surety, Maintenance & Logistics, Command & Control, Military Characteristics, Interface, and Stockpile-to-Target Sequence, among many
- Deliverables:** Phase 2A Study Report
Final Military Characteristics (MCs)
Final Stockpile-to-Target Sequence (STS).
DoD/DOE Memorandum of Understanding
- Duration & Cost:** Normally 6 months and low cost

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Phase 3 -- Development Engineering

- Initiation:** ATSD (AE) formally passes MCs, STS, and MOU to DOE/DP requesting their acceptance and requesting DOE participation in Phase 3 activities
- Purpose:** Develop a finalized and tested weapon design that meets MC and STS criteria, and that can be produced by the DOE production complex
- Organization:** Formal Project Officers Group with appropriate subgroups. Subgroups: Safety & Surety, Maintenance & Logistics, Command & Control, Military Characteristics, Interface, and Stockpile-to-Target Sequence, among many
- Deliverables:** Phase 3 Study Report
Final tested weapon design to include all required H & T gear.
- Duration & Cost:** Normally 2.5 - 3 years and high cost
- Other Activities:** DRAAG begins its activities, reviews PWDR. JNWPS manual begun

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Phase 4 -- Production Engineering

- Purpose:** DOE production complex determines how it will produce the warhead. DOE production complex tools up necessary production lines
- Duration & Cost:** Normally 2.5 years and high cost
- Other Activities:** All weapons manual produced
First generation training of military initiated
DRAAG continues its activities, reviews IWDR

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Phase 4 Activities

DOE Production Complex

Allied Signal, Kansas City Division

Location: Kansas City Missouri

DOE Contractor: Allied Signal Corporation

Product:

Non-nuclear electrical, electronic, electromechanical, mechanical, plastic, and nonfissionable metal components

Pinellas - Neutron detectors, LACs, among others

Rocky Flats - Reservoirs and SST construction

Mound - Flat & round cables and ACORNS

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Phase 4 Activities

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Phase 4 Activities

DOE Production Complex

Savannah River Plant

Location: Aiken, South Carolina

DOE Contractor: Westinghouse Corporation

Product:

Tritium, special isotopes, targets, and naval reactor fuel material

Fill boost reservoirs and ship them to the military

Mound - Gas transfer systems

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Phase 4 Activities

DOE Production Complex

Sandia National Laboratories

Location: Albuquerque, New Mexico

DOE Contractor: Lockheed-Martin Corporation

Product:

Pinellas - Thermal batteries, neutron generators, CAP assemblies, capacitors, and frequency devices/clocks

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Phase 4 Activities

DOE Production Complex

Los Alamos National Laboratory

Location: Los Alamos, New Mexico

DOE Contractor: University of California

Product:

Pinellas - Neutron tube target loading

Rocky Flats - Beryllium technology and pit support functions

Mound - High power detonators and calorimeters

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Phase 4 Activities

DOE Production Complex

Pantex Plant

Location: Amarillo, Texas

DOE Contractor: Mason & Hanger

Product:

Explosive components

Assemble all nuclear weapons

Disassemble all weapons

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Phase 4 -- Production Engineering

- Purpose:** DOE Production Complex determines how it will produce the warhead. DOE Production Complex tools up necessary production lines
- Duration & Cost:** Normally 2.5 years and high cost
- Other Activities:** All weapons manuals produced
First generation training of military initiated
DRAAG continues its activities, reviews IWDR

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Phase 5 -- First Production

- Purpose:** Produce initial products for new material evaluation testing. Refine production lines as a result of new material testing. Increase production rate to that required in Phase 6
- Duration & Cost:** Normally 6 months and low cost
- Other Activities:** DRAAG completes its activities. Nuclear certification of receiving service units

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Nuclear Weapons Safety Study Group (NWSSG)

Chaired by Representative Service

Membership includes DOE, Defense Nuclear Agency, and representatives from Service Operational and Developmental Commands

Performs Safety Studies

Initial Safety Study - as early as possible in weapon development

Pre-operational Safety Study - at least 120 days before IOC

Operational Safety Review - within 2 yrs of fielding and every 5 yrs thereafter

Special Safety Study - whenever system changes or problems require it

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Phase 6 -- Quantity Production & Stockpile

Purpose: Produce War Reserve (WR) warheads in quantities directed by the Nuclear Weapons Stockpile Memorandum (NWSM) to support military IOC

Other Activities: Operational activities
Logistics activities
Nuclear accident/incident activities
Technical inspections of nuclear-certified units
Stockpile quality assurance and reliability testing
Weapon modifications and retrofits
Inactive stockpile

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Phase 6 Activities

Nuclear Weapon Operations

Nuclear weapon stockpile demonstrable element of nuclear deterrent strategy

Ability to employ effectively

Surety

Deployment

Peacetime threat

Peacetime storage

Wartime threat

Wartime storage

Employment

Rigorously controlled process

Presidential release to a unified commander

Conveyance of presidential release to executing commander

Execution of nuclear mission by delivery units

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Phase 6 Activities

Nuclear Weapon Operations (cont.)

Command and Control

Provides critical link and positive control by the President
Designated communications systems
Specific authentication procedures and codes

Training

Ensure maximum unit and force readiness
Exercises are still conducted

Personnel Reliability and Assurance Program

Ensures highest possible standards of individual
reliability
DoD (PRP) DOE (PAP)

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Phase 6 Activities

Logistics Activities

Transportation

Logistic movements (DOE and DoD)

Operational movements (DoD)

Safety and Security are important considerations

Storage

DOE

DoD

Security Areas

Maintenance

Normally accomplished by the custodial service

Accomplished at weapon storage area maintenance facilities
or in maintenance trucks (USAFE)

LLCE--boost reservoirs, neutron generators, RTGs

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Phase 6 Activities

Accident/Incident Activities

Nuclear Weapon Accident--unexpected event involving:

Accidental or unauthorized launching, firing, or use by US forces or U.S. supported allied forces of a nuclear capable system

An accidental, unauthorized, or unexplained nuclear detonation

Non-nuclear detonation or burning of a nuclear weapon or nuclear component

Radioactive contamination

Jettisoning of a nuclear weapon or nuclear component

Public hazard, actual or perceived

Nuclear Weapon Significant Incident--unexpected event involving:

Evident damage to a nuclear weapon

Immediate action for safety or security

Adverse public reaction

A situation that could lead to a nuclear weapon accident

Accident/Incident Response Preparation

DoD (EOD) and DOE (ARG) personnel continuously trained

EOD manual and ARG procedures kept updated

Joint DoD/DOE Accident/Incident training exercises held

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Phase 6 Activities

Technical Inspections

Performed by Service or Field Command, Defense Nuclear Agency teams

Conducted at least annually

Used to recertify nuclear capable units

Emphasis on safety as well as operational requirements

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Phase 6 Activities

Stockpile Quality Assurance and Reliability Testing

Begun after the system has been in the field for a year

Consists of two types of testing:

Stockpile Laboratory Testing (SLT)

Stockpile Flight Testing (SFT)

Used to include Stockpile Confidence Testing (SCT), but the UGT Moratorium has effectively canceled them

Each year test units chosen at random from the active stockpile

Test units disassembled at Pantex Plant

Non-nuclear components tested via SLT and SFT

One nuclear physics package testing non-nuclearly at physics lab

All but one test unit rebuilt and returned to the field

Each Service tests non-DOE system components

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Phase 6 Activities

Weapon Modification and Retrofits

Can be done in the field or at Pantex Plant

Modifications and retrofits usually incorporate new technology to increase weapon safety and/or reliability

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Phase 6 Activities

Inactive Stockpile (IS)

DoD
6(2)

DoE
6(3)

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Components may be stored to upgrade IS weapons to the status of the same weapons in the active stockpile

Phase 7-- Retirement

Purpose: To identify warheads to leave the active stockpile and to be dismantled by the Doe Productive Complex

Other Activities: Temporary storage of retired weapons by military is required as Pantex cannot accept all retired warheads
Proper disposal of dismantlement waste stream
Storage of nuclear components at Pantex due to inability to dispose of them
Special nuclear material is reclaimed and retained

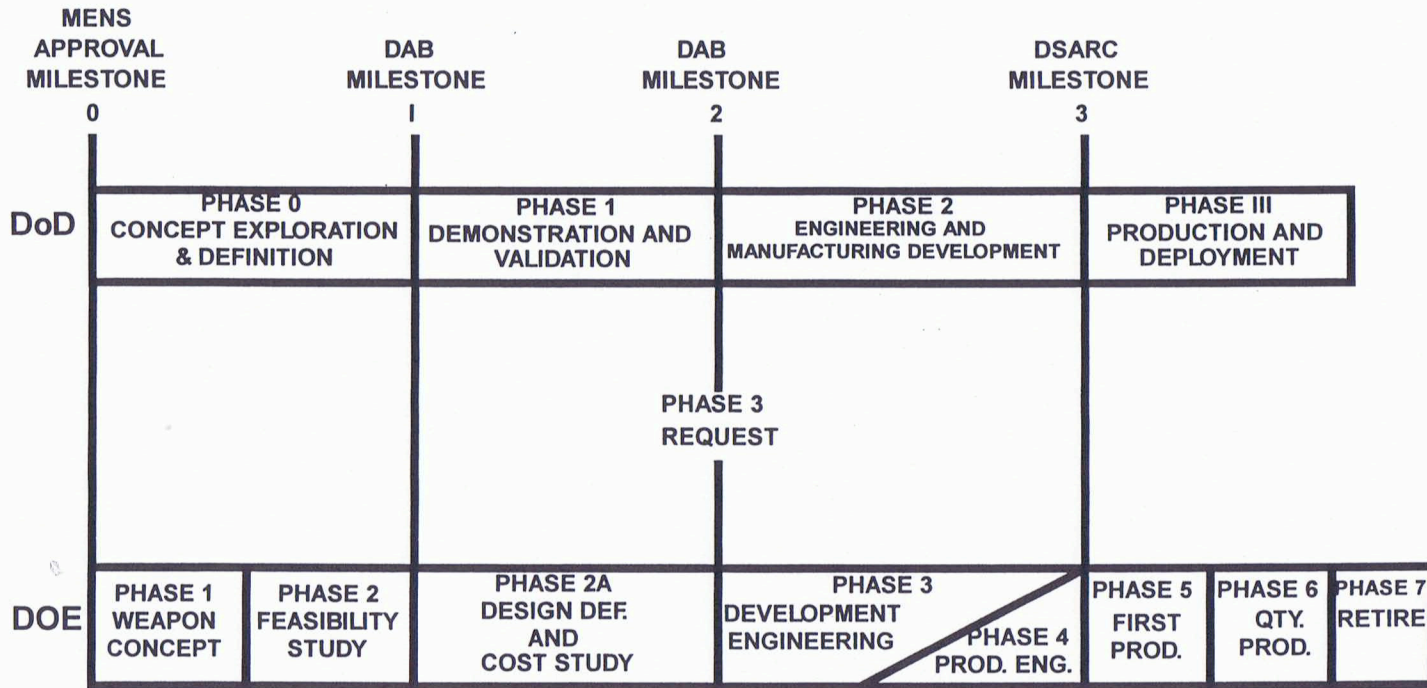
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DOD and DOE Acquisition



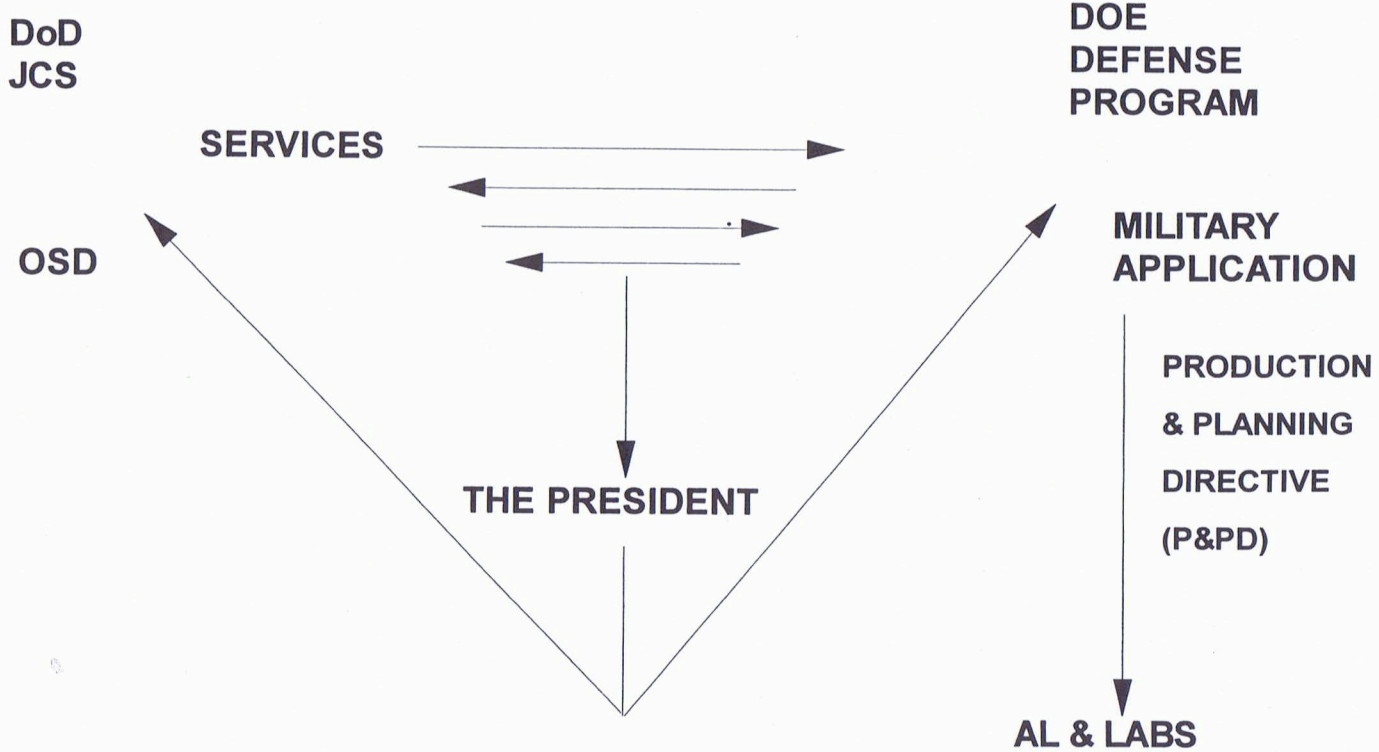
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ANNUAL STOCKPILE PAPER



LOOKS 11 YEARS AHEAD FOR PLANNING
 AUTHORIZED 5 YEARS OF PRODUCTION
 AND LONG LEAD PROCUREMENT
 DoD & DOE MAY ADJUST UP TO 10%

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GLOSSARY

ABM	Anti Ballistic Missile
ACDA	Arms Control and Disarmament Agency
ADM	Atomic Demolition Munition
AEC	Atomic Energy Commission - then ERDA, now DOE
AF&F	Arming, Fuzing and Firing
AFAP	Artillery Fired Atomic Projectile
AFWL	Air Force Weapons Laboratory - now Phillips Laboratory
AK	Adaptation Kit
α	Alpha (Neutron Multiplication Rate)
ALCM	Air Launched Cruise Missile
AL	Albuquerque Operations Office
AMAC	Aircraft Monitor and Control
ASDP	Assistant Secretary (DOE) for Defense Programs
ATSD (AE)	Assistant to the Secretary of Defense for Atomic Energy
AWLPG	AL Workload Planning Guidance
Barn	Unit of cross section - 10^{-24} cm ²
Boosting	The use of deuterium/tritium to increase primary yield
Burnt Orange	The colors of a well-known outstanding university
CAT (A,B,C,D,E, or F) PAL	Permissive Action Link - code controlled open switch in the weapons arming circuit. Characteristics as defined in the "General Characteristics" of PAL definition
CD	Command Disable (locally initiated disablement of a nuclear weapon. Not, certificate of deposit, but can be command destruct

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CDU	Capacitor Discharge Unit
CEP	Circular Error Probable; circle within which 50% of the weapons are expected to hit
Channel	The space around the secondary and between the primary and secondary but inside the radiation case
CHE	Conventional High Explosive (means non-IHE)
CINC	Commander-in-Chief
CNWDI	Critical Nuclear Weapon Design Information - a DoD category of Secret RD information or higher pertaining to sensitive weapon design information; not, Caught Naked While Driving Intoxicated
Critical Mass	The minimum amount of fissionable material capable of supporting a chain reaction under precisely specified conditions
CTB	Comprehensive Test Ban
DAB	Defense Acquisition Board
DASMA	Deputy Assistant Secretary for Military Applications
Depleted Uranium	Uranium which has had much of the isotope U ²³⁵ removed; essentially U ²³⁸
Destruct	<u>Normally</u> refers to the intentional destruction of a weapon by the high order detonation of the weapons HE at a single point
Disablement	Usually nonviolent actions taken on weapon hardware to prevent normal use. Disablement and destruct normally differ in degree
DMA	Directory of Military Application - now DASMA
DNA	Defense Nuclear Agency
DoD	Department of Defense
DRAAG	Design Review and Acceptance Group
EBW	Exploding BridgeWire (Detonator)
EMP	Electromagnetic Pulse

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EMR, EMI	Electromagnetic Radiation, Electromagnetic Interference
ENDS	Enhanced Nuclear Detonation Safety
Enhanced Electrical Safety	Embodiment of the exclusion region, strong-link, weak-link, unique signal concept (ENDS)
EOD	Explosive Ordnance Disposal
EP	Earth Penetrator
ER	Enhanced Radiation - usually neutron enhancement
ERDA	Energy Research Development Administration - was AEC, now DOE
ESD	Environmental Sensing Device
FEBA	Forward Edge of Battle Area - now FLOT
FLOT	Forward line of troops
FPU	First Production Unit
FRD	Formerly Restricted Data. Same as RD for foreign nationals
FRP	Fire Resistant Pit
Fuze	Component or subsystem that triggers the firing set. Use of fuse will likely bring abuse on you from old fuzing heads
FY	Fiscal Year
GLCM	Ground Launched Cruise Missile
HE	High Explosive
HOB	Height of Burst - vertical distance from the Earths surface to the point of burst
ICBM	Intercontinental Ballistic Missile
IFI	In-Flight-Insertion (mechanism)
IHE	Insensitive High Explosive - some form of TATB
INC	Insertable Nuclear Capsule
INF	Intermediate Range Nuclear Forces

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**Interstage Area
Intrinsic Radiation**

The space between the primary and secondary
Naturally occurring neutron and gamma radiation present at the surface of a
weapon

IOC

Initial Operational Capability

JAIEG

Joint Atomic Information Exchange Group

JCAE

Joint Committee Information Exchange Group

JCS

Joint Chiefs of Staff

JTA

Joint Test Assembly

KT

Kiloton equivalent of TNT hydrodynamic yield

LANL

Los Alamos National Laboratory

Lay-down

A form of weapon delivery and/or fuzing. Parachute delivered bomb from very low
altitudes with delayed groundburst using a timer fuze

Limited Stockpile Item

A stockpiled weapon which has not been accepted as a "standard" item and for
which the DoD has requested additional development

LLC

Limited Life Component; component which must be periodically replaced due to
aging

LLNL

Lawrence Livermore National Laboratory

LPO

Lead Project Officer

LRNTF

Long Range Theater Nuclear Forces

MA

Military Application (DOE) - usually refers to the DASMA office or staff

MAR

Major Assembly Release; SNL prepared, AL approved statement that war reserve
weapon material is satisfactory for release on a designated date to the DoD for
specified use qualified by exceptions and limitations

MIR

Major Impact Report

MIRV

Multiple Independently Targetable Reentry Vehicle

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Mk# Mark Number. The system of certifying nuclear weapons and RV/RBs, cars, and other assorted goods (like TV programs!) For nuclear weapons - now replaced by W for Warhead and B for Bomb or other

MLC Military Liaison Committee - historically was the coordinating and interchange of information focus between DoD and DOE

MRR Minimum Residual Radiation - now RRR

MRV Multiple Reentry Vehicle

MT Megaton, million tons equivalent TNT. Also metric tons - 1000 kilograms

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OMA Office of Military Application - now office of DASMA

OMB Office of Management and Budget

One Point The detonation of the weapon HE at a single point

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Oy	Oralloy - Oak Ridge Alloy. Uranium enriched in the isotope U ²³⁵ to 93.5%
OSD	Office of the Secretary of Defense
PL	Phillips Laboratory (formerly Air Force Weapons Lab)
PAL	Permissive Action Link - coded use control feature
PA&E	Program Analysis and Evaluation, OSD, (not program annihilation and elimination)
P&PD	Production and Planning Directive
P&S	Production and Surveillance
PM-NUC	Program Manager - Nuclear Munitions (Army program office for nuclear-no longer active)
POC	Programs of Cooperation
POG	Project Officers Group
POM	Meeting of the POG
Primary	The "fission" device
Pu	Plutonium, a reactor produced fissionable material obtained by bombarding U ²³⁸ with neutrons
QA	Quality Assurance - DoD uses QART—Quality Assurance, Reliability Testing
QRA	Quick Reaction Alert; weapon system deployed in a state that would allow its employment in a stated minimum specified time
RB	Reentry Body - Navy term for RV
RD	Restricted Data; all data concerning design, manufacture, or utilization of nuclear weapons and the production of special nuclear material which has not been removed by the Atomic Energy Act of 1954
Rolomite	A Sandia designed ESD sensor
RRR	Reduced Residual Radiation - reduced fission devices—formerly MRR (Minimum Residual Radiation)
RTG	Radioisotopic Thermoelectric Generator

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RV	Reentry Vehicle Army, Air Force - Navy calls them RBs, definitely not a recreational vehicle
SAC	Strategic Air Command
Secondary	The "thermonuclear" device
Sec Def	Secretary of Defense
Shake	10 ⁻⁸ seconds
SLBM	Submarine Launched Ballistic Missile
SLCM	Sea Launched Cruise Missile
SNL	Sandia National Laboratories
SNM	Special Nuclear Material - Pu, Oy
SP	Strategic Programs - Navy SLBM office
Specified Command	Combat command with a broad and continuing mission - usually a single service such as the Strategic Air Command
SRAM	Short Range Attack Missile
SS Material	Source Strength Material - DOE audits one kilogram quantities (includes depleted and natural uranium)
SSPO	Strategic Systems Program Office - now SP
Standard Stockpile Item	A nuclear weapon which meets the approved military characteristics to DoD's satisfaction
Stockpile Nuclear Test	QA test of a system withdrawn from the stockpile. That rare instance that a stockpiled weapon is tested downhole at NTS - a stockpile "confidence test"
STS	Stockpile-to-Target Sequence
TATB	Triamino-Trinitro-Benzene; see IHE
TTR	Tonopah Test Range - Sandia's testing range at Tonopah, Nevada

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TREE	Transient radiation effects on electronics
Tritium	Third isotope of hydrogen, radioactive gas used to boost weapons
TTBT	Threshold Test Ban Treaty
Tu	Tuballoy - natural uranium. Sometimes also includes depleted uranium, i.e., essentially U ²³⁸
V-γ Map	A contour depicting permissible velocity and reentry angle combinations for a missile RV/RB
Unified Command	A combat command with a broad and continuing mission composed of forces of two or more services under a single commander
USANCA	U.S. Army Nuclear and Chemical Agency
USDR&E	Under Secretary of Defense for Research and Engineering
WR	War Reserve nuclear weapons material (in DOE or DoD custody) intended for employment in the event of war
Weapons Grade Pu	Plutonium which has 6% or less Pu ²⁴⁰ content; Pu ²³⁹ is the good stuff
WDCR	Weapon Design and Cost Report
WES	Warhead Electrical System
WS³	Weapon Secure, Safe, Storage
WSV	Weapons Storage Vault (Weapons Security Vault)
X-unit	A device used to provide energy to initiate nuclear system detonators

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WEAPONS/WEAPON APPLICATIONS

<u>WEAPON*</u>	<u>APPLICATION</u>	<u>SERVICE</u>
FATMAN	BOMB	AF
LITTLEBOY	BOMB	AF
Mk III	BOMB	AF
Mk 4	BOMB	AF
T-4	ATOMIC DEMONITION MUNITION	A
Mk 5	BOMB	AF,N
Mk 5	MATADOR	AF
Mk 5	REGULUS I	N
Mk 6	BOMB	AF
Mk 7	BOMB	AF,N
Mk 7	HONEST JOHN	A
Mk 7	CORPORAL	A
Mk 7	BOAR	N
Mk 7	BETTY	N
Mk 7	ATOMIC DEMONITION MUNITION	A
Mk 7	NIKE HERCULES	A
Mk 8	BOMB	N
Mk 9	280-mm AFAP	A
Mk 11	BOMB	N

*Absence of entry indicates system not fielded

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<u>WEAPON</u>	<u>APPLICATION</u>	<u>SERVICE</u>
Mk 12	BOMB	AF,N
Mk 14	BOMB	AF
Mk 15	BOMB	AF,N
Mk 17	BOMB	AF
Mk 18	BOMB	AF,N
Mk19	280-mm AFAP	A
Mk21	BOMB	AF
Mk23	16" AFAP	N
B24	BOMB	AF
W25	GENIE	AF
B27	BOMB	N
W27	REGULUS I	N
B28	BOMB	AF,N
W28	HOUNDDOG	AF
W28	MACE	AF
W30	TALOS	N
W30	ATOMIC DEMONITION MUNITION	A
W31	HONEST JOHN	A
W31	NIKE HERCULES	A
W31	ATOMIC DEMONITION MUNITION	A
W33	8" PROJECTILE	A,N

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<u>WEAPON</u>	<u>APPLICATION</u>	<u>SERVICE</u>
W34	LULU	N
W34	ASTOR	N
B34	HOTPOINT	N
B36	BOMB	AF
W38	ATLAS	AF
W38	TITAN I	AF
B39	BOMB	AF,N
W39	B-58 pod	AF
W39	REDSTONE	A
W39	SNARK	AF
W40	BOMARC	AF
W40	LACROSSE	A
B41	BOMB	AF
B43	BOMB	N,AF
W44	ASROC	N
W45	BULLPUP	N
W45	TERRIER	N
W45	LITTLE JOHN	A
W45	MADM.	A
W47	POLARIS	N
W48	155-mm AFAP	A,N

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<u>WEAPON</u>	<u>APPLICATION</u>	<u>SERVICE</u>
W49	ATLAS	AF
W49	THOR	AF
W49	JUPITER	A,AF
W49	TITAN I	AF
W50	PERSHING	A
W50	NIKE ZEUS	A
W52	SERGEANT	A
W53	BOMB	AF
W53	TITAN II	AF
W54	FALCON	AF
W54	DAVY CROCKETT	A
W54	SADM	A,N
W55	SUBROC	N
W56	MINUTEMAN	AF
B57	BOMB/DEPTH BOMB	AF,N
W58	POLARIS A3	N
W59	MINUTEMAN I	AF
B61	BOMB	AF,N
W62	MINUTEMAN II	AF
W66	SPRINT	A
W68	POSEIDON C3	N
W69	SRAM	AF

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WEAPONAPPLICATIONSERVICE

W70	LANCE	A
W71	SPARTAN	A
W72	WALLEYE	AF
W76	TRIDENT I	N
W78	MINUTEMAN III	AF
W79	8" AFAP	A,N
W80	SLCM	N
W80	ALCM	AF
B83	BOMB	AF
W84	GLCM	AF
W85	PERSHING II	A
W87	PEACEKEEPER ICBM	AF
W88	TRIDENT II	N

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