U.S. Department of Energy

Washington, D.C.

ORDER

DOE 5610.10

10-10-90

SUBJECT: NUCLEAR EXPLOSIVE AND WEAPON SAFETY PROGRAM

1. PURPOSE. To establish the Department of Energy (DOE) policy, objectives, standards and criteria, authorities, and responsibilities for its Nuclear Explosive and Weapon Safety Program.

2. CANCELLATIONS. DOE 5610.3, PROGRAM TO PREVENT ACCIDENTAL OR UNAUTHORIZED NUCLEAR EXPLOSIVE DETONATIONS, of 12-18-80, and those portions of DOE 5610.1, PACKAGING AND TRANSPORTING OF NUCLEAR EXPLOSIVES, NUCLEAR COMPONENTS, AND SPECIAL ASSEMBLIES, of 9-11-79, which address nuclear explosives.

3. SCOPE. The provisions of this Order apply to DOE Headquarters and field elements and its contractors and subcontractors that conduct nuclear explosive and nuclear weapon system safety, security, and control activities in support of the nuclear weapons program as provided by law and/or contract and as implemented by the appropriate contracting officer.

4. APPLICABILITY. This Order applies to all activities and operations involving nuclear explosives and nuclear weapons conducted under the Department's nuclear weapon program.

5. REFERENCES.

   a. DOE 5610.11, NUCLEAR EXPLOSIVE SAFETY, of 10-10-90, which establishes the DOE policy for the protection of public health and safety in maintaining a formal, comprehensive, and systematic nuclear explosives and weapons safety program.

   b. DOE 5610.13, JOINT DEPARTMENT OF ENERGY/DEPARTMENT OF DEFENSE NUCLEAR WEAPON SYSTEM SAFETY, SECURITY, AND CONTROL ACTIVITIES, of 10-10-90, which establishes DOE policy, procedures, authorities and responsibilities for addressing joint nuclear weapon and nuclear weapon system activities in conjunction with the Department of Defense (DOD).

6. DEFINITIONS.

   a. Abnormal Environment. Those environments as defined in a weapon's stockpile-to--sequence and military characteristics in which the weapon is not expected to retain full operational reliability. In DOE manufacturing, testing, and transportation operations, abnormal environment means an environment that a nuclear explosive is not expected to experience during operations.

b. Normal Environment. The expected logi stical and operational environments as defined in a weapon's stockpile-to-target-sequence and military characteristics that the weapon is required to survive without degradation in operational reliability. In DOE manufacturing, testing. and transportation operations, normal environment means the environment to which a nuclear explosive is expected to be exposed.

c. Nuclear Explosive. Any assembly containing fissionable and/or fusionable materials and main charge high explosive parts or propellants capable of producing a nuclear detonation (e.g., a nuclear weapon or test device).

d. Nuclear Explosive and Weapon Safety Program. The DOE program devoted to the safety of nuclear explosives and weapons as set forth in this Order and in DOE 5610,11 and 5610.13.

e. Nuclear Explosive Safety Standards. Five qualitative requirements for positive measures to prevent an accidental , inadvertent, or deliberate unauthorized nuclear detonation or actions that might lead to a detonation. to provide for physical security, and to prevent plutonium dispersal. These standards may be met through design features. safety rules, and procedures that reduce risk.

f. Nuclear Explosive Safety Study. A formal DOE process whereby the safety of an operation. including transportation, involving a nuclear explosive is evaluated and documented in a study report.

g. Nuclear Explosive Safety Survey. A formal DOE process whereby a DOE operation, including transportation, involving a nuclear explosive is evaluated by conducting a comparative analysis of the operation with the nuclear explosive operation evaluated in an existing Nuclear Explosive Safety Study report.

h. Nuclear Weapon, A nuclear explosive configured for operational use by DOD.

i. Nuclear Yield. The energy released in the detonation of a nuclear weapon. measured in terms of the kilotons or megatons of trinitrotuluene (TNT) required to produce the same energy release.

j. One-Point Detonation. A detonation of high explosive (HE) which is initiated at a single point. This type of detonation may be intentionally initiated in certain self-destruct systems.

k. Positive Measures. Design features. safety rules, procedures. or other controls used individually or collectively to provide nuclear explosive Safety. Positive measures are intended to assure a safe response in applicable operations and be controllable. Some examples of Positive measures are strong-link switches: other safety devices; administrative

procedures and controls; general and specific nuclear explosive safety rules; design control of electrical equipment and mechanical tooling; and physical, electrical, and mechanical restraints incorporated in facilities and transport equipment.

l. Special Assembly. A major assembly of nuclear weapon components that does not comprise a complete nuclear explosive and, therefore, is not capable of producing a nuclear detonation.

m. Stockpile. Weapons and components, the custody of which has been transferred from DOE to DOD.

7. POLICY. Protection of the public health and safety is of paramount importance in the planning and conduct of the DOE's nuclear weapons program. The primary goal shall be to assure safety while effectively conducting the program in the national security interest. Nuclear explosive and weapon safety issues shall be resolved through a systematic process whereby:

a. The concept of operation is totally considered.

b. Attendant risks are identified, analyzed, evaluated, and documented.

c. Informed decisions are made at the appropriate management level to ensure that the degree of safety provided is adequate and consistent with overall program objectives.

d. To this end, the DOE shall maintain a formal, comprehensive, and systematic nuclear explosive and weapons safety program.

8. OBJECTIVES. The objectives of the nuclear explosive and weapons safety program are to:

a. Assure that all nuclear explosive and nuclear weapon operations by DOE and DOE contractors are conducted safely.

b. Discharge DOE's dual-agency role for the safety of nuclear weapons in DOD custody.

9. SAFETY PROGRAM ELEMENTS. The safety program shall consist of the following program elements:

a. A safety review process under which all operations are reviewed for identification of risks, These risks are analyzed and documented in safety studies and risk assessments so that informed management decisions can be made regarding conduct of the operation and the need for implementation of any additional positive measures to reduce risk to acceptable levels.

b. A stockpile review under which the DOE will actively and continuously review the stockpile to identify safety concerns and to vigorously pursue modification programs, safety rules, and positive measures to address identified concerns on an expeditious basis.

c. Internal DP-20 and DP-20 field organization appraisals to assure activities identified in paragraph 9a above are being accomplished. Such appraisals are to be conducted by independent reviewers having no operational responsibility for the appraised operation.

d. A corrective action program to document and track the implementation of corrective actions.

e. Nuclear explosive safety design criteria. (See page 8, paragraph 12, of this Order.)

f. Specific implementing Orders to address both nuclear explosive safety and supporting activities. These Orders are referenced in paragraph 5 above.

12. RESPONSIBILITIES AND AUTHORITIES. Within the DOE, safety is a line management responsibility. The following authorities and responsibilities apply to the nuclear explosive and weapon safety program:

a. Secretary of Energy (S-1) has ultimate responsibility for the safety of all nuclear explosive and nuclear weapon operations conducted by the Department and/or its contractors and, by Presidential Directive, has joint responsibility for the safety of nuclear weapons in DOD custody.

b. Assistant Secretary for Defense Programs (DP-1), through the Under Secretary, is responsible for:

(i) Implementing the Secretary's policy for line management responsibility for the nuclear explosive and weapon safety program including those aspects of this program related to safety and health of workers, the public, and protection of the environment.

(2) Serving as a member of the Nuclear Weapons Council and representing the DOE on nuclear explosive and weapon safety matters.

(3) Concurring in DOD-proposed nuclear weapon safety rules.

c. Assistant Secretary for Environment, Safety and Health (EH-1) is responsible for assisting the Assistant Secretary for Defense Programs (DP-1) in specialized safety disciplines, as requested.

d. Deputy Assistant Secretary for Military Application (DP-20) is responsible for:

(1) Providing overall program management and direction including implementing safety policy, developing safety directives, and interfacing with the DOD's nuclear weapons system safety program to assure compliance with requirements established for the nuclear explosive and weapons safety. program in this and related Orders.

(2) Assuring that program line managers are meeting their responsibility for applying safety emphasis to all decisions for the design and development of each new weapon system and ensuring the continued safety of the stockpile.

(3) Assuring that there is an active and continuous review of the stockpile to identify safety concerns and a program to provide for the stockpile improvements or positive measures to address identified concerns.

(4) Assuring that all safety actions related to nuclear weapons safety requiring a DOE concurrence to the DOD are thoroughly analyzed from a safety viewpoint by qualified safety experts, with special emphasis on the DOE's joint safety responsibility as required by Presidential Directive.

(5) Developing nuclear explosive safety policy, requirements, and standards for promulgation by the Secretary.

(6) Assuring that prior to approval and conduct of nuclear explosive or nuclear weapon operation by DOE and DOE contractors, a Nuclear Explosive Safety Study or Survey is performed by safety experts not responsible for the design or operation. The study/survey shall include consideration of risk estimates for credible accidents and dispersal of toxic or radioactive materials as defined by this and related Orders.

(7) Approving the assembly and/or disassembly of any non-one-point safe nuclear explosive test devices. Specific procedures will govern the assembly and control of all non-one-point safe explosive test devices.

(8) Approving Nuclear Explosive Safety Study Reports.

(9) Rendering decisions recommendations on requests for any deviations or exclusions from safety requirements, standards, and criteria established by the Nuclear Explosive and Weapons Safety Program in this and related orders, laws, or regulations and forwarding to higher management, if appropriate. Exclusions and deviations will be consistent with legal or regulatory provisions for obtaining them,

(10) Providing an independent Headquarters safety oversight program to include safety appraisals of implementation of the provisions of the Nuclear Explosive and Weapon Safety Program.

(11) Assuring that identified safety issues are addressed and resolved in a timely manner.

(12) Evaluating reported occurrences to assure corrective actions are taken.

(13) Assuring that planned and implemented safeguards and security policies and standards are consistent with safety requirements.

(14) Conducting a periodic review and, if needed, revisions to the DOE 5610 series Orders.

e. Deputy Assistant Secretary for Security Affairs (DP-30 is responsible for:

(1) Establishing safeguards and security policies and standards for nuclear explosives, nuclear components, and special nuclear assemblies.

(2) Advising the Assistant Secretary for Defense Programs as to the adequacy of DOE and DOE contractor safeguards and security programs.

f. Director of Security Evaluation (EH-4) is responsible for providing to the Deputy Assistant Secretary for Military Application safeguards and security Inspection reports.

g. Managers of Field Offices assist DP-20 in the implementation of this program and are responsible to DP-20 for implementing the provisions of this and related safety Orders in their areas of authority and responsibility. This includes:

(1) Assuring that field office, laboratory, contractor, and subcontractor line managers have been assigned safety program responsibilities.

(2) Assuring that the mandate to comply with DOE safety and environmental requirements, rules, standards, and criteria is fully considered in the planning of all nuclear explosive and nuclear weapon operations.

(3) Assuring that management and staff of their safety organizations have full access and free communications with the field office Manager on nuclear explosive and nuclear weapons safety matters.

(4) Assuring that prior to beginning any operation involving a nuclear explosive or transportation of a nuclear explosive that a Nuclear Explosive Safety Study or Nuclear Explosive Safety Survey is conducted and approved.

(5) Approving Nuclear Explosive Safety Survey Reports.

(6) Developing and publishing such field directives as are necessary to implement this Order and related Orders.

(7) Assuring that appropriate safety awareness and training programs are developed, documented, and implemented to ensure the safe conduct of activities covered by this Order.

h. Manager Albuquerque Operations Office (AL), in addition to the responsibilities and authorities in paragraph 10g above, is responsible to DP-20 for:

(1) Conducting all operational aspects of this Nuclear Explosive and Weapon Safety Program for onsite and offsite transportation activities, except those onsite activities at the Nevada Test Site that are the responsibility of the Manager, Nevada Operations Office, and the onsite activities at the Lawrence Livermore National laboratory that are the responsibility of the Manager, San Francisco Operations Office.

(2) Administering, for DP-20, DOE's program for participation in DOD Safety Studies and Reviews of the Nuclear Weapons Systems Safety Program, and assisting in safety rules processing in accordance with DOE 5610.13.

i. Manager, Nevada Operations Office (NV), in addition to the responsibilities and authorities in paragraph 10g above:

(1) Is authorized by DP-20, on a test-by-test basis, to conduct approved underground nuclear tests at the Nevada Test Site and is responsible to DP-20 for the safe conduct of the underground test program and for conducting the operational aspects of the Nuclear Explosive and Weapons Safety Program, in accordance with the 5610 series of Orders.

(2) Obtaining DP-20 approval prior to the assembly and/or disassembly of any non-one-point safe nuclear explosive test device.

(3) Establishing specific procedures for the assembly and/or disassembly and control of nuclear explosive test devices.

11. NUCLEAR EXPLOSIVE SAFETY STANDARDS. These standards are similar to those used for Department of Defense DOD) operations but have been modified to delete operations which are not applicable to the Department of Energy (DOE) and have been expanded to include a standard that addresses plutonium dispersal safety. All D0E nuclear explosive operations, including transportation, shall be evaluated against the following qualitative standards (in the context of this Order, the word prevent means to minimize the possibility; it does not mean absolute assurance against):

a. There shall be positive measures to prevent nuclear explosives involved in accidents or incidents from producing a nuclear yield.

b. There shall be positive measures to prevent deliberate prearming, arming, or firing of a nuclear explosive except when directed by competent authority.

c. There shall be positive measures to prevent the inadvertent prearming, arming, launching, firing, or releasing of a nuclear explosive in all normal and credible abnormal environment.

d. There shall be positive measures to ensure adequate security of nuclear explosives pursuant to the DOE safeguards and security requirements.

e. There shall be positive measures to prevent accidental, inadvertent, or deliberate unauthorized dispersal of plutonium to the environment.

12. DESIGN SAFETY. The following criteria will be implemented in the design of nuclear explosives and nuclear weapons:

a. General. Measures will be taken to assure safety is designed into all new nuclear weapons at the earliest possible stage.

(1) In weapon development activities, explicit consideration of safety features and measures will begin at the concept definition phase and continue throughout weapon development and engineering. Weapon safety is an integral part of weapon design and development.

(2) New nuclear weapon designs will incorporate current safety features, as certified by DP-20, unless there are overriding reasons for not incorporating them, and explicitly documented agreements are reached between the Secretaries of Energy and Defense.

b. Nuclear Detonation Safety - Weapons. Priority shall be given to the development and incorporation of design features that prevent accidental and/or’ inadvertent nuclear detonation. Effective with” this Order, all nuclear weapons shall be designed with the objective of achieving the following design goals for nuclear weapons delivered to DOD custody and for subsequent DOD operations.

(1) Normal Environment. Prior to the receipt of enabling stimuli and the arming signal, the probability of a premature nuclear detonation will not exceed one in 10^9 per nuclear weapon lifetime.

(2) Abnormal Environment. Prior to the receipt of the enabling stimuli. the probability of a premature nuclear detonation will not exceed one in 10 per credible nuclear weapon accident or exposure.

(3) One-Point Initiation. The probability of achieving a nuclear yield greater than four pounds of TNT equivalent in the event of any one-point initiation of the weapon's high explosive will not exceed one in 10^6. (This goal does not relieve requirements for design to provide protection concerning multi-point detonations.)

c. Nuclear Detonation Safety - Test Nonweapon configuration nuclear explosive test devices shall incorporate positive measures of precluding the transfer of sufficient energy to fire the device detonators until the latest possible time. The emplacenent configuration after connection of the test device fireset shall contain positive measures to preclude the accidental operation of the fireset in all credible environments.

d. Plutornium Dispersal Safety. The plutonium dispersal standard requires positive measures to prevent plutonium dispersal. To meet this standard. the following principle applies: Design features for control of plutonium dispersal under credible accident conditions will be incorporated for Each nuclear weapon unless the responsible Military Service requests and properly justifies an exception based on clear and significant degradation of military capability. Exceptions must be approved by the Secretary of Energy and documented by agreement of the Secretaries of Energy and Defense.

BY ORDER OF THE SECRETARY OF ENERGY:

JIM E. TARRO
Director of Administration and
Human Resource Management