



Department of Energy
 Germantown, MD 20874-1290

May 22, 1995

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 DNF SAFETY BOARD

Mr. John T. Conway
 Chairman
 Defense Nuclear Facilities Safety Board
 625 Indiana Avenue, NW., Suite 700
 Washington, D.C. 20004

Dear Mr. Conway:

In accordance with the Implementation Plan (IP) for Recommendation 93-1 Action 4 Report/Nuclear Explosive Safety Study Corrective Action Plan (93-1/NESSCAP), I am forwarding the enclosed progress report describing program accomplishments from March 1 through April 30, 1995.

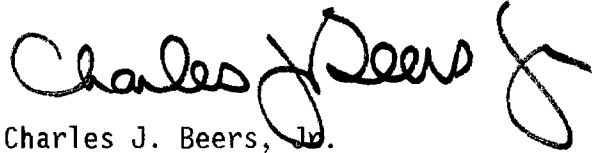
Program emphasis during this period focused on completing draft Department of Energy (DOE) Orders 5610.10 and 5610.11. An initial draft, the product of a concerted effort between Headquarters and field offices, was received in Washington, D.C., on March 30, 1995. The first meeting of the Headquarters/field DOE 5610 Order Integration Group (OIG) was held on April 19-20, 1995, to address comments and issues that were raised during initial Headquarters review. The current draft DOE 5610.10 and 5610.11 Orders, the product of that meeting, are provided as enclosures 2 and 3.

The next step, to develop supporting implementation guides and technical standards, is underway; a schedule is provided in the progress report. This is an resource intensive effort. To ensure completion of the task as soon as possible, the field teams are augmented with Headquarters subject matter experts and technical editors. However, even with this additional Headquarters support, the June 30, 1995, commitment to the board for final documents will be difficult to meet. Therefore, I am requesting a 1-month extension of our final deadline to allow for necessary Headquarters reviews. We will, however, provide all existing orders, guides, and standards (both final and interim draft copies as available) to the board on June 30, 1995.



If you have questions, please call me or have your staff contact Dana Krupa of my staff at 202-586-3842.

Sincerely,



Charles J. Beers, Jr.
Rear Admiral, U.S. Navy
Deputy Assistant Secretary for
Military Application and
Stockpile Support
Defense Programs

5 Enclosures:

Recommendation 93-1/NESSCAP Progress Report
Draft DOE Order 5610.10
Draft DOE Order 5610.11
S²C Proposed Nuclear Surety Standards
DOE 5610-Series, Nuclear Explosive Safety Orders
Incorporation of Nuclear Safety Requirements
Applicable to other Defense Nuclear Facilities

**RECOMMENDATION 93-1
NUCLEAR EXPLOSIVE SAFETY STUDY CORRECTIVE ACTION PLAN (NESSCAP)
PROGRESS REPORT
MARCH-APRIL 1995**

1. GENERAL

This report describes the Recommendation 93-1/NESSCAP Implementation Plan (IP) activities during the March-April 1995 period.

Major effort during this period was the completion of the proposed draft nuclear explosive and weapon surety (NEWS) orders by field elements and a integrated review and incorporating revisions by a combined Headquarters and operations office effort.

Efforts associated with these actions are described in enclosures to this report. Initial draft Department of Energy (DOE) Orders 5610.10 and 5610.11, which were reviewed by a joint Headquarters and field orders integration team on April 19-20, 1995, are provided as enclosures.

One of the major elements of the orders preparation process has been the on-going effort to incorporate the nuclear safety requirements contained in DOE 5480 Series Orders into the revised NEWS orders.

2. CURRENT ACTIVITIES

a. Initial Draft Orders Completed:

Program emphasis has focused on completing draft DOE 5610.10 and 5610.11 Orders. The drafts, a product of a concerted effort among Defense Programs (DP), Environment, Safety and Health, and field offices, was received by the Deputy Assistant Secretary for Military Application and Stockpile Support (DASMASS) on March 30, 1995.

b. Initial Draft Orders Review:

An internal Headquarters DOE review was conducted of the draft orders and comments were forwarded to the Field Integration Team on April 11, 1995. These comments formed the basis of discussion for the Headquarters/field DOE 5610 Order Integration Group (OIG) meeting on April 19-20, 1995, where the draft was finalized.

The documents will also undergo an internal DP technical/editorial review process to assure that they meet current Departmental editorial criteria. While there will be some limited text and document organization changes during this editorial review process, few substantive technical changes are anticipated. Copies of informal draft orders were provided to all working group participants. Nuclear surety standards were modified to reflect agreements made at the OIG. Copies of the draft DOE Orders 5610.10 and 5610.11 are provided as enclosures 2 and 3.

c. Policy Oversight Group (POG)

On April 24, 1995, the second 93-1/NESSCAP POG met and was chaired by DASMSS. This meeting focused on: potential changes in the Department's nuclear explosive safety standards (NESS); the use of qualitative risk assessments in the nuclear explosive safety process; and the 93-1/NESSCAP schedule. Additionally, programmatic impacts from consolidating nuclear surety orders and nuclear explosive orders into a single nuclear surety program were discussed. In principal, DASMSS agreed to consolidate DOE Orders 5610.10, 5610.11, 5610.13 and 5610.15 into a single nuclear surety order. An implementation schedule or plan of action has not been decided.

d. Impacts of Surety Standard Modifications:

The Department is currently reviewing several options for the policy statements (surety standards) that forms the basis of the NEWS program. These options are being independently reviewed by several groups including the DASMSS Safety, Security, and Control (S²C) Committee, the DASMSS Weapons Panel, and the OIG.

The S²C Committee is chartered by DASMSS to develop a strategic nuclear safety, security, and control (surety) vision. This includes reviewing and recommending changes, as appropriate, to the DOE nuclear explosive safety standards. During the S²C meeting on April 25-26, 1995, the Committee debated several nuclear surety policy alternatives and developed a suggested version that was referred to the POG. The S²C Committee proposal is provided as enclosure 4.

The surety standards will also be considered by the DASMSS Weapons Panel to ensure consistency and adequately describe the overall Departmental goals. Once completed, the revised surety standards will be incorporated in the proposed DOE 5610.10 and 5610.11 Orders.

e. Document Configuration Control:

A configuration control program is being maintained to ensure that the master copy of the proposed orders are not changed without approval of the POG. Under this program, the proposed orders will also receive an administrative review for scope, format, and compliance with the Department's administrative procedures for orders and directives. Any substantial changes will be delayed until the supporting documentation (implementing guides, technical standards, etc.,) has been developed sufficiently to permit verification of all actions required under the 93-1/NESSCAP IP.

During the orders preparation process, extensive interactions took place between participating Headquarters elements and field organizations to assure incorporation of nuclear safety requirements applicable to other defense nuclear facilities. A detailed description of this process is provided in enclosure 5. A report of field integration activities, addressing Recommendation 93-1 Action 4 Report tasks. Actions completed on each task is discussed in the attachment to enclosure 5.

3. FUTURE ACTIVITIES:

a. Standards and Guides Preparation:

The development of implementing guides and technical standards is underway. The schedule for completing this task is listed below. This is a very resource intensive effort. To expedite this process, the field teams have been augmented with Headquarters subject matter experts and technical editors. The following guides and standards are being developed:

G-5610.11, *Implementation Guide for Use with DOE Order 5610.11*
Field Review: May 2-4, 1995.

DOE-STD-ZZZZ-95, *Personnel Assurance Program*, Technical Standard
Field Review: May 16-18, 1995.

DOE-STD-YYYY-95, *Nuclear Explosive Safety Study Program*, Technical Standard
Field Review: June 6-8, 1995.

DOE-STD-XXXX-95, *Hazards Analysis*, Technical Standard
Field Review: June 20-22 & 27-29, 1995.

DOE-STD-BBBB-95, *Nuclear Explosive Surety Program Appraisals*, Technical Standard
Field Review: June 27-29, 1995.

b. Document Coordination:

Since the proposed standards and guide will address many major portions of the NESS program processes and procedures, a thorough quality review is necessary to assure that all significant commitments have been incorporated. Equally important, the complete document package must be consistent with the Department's new directives system guidelines. These same guidelines require cross verification of each document to ensure the goals and requirements are presented correctly.

While prudent judgment has been exercised with regard to the scope and nature of the proposed NEWS program standards and guides, some additional actions are anticipated. Also, many of the program documents were developed in parallel; therefore, it is necessary that they be thoroughly reviewed to ensure no major nuclear explosive safety concern has been overlooked.

c. Schedule Impact:

It is anticipated that final technical editing and quality control validations will require an additional 30 days. This review will also ensure that all elements of the Recommendation 93-1 Action 4 Report, NESSCAP, and the Recommendation 93-1/NESSCAP IP have been satisfied.

Since Headquarters receipt of the last technical standards will not occur until June 29, 1995, a 1-month extension is required to complete internal reviews. It is our intention to forward all orders, guides, and standards (both final and interim draft copies) to the board on June 30, 1995.

DOE Order 5610.10

SUBJECT: NUCLEAR EXPLOSIVE AND WEAPON SURETY PROGRAM

1. PURPOSE. To establish the top level Department of Energy (DOE) Policy, Responsibilities and Authorities, and Requirements for its Nuclear Explosive and Weapon Surety (NEWS) Program.
2. CANCELLATION. DOE 5610.10, *Nuclear Explosive and Weapon Safety Program*, of 10-10-90 is superseded in its entirety.
3. SCOPE. This Order establishes Nuclear Explosive Surety Standards, Weapon Design Safety requirements, and Appraisal requirements for the DOE NEWS Program. Specific requirements for related elements of the NEWS Program are provided in the 5610-series Orders identified in paragraph 8. Unplanned operations (e.g., Accident Response Group activities) are not addressed in the 5610-series Orders.
4. APPLICABILITY. This Order applies to DOE Headquarters, Field Elements, Contractors, and Subcontractors that manage, oversee, or conduct the NEWS Program, as provided by law and/or by contract as implemented by the appropriate contracting officer.
5. REFERENCES.
 - a. DOE Order 5482.1B, *Environment, Safety, and Health Appraisal Program*, of 11-18-91.
 - b. DOE Order 5610.11, *Safety of Nuclear Explosive Operations*, of TBD.
 - c. DOE Order 5610.12, *Packaging and Offsite Transportation of Nuclear Components, and Special Assemblies Associated with the Nuclear Explosive and Weapon Safety Program*, of 7-26-94.
 - d. DOE Order 5610.13, *Joint Department of Energy/Department of Defense Nuclear Weapon System Safety, Security and Control Activities*, of 10-10-90.
 - e. DOE Order 5610.14, *Transportation Safeguards System Program Operations*, of 5-12-93.
 - f. DOE Order 5610.15, *Nuclear Surety: Security and Control*, of TBD.

- g. DOE 5632.1C, *Protection and Control of Safeguards and Security Interest*, of 7-15-94.
- h. 10CFR 830.120, *Quality Assurance*

6. DEFINITIONS.

- a. Abnormal Environment. In DoD operations, 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. In DOE operations, abnormal environment means an environment that is not expected to occur during nuclear explosive operations and associated activities.
- b. Environment, Safety and Health (ES&H). Risk reduction measures to control or mitigate the possibility of exposing people to hazardous materials or hazardous energy. This includes, for example, environmental protection, nuclear safety, criticality safety, occupational safety, fire protection, industrial hygiene, health physics, occupational medicine, industrial safety, and radioactive and hazardous waste management.
- c. High Explosive (HE) Deflagration. A rapid chemical reaction in which the output of heat is sufficient for the reaction to proceed and accelerate without input of heat from another source. Deflagration is a surface phenomenon, with the reaction products flowing away from the unreacted material along the surface at subsonic velocity.
- d. High Explosive Detonation. A violent chemical reaction within a chemical compound or mechanical mixture evolving heat and pressure. A detonation is a reaction that proceeds through the reacted material toward the unreacted material at a supersonic velocity.
- e. Normal Environment. The expected logistical 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 operations, normal environment means the environment in which nuclear explosive operations and associated activities are expected to be performed.
- f. Nuclear Detonation. An energy release through a nuclear process, during a period of time on the order of one microsecond, in an amount equivalent to the energy released by detonating four or more pounds of TNT.
- g. 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).

- h. Nuclear Explosive Area (NEA). Any area that contains a nuclear explosive or collocated pit and main charge high explosive parts.
- i. Nuclear Explosive and Weapon Surety (NEWS) Program. The DOE program devoted to the safety, security and control of nuclear explosives and nuclear weapons.
- j. Nuclear Explosive Operation. Any activity involving a nuclear explosive, including activities in which main charge high explosive parts and pit are collocated.
- k. Nuclear-Explosive-Operation Associated Activities. Activities directly associated with a specific nuclear explosive operation, such as work on a bomb nose or tail subassembly, even when physically separated from the bomb's nuclear explosive subassembly.
- l. Nuclear Explosive Safety (NES). Risk reduction measures to control or mitigate the possibility of unintended or unauthorized nuclear detonation, or high explosive detonation or deflagration, in a nuclear explosive area.
- m. Nuclear Explosive Safety Study. A formal evaluation of the adequacy of risk reduction measures to satisfy the DOE nuclear explosive safety standards.
- n. Nuclear Explosive Safety Survey. A formal DOE process whereby a DOE nuclear explosive operation is evaluated by conducting a comparative analysis of the operation with the nuclear explosive operation evaluated in an existing Nuclear Explosive Safety Study report.
- o. Nuclear Weapon. A nuclear explosive configured for operational use by the Department of Defense (DOD).
- p. Nuclear Yield. The nuclear energy released in the detonation of a nuclear explosive, measured in terms of the weight of trinitrotoluene (TNT) required to produce the same amount of energy release.
- q. Positive Measures. Design features, safety rules, procedures, or other controls used individually or collectively to provide nuclear explosive surety. 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.

- r. Surety. Safety, security, and control of nuclear explosives.

7. POLICY.

The DOE shall maintain a formal, comprehensive, and systematic NEWS program with the primary goal to protect the public and worker health and safety, and the environment.

8. NUCLEAR EXPLOSIVE and WEAPON SURETY ORDERS.

The DOE nuclear explosive and weapon surety program is governed by this Order and the following related DOE Orders:

- a. DOE Order 5610.11, *Safety of Nuclear Explosive Operations, of TBD* establishes the DOE policy, responsibilities and authorities, and requirements for assuring the safe conduct of DOE nuclear explosive operations. It addresses both NES and ES&H.
- b. DOE Order 5610.12, *Packaging and Offsite Transportation of Nuclear Components, and Special Assemblies Associated with the Nuclear Explosive and Weapon Safety Program of 7-26-94*, establishes policy, objectives, responsibilities and authorities, and requirements for the safe packaging and offsite transportation of nuclear components and special assemblies associated with the nuclear weapons program requiring the use of the Transportation Safeguards System (TSS).
- c. DOE Order 5610.13, *Joint Department of Energy/Department of Defense Nuclear Weapon System Safety, Security and Control Activities, of 10-10-90*, establishes the DOE policy, responsibilities and authorities, and requirements for addressing joint nuclear weapon and nuclear weapon system issues in conjunction with the Department of Defense (DoD). It covers DOE participation in DoD Nuclear Weapon System Safety Groups which conduct safety studies of nuclear weapon systems operated by the DoD, and develop weapon system safety rules governing those operations.
- d. DOE Order 5610.14, *Transportation Safeguards System Program Operations of 5-12-93*, establishes DOE policy, responsibilities and authorities, and requirements for the management and operation of the TSS program. The TSS Program covers transportation of nuclear explosives, DOE-owned Categories I and II quantities of special nuclear material, classified configurations of nuclear weapons,

limited life components, and other forms and quantities of strategic materials as approved by AL.

- e. DOE Order 5610.15, *Nuclear Surety: Security and Control*, TBD establishes DOE policy and objectives, responsibilities and authorities, and requirements for the management of the Security and Control Program.

9. RESPONSIBILITIES AND AUTHORITIES. Within the DOE, safety is a line management responsibility. The following responsibilities and authorities apply to the NEWS Program:

- a. Secretary of Energy (S-1) has ultimate responsibility for the surety of all nuclear explosive operations conducted by the Department and/or its contractors and has joint responsibility for the surety of nuclear weapons in DoD custody. Also designates the DOE member of the Nuclear Weapons Council.

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

- (1) Implementing the Secretary's policy for line management responsibility for the NEWS Program, including those aspects of the Program related to safety and health of workers and the public, and protection of the environment.
- (2) Concurring in DoD-proposed nuclear weapon system safety rules.
- (3) Ensuring, in coordination with the Assistant Secretary for Environment, Safety, and Health, that appropriate ES&H requirements are integrated with NEWS requirements and that divergence does not occur.

- c. Assistant Secretary for Environment, Safety and Health (EH-1) is responsible for:

- (1) Assisting the Assistant Secretary for Defense Programs (DP-1) in ES&H disciplines, as requested.
- (2) Coordinating with DP-1 on ES&H requirements so that divergence between ES&H and NEWS Programs does not occur.

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

- (1) Developing NEWS Program policy, requirements, and standards for promulgation by the Secretary.
- (2) Providing overall NEWS Program management and direction including implementing surety policy,

developing surety directives, and interfacing with the DoD's nuclear weapon system safety program.

- (3) Assuring that there is an active and continuous review of the stockpile to identify surety concerns and a program to provide for the stockpile improvements or positive measures to address identified concerns.
- (4) Assuring that all surety actions related to nuclear weapons requiring a DOE concurrence to the DoD are thoroughly analyzed from a surety viewpoint by qualified experts, with special emphasis on the DOE's joint responsibility.
- (5) Conducting DP-20 self assessments, and conducting appraisals of Operations Offices to evaluate compliance with 5610-series Orders.
- (6) Coordinating nuclear explosive safety, security, and use control policies to assure balance and consistency with the nuclear explosive surety standards.
- (7) Developing, implementing, and maintaining a DP-20 quality assurance plan (QAP) and approving operations office QAPs and implementing plans, which shall include nuclear explosive operations, in accordance with the requirements of 10 CFR Part 830.120.

e. Office of Security Affairs (NN-50) 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 safeguards and security inspection reports to Deputy Assistant Secretary for Military Application and Stockpile Support.

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

- (1) Assuring that NEWS Program responsibilities, as appropriate, are assigned to operations office organizations, laboratories, contractors, and subcontractors.

- (2) Assuring that management and staff have full access and free communications with the Operations Office Manager on NEWS matters.
 - (3) Developing and publishing field directives as necessary to implement this Order and related Orders.
 - (4) Conducting operational aspects of the NEWS Program for onsite transportation activities.
 - (5) Integrating ES&H requirements into nuclear explosive operations and associated activities, while maintaining appropriate focus on nuclear explosive safety.
 - (6) Assuring surety of nuclear explosives during nuclear explosive operations.
 - (7) Developing, implementing, and maintaining an operations office QAP and approving contractor QAPs and implementing plans, which shall include nuclear explosive operations, in accordance with the requirements of 10 CFR Part 830.120.
- h. Manager, Albuquerque Operations Office (AL), in addition to the responsibilities and authorities in Paragraph 9.g. above, is responsible to DP-20 for:
- (1) Conducting operational aspects of the NEWS Program for offsite transportation activities.
 - (2) Administering, for DP-20, DOE's program for participation in the DoD Nuclear Weapon Systems Safety Program, and assisting in DoD safety rules processing in accordance with DOE 5610.13.
- i. Manager, Nevada Operations Office (NV), in addition to the responsibilities and authorities in Paragraph 9.g. above is responsible for conducting approved underground nuclear tests at the Nevada Test Site as authorized by DP-20 on a test-by-test basis.
10. NUCLEAR EXPLOSIVE SURETY STANDARDS. The following qualitative standards apply to the specified DOE operations:
- a. Nuclear Explosive Safety Standards.
- All DOE nuclear explosive operations shall meet the following qualitative safety standards in order to prevent unintended nuclear detonation or plutonium dispersal:

- (1) There shall be positive measures to minimize the possibility that any authorized activities could lead to fire, high explosive deflagration, or unintended high explosive detonation during nuclear explosive operations.
- (2) There shall be positive measures to minimize the possibility of accidents or inadvertent acts that could lead to fire, high explosive deflagration, or high explosive detonation during nuclear explosive operations.
- (3) There shall be positive measures to minimize the possibility of deliberate unauthorized acts that could lead to fire, high explosive deflagration or high explosive detonation during nuclear explosive operations.
- (4) There shall be positive measures to minimize the possibility of fire, high explosive deflagration, or high explosive detonation given an accident or inadvertent act during nuclear explosive operations.

b. Nuclear Explosive Security Standard.

All DOE nuclear explosive operations shall be evaluated against the following qualitative security standard:

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

c. Nuclear Weapon Use Control Standard

Nuclear explosives shall be evaluated against the following qualitative use control standard:

- There shall be positive measures that, given access, allow authorized operations and prevent or delay the unauthorized use of nuclear explosives.

11. REQUIREMENTS

- a. Nuclear Weapon Design Safety. Safety is an integral part of design and development. Explicit consideration of safety will begin at the concept definition phase and continue throughout development and engineering. New nuclear weapon designs will incorporate current safety features, as specified 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. The following criteria will be implemented in the design of nuclear weapons:

- (1) Nuclear Detonation Safety. Priority shall be given to the development and incorporation of design features that prevent accidental and/or inadvertent nuclear detonation. All new nuclear weapons shall be designed with the objective of achieving the following design goals for nuclear weapons delivered to the DoD.
 - (a) Normal Environment. Prior to receipt of the enabling stimuli and the arming signal, the probability of a premature nuclear detonation shall not exceed one in 10^9 per nuclear weapon lifetime.
 - (b) Abnormal Environment. Prior to receipt of the enabling stimuli, the probability of a premature nuclear detonation shall not exceed one in 10^6 per credible nuclear weapon accident or exposure.
 - (c) One-Point Safety. The probability of achieving a nuclear yield greater than four pounds of TNT equivalent in the event of a one-point initiation of the weapon's high explosive shall not exceed one in 10^6 .
 - (2) Plutonium Dispersal Safety. Design features for reducing the possibility of plutonium dispersal under credible abnormal environments shall be incorporated for each new nuclear weapon, unless the responsible Military Service requests and properly justifies an exception based on clear and significant degradation of military capability.
- b. Nuclear Test Detonation Safety. There shall be positive measures to preclude the transfer of energy to nuclear explosive test devices that is sufficient to fire detonators until detonation is authorized.
 - c. Safeguards and Security.

Nuclear explosives are safeguarded and protected in accordance with the requirements in the DOE 5630 Orders. These are developed by NN and are implemented by DP and the respective operations offices. The adequacy of these safeguards and security measures shall be documented in operations office site security surveys and EH-4 inspections and evaluations.

Security operations are evaluated for potential adverse impact on nuclear explosive safety in Nuclear Explosive Safety Studies as prescribed in DOE Order 5610.11.
 - d. Nuclear Weapon Use Control.

The adequacy of design features to meet the Nuclear Weapon Use Control Standard in Paragraph 10.c. shall be evaluated by DP-21.

Use control features are evaluated for potential adverse impact on nuclear explosive safety in Nuclear Explosive Safety Studies as prescribed in DOE Order 5610.11.

12. APPRAISALS.

- a. Organizations having NEWS Program responsibilities under the 5610-series Orders will be periodically appraised by DOE on their fulfillment of NEWS responsibilities. Appraising organizations will determine the time period between appraisals.
- (1) DP-1 shall appraise DP-20 overall management of the NEWS Program in accordance with the provisions of the USDOE Defense Programs Headquarters Quality Management Plan of September 1993.
 - (2) DP-20 shall appraise Operations Office implementation of requirements in the 5610-series Orders.
 - (3) Operations Offices shall appraise Area Office and Contractor compliance with requirements in the 5610-series Orders and associated field directives. The Albuquerque Operations Office shall also appraise the Transportation Safeguards Division. A Headquarters observer may be included in these appraisals.

These appraisals will verify compliance with applicable directives and requirements and assess the overall effectiveness of the NEWS Program. Appraisals will be planned and conducted in accordance with DOE-STD-BBBB-95.

- b. Operations Office appraisals of the Safety of Nuclear Explosive Operations (DOE Order 5610.11) shall include both NES and ES&H elements, although not necessarily in the same appraisal. The Field Organizations' responsibilities in DOE Order 5482.1B and the requirements of paragraph (c) of 10 CFR 830.120 apply to ES&H appraisals with the following modifications:
- The priority of NES over ES&H concerns, as described in DOE Order 5610.11, shall be integrated into the process used to assess the adequacy of the implementation of ES&H requirements.
 - Nuclear explosive safety personnel shall evaluate all corrective action plans on nuclear explosive operations and associated activities and facilities to ensure that

proposed actions will not adversely affect nuclear explosive safety.

- c. Operations Offices will establish guidelines and procedures for planning and conducting appraisals, training and qualifying appraisal personnel, reporting results, and closure of corrective actions. Appraisal team members will not have directly participated in the operations to be appraised, and will be independent of the organization being appraised.

DOE Order 5610.11

SUBJECT: SAFETY OF NUCLEAR EXPLOSIVE OPERATIONS

1. PURPOSE. This Order implements the overall safety objectives of the Department of Energy's (DOE) Nuclear Explosive and Weapons Surety Program (DOE Order 5610.10). The purpose of this Order is to establish the Scope, Applicability, Policy, Responsibilities, Authorities, and Requirements for assuring the safety of DOE nuclear explosive operations and associated activities and facilities, and to protect the environment and the health and safety of workers and the public.
2. CANCELLATION. DOE 5610.11, *Nuclear Explosive Safety* of 10-10-90 is superseded in its entirety.
3. SCOPE. This Order covers the safety of all DOE nuclear explosive operations and associated activities and facilities. Unplanned operations (e.g., Accident Response Group activities) are not addressed in this Order. In the context of this Order, safety is addressed in two broad areas: nuclear explosive safety (NES) and environment, safety and health (ES&H).
4. APPLICABILITY. This Order applies to DOE Headquarters, Field Elements, Contractors, and Subcontractors that manage, oversee, or conduct nuclear explosive operations and associated activities, as provided by law and/or by contract as implemented by the appropriate contracting officer.
5. REFERENCES.
 - a. DOE Order 4330.4B, *Maintenance Management Program*, February 10, 1994.
 - b. DOE Order 5000.3B, *Occurrence Reporting and Processing of Operations Information*, of 5-30-90.
 - c. DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, Change 2, January 7, 1993.
 - d. DOE Order 5480.11, *Radiation Protection for Occupational Workers*, June 17, 1992, and supporting technical manual *DOE Radiological Control Manual*, April 1994.
 - e. DOE Order 5480.19, *Conduct of Operations Requirements for DOE Facilities*, July 9, 1990.

- f. DOE Order 5480.20A, *Personnel Selection, Qualifications, Training, and Staffing Requirements at DOE Reactors and Nonreactor Nuclear Facilities*, November 15, 1994.
- g. DOE Order 5480.21, *Unreviewed Safety Questions*, December 24, 1991.
- h. DOE Order 5480.22, *Technical Safety Requirements*, February 25, 1992.
- i. DOE Order 5480.23, *Nuclear Safety Analysis Reports*, April 30, 1992.
- j. DOE Order 5480.24, *Nuclear Criticality Safety*, August 12, 1992.
- k. DOE Order 5480.26, *Trending and Analysis of Operations Information Using Performance Indicators*, January 15, 1993.
- l. DOE Order 5480.31, *Startup and Restart of Nuclear Facilities*, September 15, 1993.
- m. DOE Order 5483.1A, *Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned Contractor-Operated Facilities*, June 22, 1983.
- n. DOE 5500.2B, *Emergency Notification Reporting, and Response Levels*, February 27, 1992.
- o. DOE 5610.10, *Nuclear Explosive and Weapon Surety Program*, TBD.
- p. DOE/EV/06194, *DOE Explosives Safety Manual, Rev. 7*, August 1994.
- q. DOE-STD-1048-92, *Performance Indicators Guidance Document*, December 1992.
- r. DOE-STD-1073-93, *Guide for Operational Configuration Management Programs*, November 1993.
- s. DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*, July 1994.
- t. DOE-STD-BBBB-95, *Nuclear Explosive Surety Program Appraisals*
- u. DOE-STD-XXXX-95, *Hazards Analysis Process*
- v. DOE-STD-YYYY-95, *Nuclear Explosive Safety Study Process*
- w. DOE-STD-ZZZZ-95, *Personnel Assurance Program*

- x. 10 CFR 830.120, *Quality Assurance*.
- y. G-830.120, *Implementation Guide for use with 10 CFR Part 830.120, April 15, 1994*.
- z. Joint Department of Energy/Department of Defense (DOE/DOD) Technical Publication 20-7, *Nuclear Safety Criteria, 9-1-86*.
- aa. Joint DOE/DOD Technical Publication 35-51, *General Instructions Applicable to Nuclear Weapons, 11-27-89*.
- bb. Joint DOE/DOD Technical Publication 45-51, *Transportation of Nuclear Weapons Material, General Shipping and Limited Life Components (LLC), 3-16-84*.
- cc. Joint DOE/DOD Technical Publication 45-51A, *Transportation of Nuclear Weapons Material (Supplement), Shipping and Identification Data for Stockpile Major Assemblies, 2-1-80*.
- dd. Joint DOE/DOD Technical Publication 45-51D, *Transportation of Nuclear Weapons Material (Supplement), Shipment by Safe-Secure-Trailer (SST), 7-14-89*.

6. DEFINITIONS.

- a. Access. The proximity to a nuclear explosive that affords a person the opportunity to tamper with it or to cause a detonation.
- b. Certified Personnel (for nuclear explosive duties). Operations personnel who are current with respect to Personnel Assurance Program (PAP) certification and the training and qualification program for the specific nuclear explosive operation to which they are assigned.
- c. Custody. Responsibility for control of and access to nuclear explosives.
- d. Defense In Depth. A management process that provides multiple layers of protection (e.g., equipment design, procedures, and training) to prevent accidents and/or to mitigate the consequences of an accident.
- e. Electrical Equipment. Custom designed and fabricated devices or commercial devices (both modified and unmodified), used in performing operations on a nuclear explosive, that does not connect to the electrical circuitry of the nuclear explosive.
- f. Electrical Testers. Custom designed and fabricated devices or commercial devices (both modified and unmodified) used

in performing operations on the electrical circuitry of a nuclear explosive.

- g. Environment, Safety and Health (ES&H). The application of risk reduction measures to control or mitigate the possibility of exposing people to hazardous materials or hazardous energy. This includes, for example, environmental protection, nuclear safety, criticality safety, occupational safety, fire protection, industrial hygiene, health physics, occupational medicine, industrial safety, and radioactive and hazardous waste management.
- h. Facility. Any equipment, structure, system, process, or activity that fulfills a specific purpose.
- i. Graded Approach. A process by which the level of analysis, documentation, and actions necessary to comply with a requirement in this Order are commensurate with the relative importance to safety, the magnitude of any hazard involved, and any other relevant factor.
- j. Hazard Analysis. The determination of material, system, process, and plant characteristics that can produce undesirable consequences, followed by the assessment of hazardous situations associated with a process or activity. Largely qualitative techniques are used to pinpoint weaknesses in facility design and in the design of nuclear explosive operations and associated activities.
- k. Hazards Analysis Report (HAR). A report that documents the systematic evaluation of hazards to workers, the public, and the environment for a specific nuclear explosive operation and its associated activities. The HAR includes a Nuclear Explosive Hazard Assessment and is an addendum to the facility Safety Analysis Report.
- l. High Explosive Deflagration. A rapid chemical reaction in which the output of heat is sufficient for the reaction to proceed and be accelerated without input of heat from another source. Deflagration is a surface phenomenon, with the reaction products flowing away from the unreacted material along the surface at subsonic velocity.
- m. High Explosive Detonation. A violent chemical reaction within a chemical compound or mechanical mixture, evolving heat and pressure. A detonation is a reaction that proceeds through the reacted material toward the unreacted material at a supersonic velocity.
- n. Main Charge. The high explosive whose explosive energy implodes the pit.
- o. Nuclear Detonation. An energy release through a nuclear process, during a period of time on the order of one

microsecond, in an amount equivalent to the energy released by detonating four or more pounds of TNT.

- p. 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 nuclear test device).
- q. Nuclear Explosive Area (NEA). Any area that contains a nuclear explosive or collocated pit and main charge high explosive parts .
- r. Nuclear Explosive Duty. Duty that allows custody of a nuclear explosive, or access to a nuclear explosive area.
- s. Nuclear Explosive Hazards Assessment (NEHA). A systematic evaluation of hazards that could lead to a nuclear detonation, or high explosive detonation or deflagration, in nuclear explosive areas. NEHAs are performed for each specific nuclear explosive operation evaluated by a Nuclear Explosive Safety Study and complement the Safety Analysis Report (SAR) for the facility(ies) in which the operation will be performed.
- t. Nuclear Explosive-Like Assembly (NELA). An assembly that is not a nuclear explosive but that represents a nuclear explosive in its basic configuration (main charge high explosive and pit) and any subsequent level of assembly up to its final configuration, or which represents a weaponized nuclear explosive such as a warhead, bomb, reentry vehicle, or artillery shell. A NELA does not contain an arrangement of high explosive and fissile material capable of producing a nuclear detonation.
- u. Nuclear Explosive Operation. Any activity involving a nuclear explosive, including activities in which main charge high explosive parts and pit are collocated.
- v. Nuclear-Explosive-Operation Associated Activities. Activities directly associated with a specific nuclear explosive operation, such as work on a bomb nose or tail subassembly, even when physically separated from the bomb's nuclear explosive subassembly.
- w. Nuclear Explosive Safety (NES). The application of risk reduction measures to control or mitigate the possibility of unintended or unauthorized nuclear detonation, or high explosive detonation or deflagration, in a nuclear explosive area.
- x. Nuclear Explosive Safety Rules. Operating limits, surveillance requirements, safety boundaries, and management and administrative controls that significantly contribute to minimizing the possibility of nuclear

detonation, or high explosive detonation or deflagration, in nuclear explosive operations and associated activities.

- y. Nuclear Explosive Safety Study (NESS). A formal evaluation of the adequacy of risk reduction measures to satisfy the DOE nuclear explosive safety standards (given in paragraph 9.g.(5) of this Order).
- z. Nuclear Explosive Safety Survey. A formal nuclear explosive safety evaluation based on a comparative analysis of the operation with the nuclear explosive operation evaluated in a current and approved Nuclear Explosive Safety Study Report.
- aa. Nuclear Weapon. A nuclear explosive configured for operational use by the Department of Defense (DoD).
- bb. One-Point Safe Nuclear Explosive. A nuclear explosive that, in the event a detonation is initiated at any one point in the high explosive system, presents no greater probability than one in a million of producing a nuclear detonation.
- cc. Permanent Marking. A durable method, normally by metal deformation, of indicating on an external area of an assembly whether it is a nuclear explosive or a nuclear explosive-like assembly.
- dd. Personnel Assurance Program (PAP). A program that establishes the requirements and responsibilities for screening, selecting, and continuously evaluating employees assigned to or being considered for assignment to nuclear explosive duties.
- ee. Plutonium Contamination. Release of plutonium in excess of that controlled and monitored by DOE radiological protection programs (see DOE Order 5480.11, DOE Order 5400.5, and the DOE Radiological Control Manual).
- ff. Plutonium Dispersal. The aerosolization and transport of plutonium by a driving force, such as fire, high explosive deflagration, or high explosive detonation.
- gg. Positive Measures. Design features, safety rules, procedures, or other controls used individually or collectively to provide nuclear explosive surety. Positive measures are intended to ensure a safe response in applicable operations and to 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.

- hh. Reader Worker Procedure and Check-Off. A procedure used during specified nuclear explosive operations in which one person reads the description of the operation to be performed, the operation is performed, and the reader checks off on a list that the operation has been performed.
- ii. Safety Analysis. A documented process: (1) to provide a systematic identification of hazards within facilities in which nuclear explosive operations and associated activities are conducted and within specific nuclear explosive operations and associated activities; (2) to describe and analyze the adequacy of measures taken to eliminate, control, or mitigate identified hazards; and (3) to analyze and evaluate potential accidents and their associated risks.
- jj. Safety Analysis Report (SAR). A report that documents the adequacy of safety analysis for facilities in which nuclear explosive operations and associated activities are performed. The SAR addresses nuclear explosive operations and associated activities in general and examines bounding accidents.
- kk. Safety Basis. The collection of information related to controlling the hazards of an operation used to determine that operations can be conducted safely within the facility.
- ll. Significant Safety Incident. Incidents that will result in serious injury or abnormal radiation exposure to personnel, initiation of any explosive or pyrotechnic, rupture of a high pressure vessel, or abnormal release of radiological contamination. This list is not meant to be all inclusive; reasonable judgment is expected.
- mm. Technical Safety Requirements (TSR). Those requirements that define the conditions, safe boundaries, and the management or administrative controls necessary for nuclear explosive operations and associated activities and facilities to manage the risk to the public and on-site workers from uncontrolled releases of radioactive materials or from radiation exposures due to inadvertent criticality. A TSR consists of safety limits, operating limits, surveillance requirements, administrative controls, use and application instructions, and the basis thereof.

7. POLICY.

Prior to commencing nuclear explosive operations and associated activities, they shall be comprehensively reviewed,

evaluated, and documented to enable informed management decisions and authorizations.

This Order integrates portions of a number of Orders, and their corresponding Rules (when issued), in order to integrate NES and ES&H and to require the same level of safety assurance for DOE defense nuclear facilities and DOE facilities in which nuclear explosive operations and associated activities are conducted. The following Orders currently have exclusion statements or are by inference not applicable: 5480.20A, 5480.21, 5480.22, 5480.23, 5480.24, 5480.31, and 5700.6C. These Orders, and their corresponding Rules (when issued), will be utilized to the extent specified in this Order for nuclear explosive operations and associated activities and facilities.

The Assistant Secretary for Defense Programs (DP-1) will coordinate with the Assistant Secretary for Environment, Safety and Health (EH-1) and will ensure that appropriate future ES&H requirements are integrated with the nuclear explosive safety requirements, and that divergence does not occur.

8. RESPONSIBILITIES AND AUTHORITIES.

Within DOE, safety is a line management responsibility. Programmatic responsibilities covered by this Order are as follows:

- a. Assistant Secretary for Defense Programs (DP-1) is responsible for:
 - (1) Adjudicating any appeals to Operations Office Manager's decisions to deny or revoke Personnel Assurance Program certifications.
 - (2) Approving any requests for deviations from general nuclear explosive safety rules, when determined appropriate.
 - (3) Approving Nuclear Explosive Safety Studies of a nuclear explosive subsequently determined to be non-one-point safe after a previous certification of one-point safe.
 - (4) Approving requests for exceptions to requirements from other DOE Orders that are adopted in this Order, when determined appropriate.
 - (5) Ensuring, in coordination with the Assistant Secretary for Environment, Safety, and Health, that appropriate ES&H requirements are integrated with NEWS requirements and that divergence does not occur.

b. Assistant Secretary for Environment, Safety and Health (EH-1) is responsible for:

- (1) Assisting the Assistant Secretary for Defense Programs (DP-1) in environmental, safety and health disciplines, concerning the safety of nuclear explosive operations and associated activities and facilities, as requested.
- (2) Coordinating with DP-1 on future ES&H requirements so that divergence between ES&H and NES Programs does not occur.

c. Deputy Assistant Secretary for Military Application and Stockpile Support (DASMASS, DP-20) is responsible for:

- (1) Implementing the overall requirements of this Order.
- (2) Approving Nuclear Explosive Safety Study Reports and resolving any minority opinions.
- (3) Approving exceptions to the requirements of this Order, except where higher approvals are specified.
- (4) Evaluating reported nuclear explosive occurrences and corrective actions.
- (5) Interfacing with EH in the future development of ES&H (5480-series) Orders to ensure that the requirements are integrated with the nuclear explosive safety (5610-series) requirements, and that divergence does not occur.
- (6) Developing, implementing, and maintaining a DP-20 quality assurance plan (QAP) and approving Operations Office QAPs and implementing plans, which shall include nuclear explosive operations, in accordance with the requirements of 10 CFR Part 830.120.

d. Managers of the Operations Offices are responsible for implementing the provisions of this Order in their respective areas of authority to include:

- (1) Assuring that responsibilities and authorities are clearly defined and delegated at appropriate management and supervisory levels.
- (2) Authorizing nuclear explosive operations, in accordance with the requirements of this Order.
- (3) Assuring that nuclear explosive operations are conducted safely, in accordance with the requirements of this Order.

- (4) Developing, implementing, and maintaining an Operations Office QAPs and approving contractor QAPs and implementing plans, which shall include nuclear explosive operations, in accordance with the requirements of 10 CFR Part 830.120.

9. REQUIREMENTS.

a. Safety Program Elements.

Operations Offices shall have a comprehensive safety program for nuclear explosive operations and associated activities under their purview. The safety program shall integrate nuclear explosive safety (NES) requirements from the 5610-series Orders and environment, safety, and health (ES&H) requirements from the 5480-series Orders. Many of the 5480-series Orders are directly applicable and others exclude nuclear explosive operations. This Order adopts appropriate requirements from the excluded Orders to provide a complete safety program for nuclear explosive operations and associated activities and facilities.

Implementation of a requirement to prevent or mitigate one hazard will be reviewed to ensure the likelihood of a significant safety incident involving another hazard is not increased. If any such instance is identified, alternative methods should be investigated to attempt to implement the requirement without increasing the risk associated with other hazards. Guidelines, best management practices, or other implementation guidance that is not mandatory will be similarly reviewed for potential impact on a higher consequence hazard before being implemented.

The safety program shall include the following elements, tailored for the operations:

(1) Conduct of Operations.

DOE Order 5480.19 provides DOE policy and requirements for conducting operations at DOE facilities, and is applicable to nuclear explosive operations and associated activities and facilities. The guidelines in Attachment I to DOE Order 5480.19 shall be applied in a graded approach commensurate with their potential ES&H impact and their potential NES impact.

(2) Training and Qualification of Personnel.

Each organization responsible for and/or involved in nuclear explosive operations and associated activities shall develop and implement a training and qualification program for their personnel who manage, oversee or perform nuclear explosive duties. These personnel include DOE and contractor management and technical

support personnel, PAP supervisors, PAP medical personnel, and operations and maintenance personnel. The DOE and contractor training and qualification programs will address the requirements of DOE Order 5480.20A, except Chapters II and III, and develop requirements equivalent to those in Chapter IV. Training and qualification requirements shall be graded to the particular responsibilities assigned.

(3) Maintenance of Facilities, Tooling and Equipment.

Policy and requirements for maintaining and repairing government property are provided in DOE Order 4330.4B, *Maintenance Management Program*. Operations Offices shall ensure that DOE contractors develop and implement a maintenance program for facilities, tooling, and equipment used for nuclear explosive operations and associated activities, in accordance with the nuclear facility requirements in Section 10 of DOE Order 4330.4B.

(4) Configuration Management.

Operations offices shall ensure that the Design Laboratories and operating contractors, as appropriate, develop and implement a Configuration Management (CM) Program for nuclear explosive operations and associated activities and facilities. The Program will be documented in appropriate plans which will be approved by the operations office. These plans must address the measures to control the configuration of nuclear explosive assemblies; the configuration of tooling, equipment, and procedures used in nuclear explosive operations and associated activities; and the interface with the configuration management plan for the facilities in which these operations and activities are conducted. DOE-STD-1073-93 shall be used for guidance in developing the CM Program and in preparing the CM plans. Additional guidance is provided in *Implementation Guide for use with DOE Order 5610.11, G-5610.11-Rev. 0*.

(5) Quality Assurance (QA).

Operations Offices shall ensure that DOE contractors develop and implement a QA program for nuclear explosive operations and associated activities and facilities, in accordance with the criteria in Paragraphs (b)(1) and (c) of 10 CFR 830.120. The contractor will submit a QA Plan to DOE for approval. The guidance in G-830.120 should be used for developing the QA program plan and detailed implementing procedures.

(6) Issues Management.

DOE and DOE contractors shall develop and implement corrective action and commitment tracking systems to assist in identifying, tracking, and monitoring required actions related to the safety of nuclear explosive operations and associated activities and facilities. Additional guidance is provided in G-5610.11-Rev. 0.

(7) Occurrence Reporting.

Operational occurrences will be reported and processed in accordance with DOE Order 5000.3B and paragraph 9.g.(13) of this Order.

(8) Performance Indicators.

Operations Offices shall ensure that DOE contractors report performance indicators, in accordance with the requirements of DOE Order 5480.26 and the guidance of DOE-STD-1048-92. Additional performance indicators for nuclear explosive operations and associated activities, that assist in early identification of potential problems, deteriorating or improving conditions, or lessons learned, shall be identified. Operations Offices shall specify reporting requirements for these additional performance indicators. Additional guidance is provided in G-5610.11-Rev. 0.

b. Safety Analyses.

(1) Safety analyses shall be performed for all DOE nuclear explosive operations and associated activities and facilities. The safety analysis shall consist of a Safety Analysis Report for the facility and a Hazards Analysis Report for the operation, which includes a Nuclear Explosives Hazards Assessment (see (a), (b) and (c) of this section). Safety analysis should be an iterative process, performed in parallel with development of the operation being analyzed, so that the operation design benefits from safety analysis results. Each operations office shall develop specific requirements and a process for complying with the following safety analysis requirements.

(a) Safety analysis of facilities used for nuclear explosive operations and associated activities will be performed and will be documented in a Safety Analysis Report (SAR). Safety analyses of operations will address a spectrum of potential accidents based on bounding condition hazards. The SAR will be prepared and processed in accordance with the requirements of DOE Order 5480.23, and the guidelines of DOE Order 5480.23, Attachment I, and DOE-STD-3009-94.

- (b) A hazards analysis will be performed for each nuclear explosive operation in accordance with the general guidance provided in DOE-STD-3009-94 and the specific guidance in DOE-STD-XXXX-95. Human factors will be addressed in the hazards analysis, as described in DOE-STD-XXXX-95. The hazards analysis will be formally documented in accordance with the guidance in DOE-STD-XXXX-95, and submitted to DOE for approval. The results of the analysis will be evaluated against the facility SAR to ensure the operation is within the facility authorization basis.
- (c) Those aspects of the hazards analysis that involve nuclear detonation, and high explosive detonation and deflagration, will be documented in a Nuclear Explosive Hazards Assessment (NEHA), in accordance with DOE-STD-XXXX-95. The NEHA will be submitted to the Nuclear Explosive Safety Study Group for use in their study.
- (2) Nuclear explosives operations and associated activities shall comply with the criticality safety requirements of DOE Order 5480.24. Criticality safety analyses of the facility and general nuclear explosive operations and associated activities shall be documented in the SAR. Criticality safety of a specific nuclear explosive and its components is addressed in the design process and should not be discussed in the SAR. Criticality safety analyses of specific nuclear explosive operations and associated activities will be documented in accordance with DOE-STD-XXXX-95.
- (3) Technical Safety Requirements (TSRs) for facilities in which nuclear explosive operations and associated activities are conducted shall be developed and implemented in accordance with the requirements of DOE Order 5480.22. Facility related requirements will be derived from the SAR.
- (4) Nuclear explosive operations and associated activities shall have operating limits, surveillance requirements, limiting conditions of operations, and administrative controls derived from the HAR and specified in operational safety controls and nuclear explosive safety rules.
- (5) Operations offices shall establish a change control process for nuclear explosive operations and associated activities. Any proposed changes to nuclear explosive operations or facilities must be reviewed for nuclear explosive safety impact by personnel assigned nuclear explosive safety

responsibilities. An evaluation of the change to the nuclear explosive operation or the facility shall be conducted to determine if the facility safety basis documented in the SAR is exceeded. If the safety basis is exceeded, the unreviewed safety questions requirements of DOE Order 5480.21 shall be followed.

c. Process Design (Defense-in-Depth).

Operations Offices shall develop a Defense-in-Depth management process that provides multiple layers of protection to prevent accidents and/or to mitigate the consequences of an accident. Configuration management requirements shall be established to ensure that no changes are made that could adversely affect the safety of operations. A positive verification process shall be established to ensure use of correct equipment, qualified personnel, operationally ready facilities, and current procedures.

- (1) Equipment used in nuclear explosive operations (including tooling, mechanical equipment, and electrical equipment) shall be designed, fabricated, and tested to standards that are selected or established commensurate with the safety importance of the function to be performed. Existing technical standards may be adopted or new standards developed, as appropriate, considering the unique application to nuclear explosive operations. Operations offices will ensure that DOE contractors maintain design criteria documents for tooling and equipment. Human factors requirements will be included in the design criteria documents.
- (2) Programs shall be implemented for selecting, training, and qualifying personnel involved with nuclear explosive operations and associated activities and for assuring their continuing fitness for duty. [See Paragraphs 9.a.(2), 9.g.(1) and 9.g.(2)].
- (3) Facilities in which nuclear explosive operations and associated activities are performed shall be operationally ready, and interfaces between those facilities and the nuclear explosive will be controlled. Appropriate preventative maintenance programs will be established to ensure reliability.
- (4) Procedures governing nuclear explosive operations and associated activities shall be developed, controlled, reviewed, and approved. Human factors will be considered in the development of procedures. Procedures will be written and formatted to

facilitate the safe accomplishment of the task, e.g., cautions, hold points, illustrations, etc.

- (5) The configuration and condition of a nuclear explosive and its components shall be known before and during any planned operations.
- (6) Guidance appropriate for nuclear explosive operations contained in the DOE Explosives Safety Manual shall be considered.

Additional guidance is provided in G-5610.11-Rev. 0.

d. Internal Safety Reviews.

Operations Offices shall require that DOE contractors perform internal, objective, and independent safety reviews of nuclear explosive operations and associated activities. The safety review system will include items of potential safety significance from the perspectives of both NES and ES&H. The safety review system will function in an advisory capacity to the line organization management. Safety reviews will be documented in sufficient detail to support management and DOE overview of the process. Additional guidance is provided in G-5610.11-Rev. 0.

e. Readiness Reviews.

(1) Facility Readiness Reviews.

Readiness reviews for facilities used for nuclear explosive operations will be performed in accordance with DOE Order 5480.31 and operations office implementing directives and procedures whenever one is required for facility startup or restart. A facility readiness review is generally not required when a new nuclear explosive operation is introduced to a facility if there are no changes to the facility or its safety basis.

DOE Order 5480.31 is written for nuclear facilities, and some requirements are keyed to a nuclear facility hazard category. Facilities in which nuclear explosive operations are conducted are not designated as nuclear facilities. Due to non-applicability of nuclear facility hazard classification to facilities used for nuclear explosive operations, operations office implementing procedures will specify the application of DOE Order 5480.31 requirements. DOE-STD-1027-92 provides guidance on hazard categorization. Compliance with this standard is not mandatory, but its guidance should be helpful in defining facility readiness assessment requirements in accordance with DOE Order 5480.31.

(2) Nuclear Explosive Operation Readiness Assessments.

A readiness assessment will be performed for startup of a nuclear explosive operation, or for restarting an operation following a shutdown greater than one year, after a significant change to the operation, or after an unplanned shutdown due to significant safety concerns. These readiness assessments will be planned and performed in accordance with processes and requirements in DOE Order 5480.31, tailored to the unique features of nuclear explosive operations.

Operations offices will develop and implement an operations readiness assessment process that addresses their nuclear explosive operations. The process will incorporate the attributes of facility readiness assessments from DOE Order 5480.31 by adopting appropriate requirements from the Order. Requirements unique to nuclear explosive operations will be specified.

Additional guidance is provided in G-5610.11-Rev. 0.

f. Occupational Safety and Health Program.

Operations Offices shall establish requirements to ensure that worker safety and health is given adequate and appropriate consideration in all nuclear explosive operations and associated activities and facilities, in accordance with DOE Order 5483.1A, DOE Order 5480.11, and the DOE/EV/06194.

g. Nuclear Explosive Safety Program.

Nuclear explosives operations require additional special safety consideration because of the potential high consequences of an accident or unauthorized act. Therefore, Operations Offices shall implement a formal, comprehensive program focusing on the nuclear explosive safety aspects of DOE operations. The NES Program shall include the following:

(1) Personnel Assurance Program (PAP).

The DOE PAP, a human reliability program, provides requirements for assuring the suitability of individuals selected for assignment to nuclear explosive duties. All individuals assigned nuclear explosive duties must be in the DOE PAP. The DOE PAP will be administered in accordance with DOE-STD-ZZZZ-95. PAP certification for assignment to nuclear explosive duties is in addition to meeting all other job-qualification requirements.

(2) Training and Qualification.

The training and qualification program required in paragraph 9.a.(2) shall include special training requirements to qualify DOE and DOE contractor employees assigned nuclear explosive safety responsibilities. Specific nuclear explosive safety requirements for training and qualification are provided in DOE-STD-YYYY-95 for the nuclear explosive safety study process and in DOE-STD-ZZZZ-95 for the DOE PAP.

(3) Two-Person Concept.

The Two-Person Concept requires that a minimum of two authorized people be present during all operations that afford access to a nuclear explosive area. The two people must be in a position to detect incorrect or unauthorized acts and meet the following criteria:

- Be certified in the DOE PAP,
- Have technical knowledge with respect to the task being performed, and
- Be knowledgeable of pertinent safety and security requirements.

The Two-Person Concept applies to any area that contains a nuclear explosive or the principal components of a nuclear explosive (main charge and pit), and any other designated area.

Managers of the Operations Offices responsible for nuclear explosive operations shall establish implementing procedures for the Two-Person Concept.

(4) Reader Worker Procedure and Check-off.

Reader worker procedures and check-off are to be used for those nuclear explosive operations specified by the cognizant Operations Office Manager.

(5) DOE Nuclear Explosive Safety Standards.

All DOE nuclear explosive operations shall meet the following qualitative safety standards in order to prevent unintended nuclear detonation or plutonium dispersal:

- (a) There shall be positive measures to minimize the possibility that any authorized activities could lead to fire, high explosive deflagration, or unintended high explosive detonation during nuclear explosive operations.

- (b) There shall be positive measures to minimize the possibility of accidents or inadvertent acts that could lead to fire, high explosive deflagration, or high explosive detonation during nuclear explosive operations.
- (c) There shall be positive measures to minimize the possibility of deliberate unauthorized acts that could lead to fire, high explosive deflagration or high explosive detonation during nuclear explosive operations.
- (d) There shall be positive measures to minimize the possibility of fire, high explosive deflagration, or high explosive detonation given an accident or inadvertent act during nuclear explosive operations.

In the above Standards, hazards that can cause plutonium dispersal during nuclear explosive operations are addressed via evaluation of potential for high explosive detonation and deflagration.

(6) General Nuclear Explosive Safety Rules.

The general nuclear explosive safety rules set forth in this paragraph are mandatory for all DOE nuclear explosive operations. Any deviation from these rules must be approved in advance by the Assistant Secretary for Defense Programs.

- (a) Nuclear explosive operations shall not be performed until a Nuclear Explosive Safety Study or Survey is conducted and the associated report is approved.
- (b) Operations on nuclear explosives or collocated main charge HE and pit, and any operation that could directly affect nuclear explosive safety, shall be performed in accordance with approved written procedures.
- (c) The assembly and disassembly of nuclear explosives will be performed only at those locations authorized by the Assistant Secretary for Defense Programs.
- (d) Operations involving a nuclear explosive not known to be one-point safe shall be conducted only at the Nevada Test Site.
- (e) Production plant operations shall not be started on a nuclear explosive until it is certified by the design agency to be one-point safe.

(f) If it is determined that a nuclear explosive no longer meets the one-point safety criteria, all production plant operations and offsite transportation will be discontinued with that nuclear explosive. Before operations can be resumed with that nuclear explosive, a Nuclear Explosive Safety Study shall be conducted and approved.

(7) Supplemental Nuclear Explosive Safety Rules.

Safety rules may be needed to supplement the general nuclear explosive safety rules for specific operations or to address specific characteristics of an individual design of a nuclear explosive, a specific test, or an operation.

(8) Nuclear Explosive Safety Studies and Surveys.

The Manager of the Operations Office responsible for a proposed nuclear explosive operation shall establish a Nuclear Explosive Safety Study Group (NESSG) to perform an independent nuclear explosive safety evaluation of the proposed operation. Specific requirements for the NESS process are prescribed in DOE-STD-YYYY-95.

(a) The functions of a NES Study are to:

- determine the adequacy of positive measures to satisfy the nuclear explosive safety standards,
- identify any nuclear explosive safety concerns and make appropriate recommendations, and
- write a Nuclear Explosive Safety Study Report in accordance with DOE-STD-YYYY-95.

(b) NES Studies shall include the review of a Nuclear Explosive Hazard Assessment (NEHA). NEHAs are focused on nuclear detonation, and high explosive detonation and deflagration. In addition to general and conceptual guidance provided in DOE-STD-3009-94, specific guidance for performing and documenting NEHAs is provided in DOE-STD-XXXX-95.

(c) For a proposed nuclear explosive operation that is comparable to a previously studied and approved operation, a NES Survey may be conducted. This action is appropriate provided the characteristics of the operation which affect nuclear explosive safety are essentially the same. DOE-STD-YYYY-95 provides requirements for Nuclear Explosive Safety Surveys.

- (d) The functions of a NES Survey are to:
- conduct a comparative analysis of the proposed nuclear explosive operation with a relevant operation in an existing approved NES Study report.
 - write a Nuclear Explosive Safety Survey Report in accordance with DOE-STD-YYYY-95.
- (e) The approval level for NES Study reports is DASMSS. The approval level for NES Survey reports is the cognizant Operations Office Manager.
- (f) Approved NES Study or Survey reports remain (are) valid for five years from the date of approval.
- (9) Nuclear Explosive-Like Assembly (NELA) Requirements.
- (a) Technical criteria for NELA requirements shall be established by the Manager, Albuquerque Operations Office and distributed to all organizations that perform NELA operations. These requirements will support the following qualitative NELA Standards:
- There shall be positive measures to minimize the possibility of accidental, inadvertent, or deliberate unauthorized assembly of a nuclear explosive in place of a NELA configuration.
 - There shall be positive measures to minimize the possibility of accidental, inadvertent, or deliberate unauthorized transfer of a nuclear explosive in place of a NELA configuration.
- (b) Managers of other Operations Offices shall implement the NELA requirements established by the Manager, Albuquerque Operations Office, as applicable.

(10) Permanent Marking Instructions.

Permanent marking of nuclear explosives and NELAs is intended to provide a rapid and accurate method to distinguish between configurations capable of a nuclear detonation and those that are not.

- (a) Permanent marking instructions apply to nuclear explosives and NELAs in the custody of the DOE. However, NELAs that are routinely assembled and disassembled for training, development, testing, evaluation, or demonstration purposes need not be

permanently marked provided the NELA is not shipped offsite.

- (b) Permanent marking instructions shall be established and issued by the Manager, Albuquerque Operations Office. Managers of other Operations Offices shall implement the permanent marking instructions established by the Manager, Albuquerque Operations Office, as applicable.

(11) Control of Electrical Testers/Equipment.

Managers of Operations Offices responsible for nuclear explosive operations shall establish safety requirements for electrical testers/electrical equipment used in NEAs.

- (a) Testers that introduce electrical energy into a nuclear explosive or high explosive subassemblies in an NEA shall meet the following requirements, as a minimum:
 - (1) Each tester shall have an independent safety theme that does not rely upon the nuclear explosive's safety features.
 - (2) No single point failure within a tester shall result in the application of unintended stimuli.
 - (3) Testers shall use the lowest practical values of internal and output currents and voltages that will adequately perform their intended functions.
 - (4) A comprehensive safety analysis shall be performed and documented for each electrical tester and the electrical tester/nuclear explosive or high explosive interface.
 - (5) Procedures shall be established to properly control, store, maintain, calibrate, and operate testers.
 - (6) Each model of electrical tester and its nuclear explosive or high explosive interface shall be studied by an NESSG and approved.
 - (7) Operations offices shall be establish and maintain a record of approved electrical testers.
 - (8) Computer-controlled testers shall provide positive measures against inadvertent or

unauthorized actuation of nuclear explosive safety critical components (e.g., strong-link switches).

- (b) Any electrical energy source or electrical equipment within an NEA will be evaluated and approved. The process for evaluating and approving electrical energy sources and electrical equipment for use in an NEA shall be reviewed in a NESS.

(12) Offsite Transportation of Nuclear Explosives.

The Manager of the Albuquerque Operations Office is responsible for all DOE offsite transportation of nuclear explosives and shall establish requirements and procedures to assure safe offsite transportation. Offsite transportation operations begin when the loaded conveyance is closed and ends with the opening of the conveyance at its destination. The following requirements shall be met.

- (a) Nuclear explosives shall not be transported offsite in the same conveyance with any other cargo.
- (b) Nuclear explosives shall be transported offsite in conveyances specifically approved by the Albuquerque Operations Office manager for transport of nuclear explosives. Nuclear explosive conveyances shall be validated as acceptable for conveying hazardous material in conformance with applicable Department of Transportation (DOT) regulations.
- (c) Nuclear explosives shall be transported and restrained in compliance with the general instructions of Technical Publication (TP) 35-51; the specific procedures, equipment descriptions, and restraint requirements specified in TP 45-51, TP 45-51A, and TP 45-51D; and in compliance with TP 20-7. Technical design guidelines for nuclear explosive transportation handling and restraint hardware are contained within the DOE Nuclear Explosive Transportation Standard, DOE-STD-AAAA-95.

(13) Onsite Transportation of Nuclear Explosives

Managers of Operations Offices responsible for nuclear explosive operations shall establish requirements and procedures to assure safe onsite transportation of nuclear explosives at their respective sites. Technical design guidelines for nuclear explosive transportation

handling and restraint hardware are contained within the DOE Nuclear Explosive Transportation Standard, DOE-STD-AAAA-95.

(14) Reporting Nuclear Explosive Occurrences.

DOE Order 5000.3C provides requirements for categorization and reporting unusual and off-normal nuclear explosive occurrences. The detailed classification for emergencies and the emergency responses to be taken are provided in DOE 5500.2B. The types of nuclear explosive occurrences that are to be categorized as Emergency Occurrences are:

- an unplanned nuclear or high-explosive detonation or deflagration;
- dispersal of plutonium from a nuclear explosive operation;
- seizure, theft, or loss of a nuclear explosive;
- inadvertent or deliberate unauthorized arming of a nuclear explosive;
- any safeguards or security event involving nuclear explosives that is an actual or potential threat to DOE operations, facilities, or personnel, and results or could result in significant effects on the public health and safety and/or on the national security.

In addition to any other Departmental reporting requirements, the Office of the DASMSS (Attention: Office of Weapons Surety) shall receive initial and follow-up reports relating to nuclear explosive occurrences.

10. VARIANCES, WAIVERS and EXCEPTIONS.

Alternate or equivalent means of providing adequate safety may be proposed to meet a specific requirement of this Order and associated Manuals, Guides, and Standards. The following procedures and approval levels shall apply:

- a. Variance. A variance is an approved condition that technically varies from the safety directive requirements, but affords equivalent levels of protection without compensatory measures.

- (1) A variance may be approved by the cognizant Operations Office Manager. Notification of variances shall be made to DASMSS.

- (2) Variances may be approved for an indefinite period of time.
 - (3) Variances shall be documented.
- b. Waiver. A waiver is an approved nonstandard condition that deviates from DOE directive requirements which, if uncompensated, would create a potential or real vulnerability and, therefore, requires implementation of compensatory measures for the period of the waiver (e.g., expenditure of resources to implement enhanced protection measures).
- (1) Waivers may be approved by cognizant Operations Office Managers providing:
 - (a) Cognizant Headquarters Program Office(s) and the Office of Weapons Surety are notified of the nature of the waiver 30 days in advance of such approval.
 - (b) Comments provided by Headquarters Elements are considered before approving the waiver.
 - (2) A waiver shall not be implemented until adequate compensatory measures are in place.
 - (3) Approvals shall specify the time duration of the waiver.
 - (4) Waivers shall be documented.
- c. Exception. An exception is an approved deviation from a DOE safety directive requirement that creates a safety vulnerability. Exceptions shall be granted only when correction of the nonstandard condition is adjudged to be not feasible and compensatory measures are inadequate to preclude the acceptance of risk. An exception must be approved by the DASMSS or higher authority where specified in this Order.
- (1) Approvals shall specify the time duration and periodic revalidation requirements of the exception.
 - (2) Exceptions shall be documented.
- d. Specific elements of information to be included with each request for a variance, waiver, or exception are:
- (1) Identification of the requirement from which a deviation is being requested, with a citation (paragraph or other provision) and summary of the requirement.

- (2) Identification of the specific facility, process, procedure, system etc.
 - (3) Specific description of the deviation and the associated reason or rationale for the deviation request. A description of the relationship of the subject of the deviation request to other safety interests shall be included if they are significantly affected.
 - (4) Description of the current measure(s) used for prevention/protection and a evaluation of the effectiveness of such measure(s); description of alternative measure(s) or level(s) of prevention/protection to be provided as an alternative to the requirement(s).
 - (5) Expected duration of the condition for which the deviation is requested, including milestones for correcting, alleviating, or eliminating the deviant condition, if applicable.
 - (6) An evaluation of the risk associated with the deviation. Results of the safety analysis and evaluation of nuclear explosive safety and ES&H concerns conducted on compensatory measures which form the basis of the deviation, shall be included.
11. Contact. Deputy Assistant Secretary for Military Application and Stockpile Support, Office of Nuclear Surety.

**Nuclear Surety Standards
Safety, Security, and Control Committee**

All Department of Energy (DOE) nuclear explosive operations shall meet the following qualitative surety standards in order to prevent unintended nuclear detonation, fissile material dispersal, or loss of control.

1. There shall be positive measures to minimize the possibility of accidents, inadvertent acts, or authorized activities that could lead to fire, high explosive deflagration, or unintended high explosive detonation.
2. There shall be positive measures to minimize the possibility of fire, high explosive deflagration, or high explosive detonation given accidents or inadvertent acts.
3. There shall be positive measures to minimize the possibility of deliberate unauthorized acts that could lead to fire, high explosive deflagration, or high explosive detonation.
4. There shall be positive measures to ensure adequate security of nuclear explosives.
5. There shall be positive measures that, given access, allow authorized operations and prevent or delay unauthorized nuclear detonation.

DOE 5610-SERIES, NUCLEAR EXPLOSIVE SAFETY ORDERS INCORPORATION OF NUCLEAR SAFETY REQUIREMENTS APPLICABLE TO OTHER DEFENSE NUCLEAR FACILITIES

INTRODUCTION

In accordance with the Recommendation 93-1 Action 4 Report and the Nuclear Explosive Safety Study Corrective Action Plan (NESSCAP), this enclosure describes the Department's methodology in incorporating the requirements from nuclear safety orders and programs applicable to other defense nuclear facilities and/or commercial equivalent activities into the DOE 5610 Series Orders.

This information also satisfies the Deputy Assistant Secretary for Military Application and Stockpile Support (DP-20) tasking (93-1/NESSCAP Policy Oversight Group of February 28, 1995) to describe how other nuclear safety orders would be adopted into the nuclear explosive and weapon safety (surety) program.

GENERAL

A "graded approach" concept based upon an understanding of the "relative importance to nuclear explosive safety, the magnitude of any hazard involved, and potential consequences" was used to review and adopt all DOE nuclear safety orders applicable to other defense nuclear facilities.

- a. Under the graded approach concept, subject matter expert (SME) teams examined the provisions of each adopted order to:
 - identify situations where more stringent safety criteria or standards were required;
 - evaluate potential consequences which might adversely affect nuclear explosive safety;
 - determine if implementing requirements were confusing or incompatible with nuclear explosive operations;
 - determine if the requirement would lower nuclear explosive safety; and
 - assess the impacts of changes or revisions cited in the Recommendation 93-1 Action 4 or the NESSCAP report to determine if any changes to the implementation goals were required.

- b. The SME's adopted the requirements of the nuclear facility safety orders if:
- it did not duplicate an existing requirement;
 - the requirement addressed processes that were not incompatible with nuclear explosive operations; and
 - the requirements applied to other processes and/or procedures.
- c. Modify adopted requirements, if necessary, to fit the needs of the nuclear explosive operations safety program.

Adoption of Nuclear Facility Orders for Nuclear Explosive Operations

The following DOE nuclear facility safety orders are referenced in the Recommendation 93-1 Action 4 Report as Orders that will be adopted by reference.

DOE Order 4330.4B, Maintenance Management Program

The order contains one chapter related to nuclear facilities; one chapter related to nonnuclear facilities.

Action: Proposed DOE Order 5610.11 adopts the complete DOE Order 4330.4B and directs that the more rigorous nuclear facility standards of Chapter II be applied to equipment used for nuclear explosive operations.

DOE Order 5480.20, Personnel Selection, Qualification, Training and Staffing Requirements at DOE Reactor and Nonreactor Nuclear Facilities

Revised DOE Order 5480.20A was adopted, with selected exceptions, to maintain requirements consistent with other defense nuclear facilities, but focused on unique attributes of nuclear explosive operations personnel.

Action: Proposed DOE Order 5610.11 requires development of specific personnel training and qualification requirements equivalent to those stated in Chapter IV, DOE Order 5480.20A. Specific position and duty requirements for nuclear explosive operations personnel are significantly different from other nuclear processing facilities; these unique mission elements are included in the proposed order.

Chapters II and III of DOE Order 5480.20A were not adopted as they are specifically written for nuclear reactor (category types A and B) personnel and are not considered appropriate for nuclear explosive personnel needs.

DOE Order 5480.21, Unreviewed Safety Questions (USQ)

The order provides the authority for contractors to make minor changes in safety processes/procedures after completing an internal USQ safety review. The contractor is permitted to implement these changes without formal DOE approval, but is required to maintain pertinent documents for periodic DOE reviews.

Nuclear explosive operations are very regimented; contractors are not permitted to make procedural or physical changes involving operations. Changes involving nuclear explosive operations are evaluated by safety personnel; approval responsibility for changes to nuclear explosive procedures shall be retained by the Operations Manager.

Action: Proposed DOE Order 5610.11 adopts this order for facilities used in nuclear explosive operations, but not for procedural changes for the operations themselves; it was assessed to provide a lower level of safety assurance than existing requirements. While the USQ process is effectively

employed to ensure that facility changes do not impact the facility safety basis, the approval authority for nuclear explosive operations remains with DOE. This additional level of positive control was believed to be warranted to preclude operations change implementation without DOE approvals.

DOE Order 5480.22, Technical Safety Requirements (TSR)

The order provides for the establishment of safety related controls that are associated with the operation of the nuclear explosive facility.

Action: Proposed DOE Order 5610.11 adopts this order for the nuclear explosive facility operations, but not for operations involving direct work on the nuclear explosives. Enhancements are needed to provide a higher level of safety assurance for nuclear explosive operations than the existing requirements for nuclear explosive facilities.

As the NES program evolved, it developed and implemented a specific terminology to describe procedural and process controls more in keeping with the assembly, disassembly and test operations. These controls should be treated similarly to a facility TSR, but as separate entities called "Operational Safety Controls" and "Nuclear Explosive Safety Rules". The current draft 5610.11, which does not describe this topic adequately, will add the following definition:

"Operational Safety Control (OSC): Operating limits, surveillance requirements, safety boundaries, and management and administrative controls that significantly contribute to protecting workers, the public, and the environment from hazards other than nuclear detonation and HE detonation and deflagration (which are addressed by Nuclear Explosive Safety Rules) for specific nuclear explosive operations and associated activities. OSCs will be specified as necessary to prevent or mitigate the consequences of, a safety significant incident. OSCs apply to operations in the nuclear explosive facilities. These are similar to the TSRs which are most closely associated with the facility operations rather than the nuclear explosive operation."

This definition clarifies the distinction between OSCs and TSRs. The OSC may or may not be tied to the facility safety basis described in the facility SAR. In most cases, they only apply while a specific nuclear explosive operations is being conducted. The intent is to distinguish them from facility TSRs and not to reduce the documentation requirements or the importance with their compliance.

DOE Order 5480.23, Safety Analysis Reports

A major 93-1/ NESSCAP program objective is to assure that these safety elements are integrated and coordinated, and that divergence between the safety analysis report (SAR) and nuclear explosive safety study (NESS) processes does not occur.

Action: Proposed DOE Order 5610.11 adopts the basic 5480.23 concepts and policies, but recognizes that some exceptions are necessary due to unique aspects of the nuclear explosive operations.

The basic concept of nuclear explosive safety is to isolate nuclear explosive operations, both electrically and mechanically, from the facility in which they are conducted. As such, the classic elements used to describe the bounding accidents and incidents for a nuclear facility SAR are variable for nuclear explosive operations.

The potential bounding accidents and incidents must consider the various nuclear explosive systems which could be processed through the facility. The SAR bounding incidents can and would be based on some worst case hazards analysis of the different nuclear explosive systems which may be present in the facility at any time. Each nuclear explosive system carries certain hazards and risks. These risks are evaluated by the appropriate design laboratory, which is responsible for the development of the procedures, tests, and other equipment that is necessary to perform the specific nuclear explosive operation.

The issue here is the development of a worst-case composite nuclear explosive source from different physical attributes and configurations, which support definition of the facility safety basis. However, no nuclear explosive device may be replicated by the unique "special case" explosive device used to develop the facility safety basis.

In general, the use of the worst case composite nuclear explosive device characteristics may provide the safety basis for a facility which could be used for any nuclear explosive operation. However, if reviewed on a nuclear explosive device-by-device basis, such as performed in the NESS process, the SAR would demonstrate that it's requirements are met, but that the facility safety basis greatly exceeds that which is needed for the device specific operation under study.

The method employed for the proposed DOE Order 5610.11 and supporting standards and guides is to perform an operation-specific hazard analysis to verify that the specific operation is within the facility bounding accident. This provides for a rigorous analysis of potential hazards on a device-by-device basis, without requiring a major revision to the facility SAR.

This approach is not inconsistent with the policy and requirements contained in DOE Order 5480.23. The major difference with provisions of the SAR order concerns the criticality safety of a single nuclear explosive device. This is a special nuclear explosives design issue for which the design laboratory is responsible for the conduct and review of all nuclear explosive criticality directly related to the device design. This sensitive information is reviewed and results reported in the NESS process.

The hazard analysis supporting the nuclear explosive safety evaluations is used "...to pinpoint weaknesses in facility design and in the design of nuclear explosive operations and associated activities." Also, the Hazards Analysis Report (HAR) (ref definition) "documents the systematic evaluation of

hazards to workers, the public, and the environment for a specific nuclear explosive operation and its associated activities." The HAR is an addendum to the SAR.

One of the primary elements of the revised and enhanced NESS process is to clarify the requirements for safety and hazards analysis information to be documented for nuclear explosive operations. To assure integration of the SAR/NESS processes, a companion element to the facility HAR is the Nuclear Explosive Hazards Analysis (NEHA), which describes those accidents and incidents examined by NESS. While the HAR supports the SAR process, the NEHA performs a similar function for the NESS.

Standards and guides covering the conduct of the NESS and NEHA are being developed. The adverse consequences of a nuclear explosive accident or incident are such that all actions necessary to minimize the possibility of an occurrence or otherwise mitigate the consequences must be taken. One of the critical elements in the development of the SAR/NESS planning and coordination guidance is to assure that processes and procedures are established ensuring the effective evaluation of potentially serious safety concerns and no significant hazard is overlooked or ignored.

These nuclear explosive and facility safety elements will be discussed in detail in proposed DOE Order 5610.11 and the supporting technical standard for the conduct of the nuclear explosive hazards analysis. The standard will also describe interface issues related to the facility HAR.

DOE Order 5480.24, Nuclear Criticality Safety

Action: Proposed DOE Order 5610.11 adopts this order for nuclear explosive operations, with the exception that issues related to the criticality safety of a nuclear explosive device are a design laboratory responsibility and are not addressed in the SAR. This is addressed in the NEHA that supports the NESS.

DOE Order 5480.31, Startup and Restart of Nuclear Facilities

Action: Proposed DOE Order 5610.11 fully adopts this Order for the startup and restart of the nuclear explosive facilities, but not for nuclear explosive operations.

SME evaluations have shown that DOE Order 5480.31 simply does not address the needs of nuclear explosive operations. In simple terms, the core issue is the capability of the facility and its staff to conduct the required nuclear explosive operation. Startup of a new nuclear explosive facility or the restart of an existing facility after an extended shut-down period, has different meanings for nuclear explosive operations. These operations-unique factors must be integrated into the base 5610.11 Order and its supporting standards and guides.

The intent of this action is not to avoid the requirement of DOE Order 5480.31, but to allow the development and implementation of an equivalent process tailored to nuclear explosive operations. Certain elements of DOE Order 5480.31 must be tailored to nuclear explosive operations and include:

- DOE Order 5480.31 criteria on the need of a readiness review are specifically described in terms of the facility startup or restart. (*emphasis added*)
- Startup of a nuclear explosive operation involves more than a statement that the facility is ready; it represents the culmination of actions by the design laboratories, DOE and the Management and Operating contractors. These actions exceed tasks specified in DOE Order 5480.31.
- DOE Order 5480.31-like requirements describing nuclear explosive operations requirements will be included in the NESS and NES Survey Appraisal processes. These documents will provide core information describing the equivalent processes.

DOE Order 5482.1B, Environment, Safety and Health (ES&H) Appraisal Program

The Recommendation 93-1/NESSCAP program contained specific requirements for the conduct of appraisals for both nuclear explosive safety and environment, safety and health.

Action: Elements of the DOE Order 5482.1B applicable to the facilities are adopted completely. Elements of the order are adopted for performing ES&H appraisals of the nuclear explosive operations, but are modified to include additional constraints. These additional constraints were imposed in order to assure that nuclear explosive safety is not compromised by implementing conventional nuclear safety requirements.

Programmatic appraisal requirements of DOE Order 5482.1B were not adopted in draft DOE Order 5610.10. It is not intended to avoid these appraisals, but rather to avoid duplication; ES&H appraisals related to the nuclear explosive facilities will be accomplished in accordance with the provisions of DOE Order 5482.1B regardless of what is contained in DOE Order 5610.10.

Programmatic appraisals of the nuclear explosive safety appraisal program, as an element of the DOE nuclear explosive and weapons surety (safety) program and required by NESSCAP, will be covered in the proposed DOE Order 5610.11. A standard on the NESS appraisal process is currently under development.

DOE Order 5700.6C, Quality Assurance

10 CFR 830.120 was issued subsequent to the publication of the Recommendation 93-1 Action 4 report, and has superseded DOE Order 5700.6C for contractor Quality Assurance (QA) programs. Both 10 CFR 830.120 and DOE Order 5700.6C were employed for the Recommendation 93-1 Orders evaluation, and the findings contained in the Action 4 report apply equally to the order and the rule.

The QA program criteria contained in the rule are essentially the same as the Order.

ACTION: The 10 CFR 830.120 (rule) has been adopted for nuclear explosive operations to maintain consistency with criteria applicable to other defense nuclear facilities.

IMPLEMENTATION GUIDANCE

Under the Department's new directives system, procedures and rationale for incorporating other nuclear safety provisions into DOE Order 5610.11 are contained in several supporting guides and standards. These documents, which are being prepared by teams of headquarters and field personnel, will be completed by June 30, 1995.

G-5610.11, Implementation Guide for Use with DOE Order 5610.11

DOE-STD-XXXX-95, Hazards Analysis

DOE-STD-YYYY-95, Nuclear Explosive Safety Study Process

DOE-STD-ZZZZ-95, Personnel Assurance Program

DOE-STD-BBBB-95, Nuclear Explosive Surety Program Appraisals

United States Government

Department of Energy

memorandum

Albuquerque Operations Office

DATE: APR 27 1995

REPLY TO:
ATTN OF: NSD

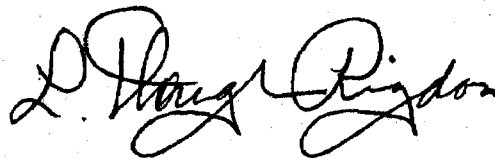
SUBJECT: DNFSB Recommendation 93-1 SME Meetings of March 16-29, 1995

TO: Dana Krupa, DP-21, HQ

This memorandum is for Defense Programs information.

The attachment documents the subject meetings. The objective of the meetings was to have subject matter experts (SMEs) review the Field Integration Team (FIT) drafts of DOE Orders 5610.10 and 5610.11 to verify satisfaction of commitments of the Recommendation 93-1 Action Items. Other objectives were to recommend scope and content for additional guidance and to document the status of all the Recommendation 93-1 actions.

I believe the SME Teams did an excellent job in reviewing the draft Orders and providing feedback to the FIT. I commend all the SMEs who helped in this effort and am especially grateful to those from HQ, NV, and the Laboratories who traveled to Albuquerque to participate.



L. Douglas Rigdon
Director
Nuclear Safety Division

Attachment

cc w/attachment:
N. Dienes, OTMO
S. Guidice, OEST
R. Inlow, ONDP
D. Finley, NESD
S. L. Krahn, DNFSB
T. Mills, DP-21, HQ

Recommendation 93-1/NESSCAP Working Group
Field Integration Team (FIT)
Recommendation 93-1 Subject Matter Expert (SME) Meetings
March 16-29, 1995
Albuquerque, NM

Purpose:

These meeting notes document the Recommendation 93-1 SME meetings held on March 16, 21, 22, 23, 24, 28, and 29, 1995. The objectives of the meetings were as follows.

1. Review the FIT drafts of DOE Orders 5610.10 and 5610.11 to verify:
 - the Orders satisfy the commitments of the Recommendation 93-1 Action Items;
 - the Orders clearly and adequately integrate nuclear facility safety requirements into the requirements for nuclear explosive operations; and
 - referenced guidance is adequate, or the Order identifies an additional standard or guide that must be developed to provide adequate guidance.
2. Recommend scope and content for additional guidance.
3. Document the status of all the Recommendation 93-1 actions based on the FIT final drafts, and identify any actions that are not addressed by the draft Order revisions or these SME meetings.

Participants:

The attendance roster (Attachment 2) identifies the SMEs that participated in each discussion. SMEs from AL and NV were the primary participants, with additional support provided by DOE Headquarters (DP-24 and DP-31) and the weapon design laboratories. The SME meeting input was presented to the full FIT for review and incorporation into the draft Orders. FIT attendance and participation are documented in FIT meeting minutes. Note that the March 24 and 29 meeting dates signify participation in the FIT meetings and do not represent separate SME meetings.

Summary:

Objective 1 was accomplished by a two-step process. SME meetings were held for each Action Item (except for two, which will be discussed below) to review the associated writeup in the FIT draft Orders. SMEs evaluated the Order requirements and guidance against the Action Item to ensure the commitments were accomplished and the Orders provided a clear, technically sufficient statement of appropriate policy for nuclear explosive operations. For most Action Items, a revision to the FIT draft was developed to document the conclusions of the SME evaluations.

The two Action Items that were not addressed in the SME meetings were Item 9, Nuclear Explosive Safety, and Item 15, Onsite Packaging and Transportation. Nuclear explosive safety was not addressed because the issues had been addressed by nuclear explosive safety SMEs in the Nuclear Explosive Safety Study Process Working Group (NESSPWG), which became in essence the FIT, during preparation of the draft Orders. Onsite Packaging and Transportation was not addressed because it will be addressed in a revision to DOE Order 5610.12, currently in progress.

The second step for completing Objective 1 was presenting the proposed revisions to the full FIT for consideration for incorporating into the Orders. This process often stimulated further debate and discussion. While some proposed revisions were accepted and incorporated without additional discussion, further rework of the text by the entire FIT was more typical. The resultant March 29 Final Drafts of the Orders adequately represent the recommendations developed by the Recommendation 93-1 SME meetings.

Objective 2 was accomplished on March 29 by the preparation of an outline of an Implementation Guide to accompany DOE Order 5610.11 (Attachment 3). Discussion during the meetings identified the issues where further guidance beyond that in the Orders was determined necessary or beneficial. New DOE standards are proposed in the Orders, and these will address some of the areas requiring further guidance. The Implementation Guide will address the remaining areas.

Objective 3 was accomplished on March 29 and 30 by reviewing the list of Recommendation 93-1 actions and documenting the status of each (Attachment 4). While many of the actions have been completed, the status matrix indicates that additional guidance is necessary for many items. This guidance will be provided in an Implementation Guide for DOE Order 5610.11 (see preceding paragraph) and five new DOE standards. Personnel assignments and schedules for these were established at the March 30 FIT meeting and will be distributed by the FIT Leader.

SME Discussions:

The SME discussions for each Action Item are summarized in Attachment 1.

Actions:

The Implementation Guide for DOE Order 5610.11 (G-5610.11-REV. 0) will be developed to provide additional guidance for the items listed in Attachment 2. The guide will be prepared by representatives from AL, NV, and DP, with participation or review by additional SMEs as required. The guide is scheduled to be reviewed by the full FIT during its May 2, 1995 session.

Attachment 1

Recommendation 93-1/NESSCAP Working Group
Field Integration Team (FIT)
Recommendation 93-1 Subject Matter Expert (SME) Meetings
March 16-29, 1995
Albuquerque, NM

Summary of Discussions

The following notes summarize the discussions of the SME meetings. To facilitate use, they are presented in the order of the Recommendation 93-1 Action Items, rather than in the order discussed.

Action Item 1 - Audits and Assessments

The Action Item uses the terms "audits," "appraisals," and "assessments." G-830.120-REV. 0 indicates that an audit is one type of assessment. An "appraisal" is considered another type of assessment. The SMEs concluded that all these terms are being used interchangeably. It was recommended that specific requirements for appraisals be specified in a section titled as such in draft DOE Order 5610.10.

The SMEs recommended that the section on assessments be deleted from draft DOE Order 5610.10, because it adds nothing to the quality assurance (QA) program requirement in draft DOE Order 5610.11 for nuclear explosive operations to comply with the criteria of paragraph (c) of 10 CFR 830.120. These criteria include management and independent assessments. Implementation Guide G-830.120-REV. 0 is referenced, and this was determined to provide adequate guidance.

The Recommendation 93-1 evaluation acknowledged that appraisal requirements for nuclear explosive safety exist in DOE Order 5610.11, but found the requirements to be less rigorous than those in DOE Order 5482.1B for ES&H appraisals. The need to upgrade the nuclear explosive safety appraisal program requirements was also identified by the Independent Nuclear Explosive Safety Study Review. The response to those recommendations was a plan for developing a new DOE standard to upgrade nuclear explosive safety appraisals. This new standard was not cited in draft DOE Order 5610.10; it was recommended that reference to it be added. To satisfy the Recommendation 93-1 commitments the new standard must specify nuclear explosive appraisal requirements that are equivalent to those for ES&H appraisals in DOE Order 5482.1B and 10 CFR 830.120, paragraph (c), and it must specify appropriate training and qualification requirements for personnel conducting these appraisals.

Draft Order 5610.10 did not cite DOE Order 5700.6C for ES&H appraisals, as committed to in the Action Item. It was recommended that a requirement to perform ES&H appraisals in

accordance with paragraph (c) of 10 CFR 830.120, which supersedes DOE Order 5700.6C for nuclear facilities, be added to draft DOE Order 5610.11 for ES&H appraisals.

The additional constraints to ensure that nuclear explosive safety considerations are factored into the ES&H appraisals and any resulting recommendations were determined to be necessary and appropriate.

Another SME recommendation was to add requirements for higher level appraisals (e.g., DP-20 appraisals of the operations offices).

During discussion of the 93-1 SME recommendations with the full FIT, potential problems were identified in specifying adoption of the entire DOE Order 5482.1B for appraising nuclear explosive operations. DOE Order 5482.1B assigns responsibilities for two levels of appraisals. DOE Field Organizations are to conduct appraisals of subordinate field activities (involving either DOE or contractor organizations) to ensure the effectiveness of ES&H activities. EH-1 is assigned the responsibility for conducting management appraisals of line organization ES&H programs. To obtain confirming data for these management appraisals, EH-1 is also assigned responsibility for conducting appraisals of select facilities and operations.

The EH-1 appraisal requirements in DOE Order 5482.1B are in effect at the sites where nuclear explosive operations are being conducted, though the nuclear explosive operations are currently excluded from appraisal requirements. There was concern that if DOE Order 5482.1B were adopted in its entirety, the EH-1 appraisals of line organization ES&H programs would be required specifically for nuclear explosive operations. The stated objective of the EH-1 appraisal is to assess the effectiveness of line organization ES&H programs, and not to appraise implementation for specific facilities or operations.

It was agreed to adopt only the Field Organization requirements from DOE Order 5482.1B for nuclear explosive operations. This resolves the observation of the Recommendation 93-1 evaluation by requiring ES&H appraisals of nuclear explosive operations. EH-1 appraisals of site ES&H programs are required by DOE Order 5482.1B; it is not necessary to repeat this requirement in the 5610 Orders.

Since operations office ES&H organizations are currently conducting ES&H appraisals for nuclear facilities as required by DOE Order 5482.1B, detailed requirements and procedures should be in place. The SMEs agreed that using these same requirements and procedures would be appropriate for ES&H appraisals of nuclear explosive operations. DOE Order 5610.10 specifies that operations offices are responsible for establishing these requirements and guidelines, to include requirements for training and qualifying appraisal personnel.

Action Item 2 - Commitment Tracking System

The SMEs recommended rewording the requirement in draft DOE Order 5610.11 to more clearly address the Action Item. It was also agreed that further guidance will be provided in the

Implementation Guide for DOE Order 5610.11 (G-5610.11-REV. 0). The guidance will discuss items that should be included in the system, and how the system should be used to improve the effectiveness of safety programs related to nuclear explosive operations.

Action Item 3 - Performance Indicators

It was agreed to leave the general requirement for performance indicators as it is in the draft DOE Order 5610.11. It was also agreed that additional guidance should be provided in G-5610.11-REV. 0, at least to cite examples as was done in the AL Supplemental Directives (SDs). Travis Hunsaker volunteered to organize a working session at NV to discuss potential performance indicators that could be used for the Nevada Test Site (NTS). Input from this session could be added to G-5610.11-REV. 0.

Action Item 4 - Quality Assurance

The SMEs agreed it is appropriate to require compliance with the paragraph (c) criteria of 10 CFR 830.120 and reference guidance in G-830.120, rather than adopt the requirements and guidance of DOE Order 5700.6C, as stated in the Recommendation 93-1 Report. The basic requirements are identical, and the guidance in G-830.120 is better than that in DOE Order 5700.6C. The rule has also superseded the Order for DOE nuclear facilities.

The SMEs recommended deleting the statement related to a graded approach and replacing it with paragraph (b)(1) of 10 CFR 830.120, which includes the graded approach requirement. Paragraph (b)(1) also requires development of a Quality Assurance Program (QAP). The SMEs believed it necessary to add a requirement to draft DOE Order 5610.11 for DOE to approve the QAP. This approval is required in the rule, but that paragraph cannot be adopted because the approval is tied to the rule implementation schedule. The schedule for implementing DOE Order 5610.11 will be specified later.

Recommendation 93-1 actions included upgrading requirements for nuclear explosive operations in AL Quality Criteria documents (QC-1 and QC-2). Although QC-1 and QC-2 address many of the 10 CFR 830.120 nuclear safety criteria, the primary purpose of QC-1 and QC-2 is to assure product quality. It was decided that both the criteria of 10 CFR 830.120 and QC-1 and QC-2 can be applied to nuclear explosive operations. The safety requirements (10 CFR 830.120 criteria) are specified in the SD. Product quality assurance program requirements can also be imposed in lower tier documents, but they must not compromise compliance with 10 CFR 830.120 criteria. Although the Recommendation 93-1 actions were not explicitly performed, they are considered completed by specifying 10 CFR 830.120 criteria, which satisfies the intent of the actions.

Action Item 5 - Safety Committees

Draft DOE Order 5610.11 contains the basic requirements for a safety review system. The SMEs concluded it was appropriate to provide additional expectations for the system in G-

5610.11-REV. 0. This guidance will be based on the review system elements in DOE Order 5480.6 (and former DOE Order 5480.5), and will be tailored to the unique characteristics of nuclear explosive operations.

The first action in this Action Item is to evaluate existing programs and identify areas for improvement. It was decided that it is more appropriate for DOE to establish the basic requirements and expectations in the DOE Order and accompanying guide, which would then require contractors to evaluate their own programs and develop necessary improvements. The objective of the first action will be accomplished, although the steps will be performed in a different sequence.

Action Item 6 - Staffing and Personnel Training and Qualification

The SMEs recommended changing the manner of adopting DOE Order 5480.20A to include the entire Order minus Chapters II and III, rather than just adopting Chapter I. This satisfies the first action of the Action Item.

The second action, which relates to training program accreditation, was determined to be outside the scope of the 5610 Orders. All accreditation requirements, including the specific facilities that require program accreditation, are specified in DOE Order 5480.18B. The second action is addressed by that Order.

Training program standards and guidance were discussed to complete the third action. It was determined that the general personnel training and qualification program requirements in DOE Order 5480.20A are sufficient in scope and technically adequate for contractor training programs. It was determined that Chapter IV, which contains specific training and qualification requirements for non-reactor nuclear facility personnel, does not fully apply to nuclear explosive operations. The SMEs recommended that specific requirements similar to those in Chapter IV be developed for nuclear explosive operations and associated activities and facilities, and issued in DOE Order 5610.11 or an accompanying standard or guide.

The FIT concluded that a single set of specific training and qualification requirements was not advisable due to the significant differences between the nuclear explosive operations at Pantex and NTS. The FIT Final Draft of DOE Order 5610.11 requires that responsible organizations develop requirements equivalent to those in Chapter IV of DOE Order 5480.20A.

The Action Item refers to DOE Order 5480.20, which was in effect at the time the Action 4 Report was issued. This Order has subsequently been revised to 5480.20A. With the exception of personnel staffing (Observation b for this topic in the Recommendation 93-1 Action 4 Report), adopting 5480.20A instead of 5480.20 will resolve the observations on which the Action Item was based. Personnel staffing requirements were deleted from 5480.20 in the revision to 5480.20A.

It was subsequently discovered (when preparing these notes) that personnel staffing is addressed

by DOE Order 5480.22 under Administrative Controls. The requirement is, "Staffing requirements for facility position[s] important to safe operation of the facility shall be provided in the Administrative Controls sections." Guidelines to implement this requirement are provided in Attachment 1 to DOE Order 5480.22. Draft DOE Order 5610.11 adopts DOE Order 5480.22 for Technical Safety Requirements (TSRs) for the facilities in which nuclear explosive operations are conducted, and requires that similar controls be developed for the operations. This provides requirements for nuclear explosive operations that are equivalent to those for nuclear facilities, and therefore satisfies the intent of this Action Item. The effort to finalize DOE Order 5610.11 should, however, consider adding a sentence to the TSR section noting that the staffing requirement and guidelines in DOE Order 5480.22 apply to nuclear explosive operations and associated activities and facilities.

Action Item 7 - Human Factors

The observations that led to this Action Item identified two separate issues: human factors requirements for designing the equipment and procedures used for assembly, disassembly, and testing; and requirements for assessing the safety risks of human involvement.

Draft DOE Order 5610.11 contains general requirements to consider human factors in designing equipment and developing procedures for nuclear explosive operations. It was agreed that specific expectations that will satisfy this requirement will be provided in G-5610.11-REV. 0. Material similar to that in AL SD 5610.11 will be provided.

Draft DOE Order 5610.11 requires that human factors be addressed in the hazards analysis, as will be described in the new DOE standard for hazards analysis for nuclear explosive operations. An adequate treatment of this issue in the new standard will satisfy the action.

Action Item 8 - Criticality Safety

The SMEs believed that the requirement in draft DOE Order 5610.11 to perform and document safety analyses in accordance with DOE Order 5480.23 satisfies the action to "adopt the criticality provisions of DOE Order 5480.23." The SMEs developed a recommended revision to the statement in draft DOE Order 5610.11 that adopts DOE Order 5480.24 to simply require that "nuclear explosive operations and associated activities comply with the criticality safety requirements of DOE Order 5480.24." The ANSI Standards that are referenced in DOE Order 5480.24 provide sufficient and adequate guidance; no additional guidance is necessary.

One exception to the DOE Order 5480.23 reporting requirements was recommended, and a statement was added to the draft DOE Order 5610.11 that criticality safety of a specific nuclear explosive and its components should not be discussed in the SAR. Criticality safety for a single nuclear explosive is a design requirement, and it is believed that for the facility SAR (or the operation hazards analysis) to report on the details of the nuclear physics of the weapon design (or test device design) is not appropriate. Criticality safety of a single unit is a responsibility of the design labs and is addressed in the design process.

Action Item 10 - Safety Analysis/Technical Safety Requirements

Draft DOE Order 5610.11 requires that safety analysis of facilities used for nuclear explosive operations be performed and documented in accordance with DOE Order 5480.23, based on bounding hazards. The SMEs recommended a clarification to specify that the analysis will include a spectrum of accident types, each based on bounding hazard conditions, and avoid implying that the analysis can be based on a single bounding accident.

The SMEs also recommended a revision to specifically require a complete hazards analysis for each nuclear explosive operation performed in the facility. The subset of this analysis that involves nuclear detonation, and high explosive detonation and deflagration, will be documented in a Nuclear Explosive Hazards Assessment (NEHA) for use by the Nuclear Explosive Safety Study (NESS) Group.

Draft DOE Order 5610.11 requires safety analyses be performed in accordance with the general guidance of DOE-STD-3009-94 and the specific guidance of a new DOE standard to be written specifically for nuclear explosive operations. The SMEs agreed that this approach is necessary due to the unique features of nuclear explosive operations and the attendant hazards and risks. While DOE-STD-3009-94 provides general methods, specific techniques must be identified to adequately assess the operation (e.g., considering humans as accident initiators). The SMEs believe this approach will satisfy the Action Item commitments for safety analysis if the new standard provides adequate direction and guidance.

Draft DOE Order 5610.11 requires that facility TSRs be developed and implemented in accordance with the requirements of DOE Order 5480.22. The SMEs recommended minor changes to draft DOE Order 5610.11 to clarify this point. The draft Order did not specify that DOE Order 5480.22 be applied to operating limits and controls for nuclear explosive operations. The SMEs agreed with this approach, believing that controls for individual operations do not merit permanent controls with the accompanying implementation and enforcement features of facility TSRs.

Operating controls do, however, need to be developed and implemented, and the SMEs believed that requirements "similar" to DOE Order 5480.22 TSRs, with specifics left to the operation offices to define, are appropriate. Draft DOE Order 5610.11 contained this requirement in principle, and the SMEs recommended clarifying revisions. The SMEs believed that the guidelines of DOE Order 5480.22 are sufficient to use as a basis for operating controls, and no additional guidance is required.

Action Item 11 - Unreviewed Safety Question Process

The SMEs agreed with the draft Order 5610.11 in adopting DOE Order 5480.21 for the facilities in which nuclear explosive operations are conducted, but not adopting it for the operations.

The process in DOE Order 5480.21 allows operating contractors to implement changes without

obtaining DOE approval if the contractors determine that the change does not impact the facility safety basis. DOE policy has traditionally been to require that the design labs and DOE review all changes that may impact nuclear explosive safety, even when the operating contractor's evaluation indicates that the change does not impact the facility safety basis. The SMEs agreed that this policy is warranted due to the potential consequences associated with the hazard involved, and the complexity and sensitivity of the nuclear explosive.

Draft DOE Order 5610.11 requires that contractors develop and implement change control processes equivalent to those in DOE Order 5480.21 for nuclear explosive operations and associated activities, with DOE approval required for changes that can potentially impact nuclear explosive safety. The additional approval requirement was added in response to a recommendation by the SMEs. No additional guidance was determined to be necessary. The SMEs believed that many of the features of the processes in DOE Order 5480.21 can be applied to nuclear explosive operations.

Action Item 12 - Configuration Management

The SMEs agreed with the general approach in draft DOE Order 5610.11 to require a Configuration Management (CM) program and reference DOE-STD-1073-93 for guidance, but recommended a number of additions and revisions for clarification. A requirement was added for DOE to approve contractors' CM plans, and specific items that must be addressed by the program were added to the requirements. Additional guidance (similar to that in AL SD 5610.11) will be provided in G-5610.11-REV. 0.

Action Item 13 - Design Criteria - Tooling and Special Equipment

Draft DOE Order 5610.11 contains requirements to select or establish standards for the design, fabrication, and testing of tooling and equipment used in nuclear explosive operations, and to maintain design criteria documents. The SMEs believed that additional guidance was appropriate, and it will be provided in G-5610.11-REV. 0.

Action Item 14 - Maintenance

The actions are to adopt Chapter II of DOE Order 4330.4B for maintaining facilities and equipment used for nuclear explosive operations, and to require DOE approval of the Maintenance Implementation Plan. Draft DOE Order 5610.11 includes these requirements, and the Action Item is satisfied.

Action Item 16 - Readiness Reviews

This SME meeting differed from the others in that it was held with the full FIT.

Draft DOE Order 5610.11 requires that readiness reviews for facilities used for nuclear explosive operations be performed in accordance with DOE Order 5480.31. Further direction is necessary

to apply the requirements that are keyed to a nuclear facility category, since the facilities used for nuclear explosive operations are not nuclear facilities. It was agreed to require that operations office procedures specify how these requirements are to be applied. DOE-STD-1027-93 is referenced for non-mandatory guidance to indicate the basis of nuclear facility hazard categories.

Discussions on applying DOE Order 5480.31 to nuclear explosive operations led to two alternatives. The first alternative would specify that DOE Order 5480.31 is to be used for nuclear explosive operations, recognizing that interpretations of some provisions of the Order would be required to fit the process (e.g., interpret "facility startup" to include the start of a new operation within a continuously operating facility). The second alternative would be to require that operations offices develop a review process equivalent to that in DOE Order 5480.31 that is specific to nuclear explosive operation.

The compromise was to require operations offices to develop and implement an operations readiness assessment process that incorporates the attributes of facility readiness assessments from DOE Order 5480.31 by adopting appropriate requirements from the Order and specifying requirements unique to nuclear explosive operations. G-5610.11-REV. 0 will provide expectations for the operations readiness assessment, including the essential attributes of DOE Order 5480.31 and the unique requirements for assessing the readiness of nuclear explosive operations.

Attachment 2
Recommendation 93-1 Working Group, Subject Matter Expert Meeting Attendance
March 16 – March 29, 1995, Albuquerque, New Mexico

	Bailey	Brooks	Burgin	Chaney	Dilley	Gutierrez	Hunsaker	Lifke	Little	Loczi	Martinez	Miller, C.	Miller, R.	Peterson	Rigdon	Roberson	Roybal	Salmonson	Snow	Thompson	Wahler	Walston	
1. Audits and Appraisals March 22		X		X			X		X	X			X						X				
March 28			X		X		X	X	X	X		X	X				X						
2. Commitment Tracking March 28			X				X		X	X		X					X						
3. Performance Indicators March 28			X		X		X	X	X	X		X	X				X						
4. Quality Assurance March 22				X			X		X			X						X					
5. Safety Committees March 21						X	X		X	X		X	X										X
March 28			X				X		X	X		X	X				X						
6. Staffing and Personnel Training and Qual. March 21						X	X		X	X		X					X						
March 28			X				X		X	X		X	X										
7. Human Factors March 28			X				X		X	X		X	X				X					X	
8. Criticality Safety March 21						X			X			X	X		X		X						X
10. Safety Analysis/TSRs March 21						X	X		X			X								X			X
11. Unreviewed Safety Question Process March 21						X			X			X	X		X		X			X			X
12. Configuration Management March 21						X	X			X		X											X
13. Design Criteria - Tooling and Special Equipment March 28			X	X			X			X		X						X					
14. Maintenance March 21						X						X	X		X		X						X
16. Readiness Reviews March 16	X			X								X			X								

Attachment 2
(Continued)

Recommendation 93-1 Working Group
Subject Matter Expert Meeting Attendees

Following are the names and organization affiliations of the individuals listed on the attendance matrix:

Bailey, J. Nolan, AL-OMD
Brooks, Jesse, AL-NESD
Burgin, Corrine, LLNL
Chaney, Dave, DP-24
Dilley, Dan, AL-PAD
Gutierrez, Tom, AL-OMD
Hunsaker, Travis, NV
Lifke, Don, AL-PAD
Little, Ed, DP-31 (Sonalysts)
Loczi, Vic, DP-31
Martinez, Joe, LANL
Miller, Charles, AL-NSD
Miller, Robert, AL-OMD (Stone & Webster)
Peterson, Joel, LANL
Rigdon, Doug, AL-NSD
Roberson, Jeff, DP-31
Roybal, Liz, AL-NSD
Salmonson, John, AL-NSD
Snow, Ben, AL-PAD
Thompson, Steve, AL-NSD
Wahler, Vince, AL-NSD
Walston, Bob, AL-NSD

Attachment 3

OUTLINE

**IMPLEMENTATION GUIDE
for use with
DOE Order 5610.11
SAFETY OF NUCLEAR EXPLOSIVE OPERATIONS**

Forward

- I. Introduction**
- II. Application**
- III. General Information**
- IV. Guidelines**
 - 1. Configuration Management**
 - 2. Issues Management**
 - 3. Performance Indicators**
 - 4. Process Design**
 - a. Equipment**
 - b. People**
 - c. Facilities**
 - d. Procedures**
 - e. Nuclear Explosives**
 - 5. Safety Reviews**
 - 6. Readiness Reviews**

Attachment 4

**DNFSB Recommendation 93-1
Action Item Status**

March 30, 1995

**DNFSB Recommendation 83-1
Action Item Status**

Action No.	Action Item Category	Action Item Number and Title	Description of the Action	Status
1	General		Issue revised 5610 series Orders that adopt, by reference, nuclear safety requirements.	Addressed by individual actions, below.
2			Issue a policy document to define clearly the scope of the 5480 and 5610 series Orders, establish organizational responsibilities, and establish a process to coordinate future Orders.	A statement of policy and organizational responsibilities has been included in draft DOE Order 5610.11. A process to coordinate future Orders has been established as documented by (later).
3			Initiate action to review exclusion statements in existing Orders and directives.	Need to send memo to EH with standard exclusion phrase for them to use in nuclear safety Orders. DP-311 to draft memo for DP-1.
4	Management Systems	1. Audits and Assessments	Adopt DOE Orders 5482.1B and 5700.6C for appraisals of nuclear explosive operations and augment with unique nuclear explosive standards.	Draft DOE Order 5610.10 requires ES&H Appraisals of nuclear explosive operations in accordance with DOE Orders 5482.1B and 10 CFR 830.120. Draft DOE Order 5610.10 requires nuclear explosive safety appraisals in accordance with a new DOE standard.
5			Review applicability of existing guidance and technical standards	Completed by March 22 and 28, 1995 SME meetings. New standard will be developed for nuclear explosive safety appraisals. DOE Order 5482.1B was determined to be applicable and sufficient for ES&H appraisals.
6			Develop requirements for training and qualifying audit/appraisal personnel for nuclear explosive operations.	New DOE Standard will include training and qualification requirements for nuclear explosive safety appraisals. Draft DOE Order 5610.10 requires operations offices to specify training and qualification requirements for personnel who conduct ES&H appraisals of nuclear explosive operations.

**DNFSB Recommendation 83-1
Action Item Status**

Action No.	Action Item Category	Action Item Number and Title	Description of the Action	Status
7		2. Commitment Tracking Sys.	Establish a commitment tracking system for nuclear explosive operations and associated facilities.	Draft DOE Order 5610.11 requires establishment of commitment tracking systems. Guidance will be included in Implementation Guide G-5610.11-REV. 0.
8		3. Performance Indicators	Identify performance indicators that may help assess and improve nuclear explosive operations.	Draft DOE Order 5610.11 requires operations offices to establish requirements for PIs for nuclear explosive operations. Guidance will be included in G-5610.11-REV. 0.
9			Add appropriate reqts. to 5610 series if PIs unique to nuclear explosives are identified.	See above.
10		4. Quality Assurance	Adopt DOE Order 5700.6C for nuclear explosive operations.	Draft DOE Order 5610.11 adopts the QA criteria of 10 CFR 830.120 (the rule that supersedes DOE Order 5700.6C) for nuclear explosive operations and associated activities and facilities.
11			Assess the interface between the program reqts. in QC-1 for assembly/disassembly at Pantex and those in 5700.6C for the associated facilities.	The criteria of 10 CFR 830.120 are adopted as requirements. AL must review the requirements of QC-1 compared to 10 CFR 830.120, and revise or replace it as appropriate.
12			Assess quality control program policy for the NTS test activities; provide adequate program definition.	The criteria of 10 CFR 830.120 are adopted as requirements. NV must review the requirements of QC-2 compared to 10 CFR 830.120, and revise or replace it as appropriate.
13		5. Safety Committees	Evaluate scope of existing safety review groups and procedures; identify improvements; incorporate reqts. into 5610 series Orders.	The approach is to specify the requirements that contractors must meet. Contractors will review their existing programs and must upgrade to the requirements in the Order.

**DNFSB Recommendation 93-1
Action Item Status**

Action No.	Action Item Category	Action Item Number and Title	Description of the Action	Status
14			Review applicability of existing guidance and technical standards, e.g., contractor internal review system in DOE Order 5480.6; augment as needed.	Resolved at the March 22 SME meeting. Guidance for safety reviews for nuclear explosive operations will be provided in G-5610.11-REV. 0. The guidance will be based on the system in DOE Order 5480.6, but tailored to nuclear explosive operations.
15	Personnel	6. Staffing and Personnel Trng./Qual.	Adopt DOE Order 5480.20 for nuclear explosive operations; augment with weapons-unique standards as necessary in 5610 series.	Draft DOE Order 5610.11 requires that training and qualification programs address the requirements of DOE Order 5480.20A, and specific requirements equivalent to those of Chapter IV of DOE Order 5480.20A be developed.
16			Determine necessity of accrediting training programs for nuclear explosive facilities/operations.	The revision of DOE Order 5480.18A (to 5480.18B) specifies the list for training programs requiring accreditation; the list does not include programs for nuclear explosive operations.
17			Review applicability of existing guidance and technical standards.	Completed at March 21 SME meeting. DOE Order 5480.20A was determined to be adequate, and no additional guidance or technical standards were determined to be necessary.
18		7. Human Factors	Review applicability of existing guidance and technical standards; develop additional guidance for nuclear explosive operations, as needed.	Completed at March 28 and 29 SME meetings. Human factors requirements are included in draft DOE Order 5610.11. The guidance in DOE-STD-3009-94 was determined to be applicable; additional guidance will be provided in G-5610.11-REV. 0 and a new DOE standard for hazards analysis.
19	Safety Programs	8. Criticality Safety	Adopt Order 5480.24 and the criticality safety provisions of 5480.23; augment 5610 series with unique nuclear explosive standards.	Draft DOE Order 5610.11 adopts DOE Orders 5480.23 and 5480.24, and augments with one unique nuclear explosive guideline for applying DOE Order 5480.23.
20			Review applicability of existing guidance and technical standards; augment as needed.	Completed at March 21 SME meeting. The guidance provided by DOE Order 5480.24 and its referenced standards was determined to be adequate.

**BNFSB Recommendation 93-1
Action Item Status**

Action No.	Action Item Category	Action Item Number and Title	Description of the Action	Status
21		9. Nuclear Explosive Safety	Integrate the reqts. for nuclear explosive risk assessment with the hazard and accident analyses.	Draft DOE Order 5610.11 requires a hazards assessment of the nuclear explosive operation. Detailed requirements for the assessment will be provided in a new DOE standard.
22			Add qualification reqts. to DOE Order 5610.11 for personnel assigned to the NESS group.	Qualification requirements for NESS personnel will be provided in a new DOE standard.
23		10. Safety Analysis/TSRs	Adopt DOE Orders 5480.22 and .23 for nuclear explosive operations and facilities; augment with unique nuclear explosive standards in the 5610 series, as necessary.	Draft DOE Order 5610.11 adopts DOE Orders 5480.22 and 5480.23, augmented with unique requirements for nuclear explosive operations.
24			Review applicability of existing guidance and technical standards; augment as needed.	Resolved at March 21 SME meeting. Draft DOE Order 5610.11 refers to DOE-STD-3009-94 for general guidance for safety analysis. Specific nuclear explosive hazards analysis guidance will be provided by a new DOE standard.
25		11. USQ Process	Adopt DOE Order 5480.21 and augment the 5610 series with unique provisions of a USQ-like process for nuclear explosive operations.	Draft DOE Order 5610.11 adopts DOE Order 5480.21 for facilities in which nuclear explosive operations are conducted. Operations offices are required to develop equivalent processes for nuclear explosive operations, with more stringent approval requirements.
26			Review applicability of existing guidance and technical standards; augment as needed.	Completed at March 21 SME meeting. It was determined that DOE Order 5480.21 provides adequate guidance to develop an equivalent process for nuclear explosive operations.
27	Plant and Hardware	12. Configuration Management	Add CM reqts. to the 5610 series for nuclear explosive facilities and operations.	Draft DOE Order 5610.11 requires development and implementation of a CM program.

**DNFSB Recommendation 93-1
Action Item Status**

Action No.	Action Item Category	Action Item Number and Title	Description of the Action	Status
28			Review the adequacy of existing guidance and applicable technical standards; augment as need. Adopt existing CM guidelines (STD-1073) as appropriate.	Completed at March 21 SME meeting. The guidance in DOE-STD-1073-83 was determined to be adequate and is referenced by draft DOE Order 5610.11. Additional guidance will be included in G-5610.11-REV. 0.
29		13. Design Criteria - Tooling and Special Equipment	Review applicability of existing guidance and technical standards; augment as needed. Add reqts. to 5610 series for developing GDC for tooling and special equipment important to safety of nuclear explosive operations.	Completed at March 28 and 29 SME meetings. Draft DOE Order 5610.11 requires contractors to maintain design criteria documents for tooling and equipment. Additional guidance will be included in G-5610.11-REV. 0.
30		14. Maintenance	Adopt Chapter II of Order 4330.4B for maintenance of facilities and equipment associated with nuclear explosive operations; require DOE approval of MIP.	Draft DOE Order 5610.11 adopts Chapter II of DOE Order 4330.4B and the requirement for DOE to approve the Maintenance Implementation Plan.
31	Operations and Procedures	15. Onsite Packaging and Transport.	Review applicability of existing guidance and technical standards; augment to include specific reqts. in 5610 series for onsite packaging and transport of nuclear components.	To be addressed in revised DOE Order 5610.12 (revision in progress at AI; completed draft to HQ by April 30, 1995).
32		16. Readiness Reviews	Adopt Order 5480.31 for readiness reviews of nuclear explosive facilities; augment as necessary with unique reqts. for nuclear explosive operations.	Draft DOE Order 5610.11 adopts DOE Order 5480.31 for readiness review of nuclear explosive operations and associated activities and facilities. Application of DOE Order 5480.31 will be tailored to the unique features of nuclear explosive operations.

DNFSB Recommendation 93-1
Action Item Status

Action No.	Action Item Category	Action Item Number and Title	Description of the Action	Status
33			Review applicability of existing guidance and technical standards; augment as needed.	Completed at March 16 SME meeting. Draft DOE Order 5610.11 require operations offices to develop and implement a readiness assessment process for nuclear explosive operations that incorporates the attributes of DOE Order 5480.31 and addresses their operations.