

MANUAL

DOE M 452.2-2

Approved: 4-14-09

NUCLEAR EXPLOSIVE SAFETY EVALUATION PROCESSES



U.S. DEPARTMENT OF ENERGY
Nuclear Weapon Surety and Quality Division

AVAILABLE ONLINE AT:
www.directives.doe.gov

INITIATED BY:
National Nuclear Security Administration

NUCLEAR EXPLOSIVE SAFETY EVALUATION PROCESSES

1. PURPOSE. This Manual provides supplemental details to support the nuclear explosive safety (NES) evaluation requirement of Department of Energy (DOE) Order (O) 452.2D, *Nuclear Explosive Safety*, dated 4-14-09. This Manual is now the governing directive for NES evaluations and NES change control. It incorporates and modifies the provisions and guidance formerly promulgated in DOE-Standard (STD)-3015-2004 and the nuclear explosive operations (NEOs) change control processes detailed in DOE Albuquerque Supplemental Directive (AL) 56XB, *Development and Production Manual* Chapter 11.7, *Nuclear Explosive Operations Change Control Process*.

2. CANCELLATIONS. None.

3. APPLICABILITY

- a. Departmental Elements. Except for the exclusion in paragraph 3c, this Manual applies to all Departmental elements that are involved in performing, managing, overseeing, or directly supporting nuclear explosive operations or associated activities, including those created after the Manual is issued. (Go to <http://www.directives.doe.gov/pdfs/reftools/org-list.pdf> for the most current listing of Departmental elements.).

The Administrator of the National Nuclear Security Administration (NNSA) must ensure that NNSA employees and contractors comply with their respective responsibilities under this Manual. Nothing in this Manual must be construed to interfere with the NNSA Administrator's authority under section 3212(d) of Public Law (P.L.) 106-65 to establish Administration specific policies, unless disapproved by the Secretary.

- b. DOE Contractors. The contractor requirements document (CRD) in Attachment 1 will apply to the extent set forth in the contract. Except for the exclusions in paragraph 3c, the CRD is intended to be applicable to contractors with responsibilities for operation and/or management of sites or facilities and whose responsibilities include performing, managing, overseeing, or directly supporting nuclear explosive operations (NEOs) or associated activities.

- c. Exclusions.

- (1) The following Departmental elements are excluded: Office of the Chief Financial Officer, Office of the Chief Information Officer, Office of Civilian Radioactive Waste Management, Office of Congressional and Intergovernmental Affairs, Office of Economic Impact and Diversity, Energy Information Administration, Office of Electricity Delivery and Energy Reliability, Office of Energy Efficiency and Renewable Energy, Office of Environmental Management, Office of Fossil Energy, Office of

Hearings and Appeals, Office of Human Capital Management, Office of Intelligence and Counterintelligence, Office of Legacy Management, Office of Management, Office of Nuclear Energy, Office of Policy and International Affairs, Office of Public Affairs, Office of Science, Bonneville Power Administration, Southeastern Power Administration, Southwestern Power Administration, and Western Area Power Administration.

- (2) In accordance with the responsibilities and authorities assigned by Executive Order 12344, codified at 50 USC sections 2406 and 2511 and to ensure consistency through the joint Navy/DOE Naval Nuclear Propulsion Program, the Deputy Administrator for Naval Reactors (Director) will implement and oversee requirements and practices pertaining to this Manual for activities under the Director's cognizance, as deemed appropriate.
4. SUMMARY. To ensure adequate nuclear explosive safety for nuclear explosive operations conducted by the DOE, NNSA, and their respective contractors, this Manual presents eight chapters detailing administrative and procedural requirements supplementary to DOE O 452.2D, as follows:
 - a. Chapter I provides an introduction and establishes management responsibilities including administration of this Manual.
 - b. Chapter II provides an overview of NES evaluations.
 - c. Chapter III sets forth requirements for the personnel performing NES evaluations.
 - d. Chapters IV-VI present detailed guidance and requirements for each type of nuclear explosive safety evaluation.
 - e. Chapter VII addresses closure of NES evaluation findings.
 - f. Chapter VIII establishes the process for requesting and granting exemptions to the requirements of this Manual.
 - g. CRD (Attachment 1) is applicable to contractors with responsibilities for or related to NEOs or associated activities.
 - h. Attachment 2 defines the acronyms used in this Manual.
5. REFERENCE. Title XXXII of P.L. 106-65, National Nuclear Security Administration (NNSA) Act, as amended, which established a separately organized agency within the DOE.

6. CONTACT. Address questions concerning this Manual to the Nuclear Weapon Surety and Quality Division at 202-586-5624.



STEVEN CHU
Secretary of Energy

CONTENTS

CHAPTER I. INTRODUCTION AND RESPONSIBILITIES

1.	Introduction	I-1
2.	Responsibilities	
a.	Assistant Deputy Administrator for Science, Engineering and Production Programs	I-1
b.	Director, Office of Military Application and Stockpile Operations	I-1
c.	Director, Nuclear Weapon Surety and Quality Division.....	I-1
d.	Chief, Nuclear Explosive Safety Branch	I-2
e.	Nuclear Explosive Safety Study Group Chairs	I-2
f.	Director, Nuclear Weapons Stockpile Division.....	I-3
g.	NNSA Site Office Managers.....	I-3
h.	Assistant Deputy Administrator for Secure Transportation.....	I-4
i.	NNSA Production Agencies	I-5
j.	NNSA Design Agencies.....	I-5
k.	NNSA Project Team Leads.....	I-6

CHAPTER II. NUCLEAR EXPLOSIVE SAFETY EVALUATION OVERVIEW

1.	NES Evaluation Types and Timing	II-1
a.	Nuclear Explosive Safety Studies	II-2
b.	Operational Safety Reviews.....	II-3
c.	Contractor NES Change Evaluations.....	II-4
d.	Office of Secure Transportation NES Screens.....	II-4
e.	NES Change Evaluations	II-4
2.	Security Operations	II-5
3.	Urgent NES Concerns.....	II-5
4.	NES Evaluation Schedules	II-5
5.	Process Deviations	II-5

CHAPTER III. NUCLEAR EXPLOSIVE SAFETY EVALUATION PERSONNEL

1.	Introduction	III-1
2.	NESSG Qualifications	
a.	Personal Characteristics	III-1
b.	Training.....	III-2
c.	Independence	III-2
d.	Certification	III-3
3.	NESSG Formation	III-3
4.	NESSG Composition	III-4

CONTENTS (continued)

5.	Technical Advisors (TAs).....	III-4
	TABLE 1 – Minimum NESSG Personnel Requirements for NNSA NES Evaluations	III-4
6.	NNSA Contractor NES Representatives.....	III-4

CHAPTER IV. NUCLEAR EXPLOSIVE SAFETY STUDY PROCESS

1.	Introduction.....	IV-1
2.	NESS Planning Meetings	IV-1
3.	NESS Input Documentation.....	IV-1
4.	Use of Safety Basis Documentation.....	IV-6
5.	NESS Preparation	IV-6
	a. Study-specific NESSG Training	IV-6
	b. Input Documentation Delivery.....	IV-7
	c. Orientation Meeting	IV-7
	d. NESSG Final Preparation	IV-7
6.	NESS Prerequisites	IV-8
7.	NESS Conduct	IV-8
	a. Briefings.....	IV-8
	b. Demonstrations	IV-8
	c. Deliberations	IV-9
	d. Report Generation and Concurrence.....	IV-9
8.	STA Comments.....	IV-11
9.	Feedback	IV-11
10.	NESS Validation.....	IV-11
11.	NESS Report Approval Process	IV-12
	a. Post-Evaluation Briefings and Conferences	IV-12
	b. Report Submittal	IV-12
	c. Approval Authority Actions.....	IV-13
12.	Records	IV-13

CHAPTER V. OPERATIONAL SAFETY REVIEW PROCESS

1.	Introduction.....	V-1
2.	OSR Planning Meetings.....	V-1
3.	OSR Supporting Documentation	V-1
4.	OSR Preparation	V-2
5.	OSR Conduct	V-2
	a. Briefings.....	V-3
	b. Observations	V-3
	c. Deliberations	V-3

CONTENTS (continued)

d.	Report Generation and Concurrence.....	V-3
e.	Feedback	V-4
6.	OSR Report Approval Process.....	V-4
7.	Records	V-4

CHAPTER VI. NUCLEAR EXPLOSIVE SAFETY CHANGE CONTROL PROCESSES

1.	Introduction	VI-1
2.	Organizational Change Control Assessments	VI-1
a.	Focus	VI-2
b.	Documentation	VI-2
c.	Determination Processes	VI-2
(1)	CNCE.....	VI-2
(2)	OST NES Screen.....	VI-3
d.	Determination Outcomes	VI-4
(1)	NESSG Evaluation Required.....	VI-4
(2)	NESSG Evaluation Not Required.....	VI-4
(3)	Records	VI-4
3.	NESSG Change Evaluations.....	VI-4
a.	NCE	VI-4
(1)	Planning	VI-4
(2)	Input Documentation.....	VI-5
(3)	Preparation	VI-5
(4)	Conduct	VI-6
(a)	Briefings.....	VI-6
(b)	Demonstrations	VI-6
(c)	Deliberations	VI-7
(d)	NCE Memorandums	VI-8
(e)	Feedback	VI-8
(5)	Approval Process	VI-8
(a)	NCEs without Minority Opinions Involving Pre-start Findings...	VI-8
(b)	NCEs with Minority Opinions Involving Pre-start Findings	VI-9
b.	NESS.....	VI-10

CHAPTER VII. NUCLEAR EXPLOSIVE SAFETY EVALUATION FINDINGS RESOLUTION

1.	Finding Basis and Types	VII-1
2.	Response to Findings	VII-1

CONTENTS (continued)

a.	Assignment of Responsibility	VII-1
b.	Ongoing Operations	VII-1
c.	Other Applications	VII-1
d.	Corrective Actions	VII-1
3.	Finding Closure Process	VII-2
4.	Status Reports	VII-2
5.	Closure Approval	VII-2
CHAPTER VIII. EXEMPTIONS		VIII-1
ATTACHMENT 1. CONTRACTOR REQUIREMENTS DOCUMENT (CRD)		
DOE M 452.2-2, <i>NUCLEAR EXPLOSIVE SAFETY EVALUATION</i>		
<i>PROCESSES</i>		
ATTACHMENT 1, APPENDIX A.		
NNSA CONTRACTOR NESSG TRAINING REQUIREMENTS		
ATTACHMENT 2. LIST OF ACRONYMS AND ORGANIZATIONAL DESIGNATIONS		

CHAPTER I

INTRODUCTION AND RESPONSIBILITIES

1. INTRODUCTION. The evaluations described in this Manual comprise a formalized approach to ensuring the nuclear explosive safety (NES) of all nuclear explosive operations (NEOs) performed by the National Nuclear Security Administration (NNSA) and its contractors. This approach requires that all new, approved, current, and proposed changes to NEOs and associated supporting infrastructure receive a commensurate level of review and analysis.
2. RESPONSIBILITIES.
 - a. Assistant Deputy Administrator for Science, Engineering and Production Programs.
 - (1) Approves/disapproves nuclear explosive safety study (NESS) and operational safety review (OSR) reports (if the OSR report includes a pre-start finding or a minority opinion), and ensures proper disposition of associated minority opinions.
 - (2) Approves/disapproves proposed NEO changes for which a NES Change Evaluation (NCE) produced a minority opinion involving a pre-start finding or potential pre-start finding.
 - (3) Approves/disapproves extensions to the timing requirements for periodic NES reevaluations (OSRs and NESSs).
 - (4) Designates (in coordination with Assistant Deputy Administrator for Nuclear Safety and Operations) an NNSA line manager to be responsible for ensuring timely and effective action on findings from NES evaluations for which Assistant Deputy Administrator for Science, Engineering and Production Programs is the approval authority.
 - (5) Approves exemptions to this Manual.
 - b. Director, Office of Military Applications and Stockpile Operations. Selects, ensures the hiring/contracting of, funds, and certifies a minimum of four Nuclear Explosive Safety Study Group (NESSG) senior technical advisors (STAs).
 - c. Director, Nuclear Weapon Surety and Quality Division.
 - (1) Approves/disapproves deviations from NES evaluation process requirements as assigned in this Manual.
 - (2) Updates and maintains this Manual.

d. Chief, Nuclear Explosive Safety Branch.

- (1) Recruits NESSG STAs and recommends selections to the Office of Military Application and Stockpile Operations.
- (2) Receives, reviews, and accepts or rejects the certifications for NNSA non-Federal Employee NESSG members.
- (3) Ensures that NES training courses are identified and developed as needed.
- (4) Ensures the training and certification currency of an appropriate number of NESSG chairs to meet workload and schedule demands.
- (5) Ensures that NESSG STAs receive the NES training required for certification.
- (6) Provides periodic NES evaluation schedule updates to organizations providing NESSG personnel.
- (7) Selects a NESSG chair for each NES evaluation.
- (8) Establishes a process to accumulate, distribute, and implement documented feedback.
- (9) Works as necessary with responsible NNSA line management to achieve concurrence on proposed closure of NES evaluation findings.
- (10) Biennially reviews the NESSG member certifications to ensure they show that individuals meet the NESSG member requirements.
- (11) Tracks the scheduling of NES evaluations to ensure NESSs and OSRs are performed on the generally alternating five year cycle as specified in Chapter II.
- (12) Maintains a file copy of NESS input documentation until the NESS is superseded or otherwise no longer relevant.

e. Nuclear Explosive Safety Study Group Chairs.

- (1) Review nominations and approve NESSG personnel for NES evaluations.
- (2) Verify that NESSG personnel certifications will be current at the start of a NES evaluation.
- (3) For master studies, work with the Chief, Nuclear Explosive Safety Branch to determine if a master study or OSR is the appropriate form of NES evaluation to fulfill the normally alternating five-year NESS-OSR cycle.

- (4) Conduct OSR planning meetings.
 - (5) Determine the need for and ensure the conduct of NES Change Evaluation (NCE) planning meetings, as appropriate.
 - (6) Recruit technical advisors (TAs) to participate in NES evaluations, as needed.
 - (7) Coordinate with the project team and/or NNSA line management as appropriate to schedule NES evaluations.
 - (8) Organize, convene, and lead NES evaluations.
 - (9) Submit NESS and OSR reports, NCE memorandums, and associated transmittal letters to the responsible approval authority.
 - (10) Forward final copies of NESS and OSR reports, NCE memorandums, and associated correspondence to participating NESSG personnel and appropriate organizations.
 - (11) Coordinate substantive changes to NESS and OSR reports and NCE memorandums with participating NESSG personnel and retain associated documentation.
 - (12) Suspend a NES evaluation if unable to fulfill the requirements of DOE O 452.2D and this Manual.
- f. Director, Nuclear Weapons Stockpile Division. Provides NNSA management of project teams assembled to plan, prepare, and present input documentation, briefings, and demonstrations for operation-specific NES evaluations.
- g. NNSA Site Office Managers.
- (1) Ensure that all NEOs under site office purview are covered by a current NES evaluation and request NES evaluations as needed.
 - (2) Ensure that NESSGs have adequate administrative and logistical resources.
 - (3) Provide a formal request to proceed with NES evaluations.
 - (4) At their discretion, inform the Assistant Deputy Administrator for Science, Engineering and Production Programs of the line management positions taken regarding findings and minority opinions from NES evaluations for which the Assistant Deputy Administrator for Science, Engineering and Production Programs is the approval authority.

- (5) Approve/disapprove OSR reports that have no pre-start findings or minority opinions.
- (6) Approve/disapprove change proposals and responses to emerging information evaluated by NCEs that did not result in a minority opinion related to a pre-start, or potential pre-start, finding.
- (7) Ensure a process is established for tracking and closure of approved NES evaluation findings.
- (8) Approve/disapprove closure of approved NES evaluation findings with advice of the Chief, Nuclear Explosive Safety Branch.
- (9) Ensure the training of, and certify NNSA site office NESSG members, if any.
- (10) Notify the contracting officer when a contract is affected by this Manual so that the CRD can be added.

h. Assistant Deputy Administrator for Secure Transportation.

- (1) Ensures that all NEOs under Office of Secure Transportation (OST) purview are covered by a current NES evaluation and requests NES evaluations as needed.
- (2) Provides input, briefings, and demonstrations as required and certifies the accuracy of the information.
- (3) Ensures that NESSGs have adequate administrative and logistical resources.
- (4) Provides a formal request to proceed with NES evaluations.
- (5) Informs the Assistant Deputy Administrator for Science, Engineering and Production Programs of the line management positions taken regarding findings and minority opinions from NES evaluations for which the Assistant Deputy Administrator for Science, Engineering and Production Programs is the approval authority.
- (6) Approves/disapproves OSR reports that have no pre-start findings or minority opinions.
- (7) Approves/disapproves change proposals and responses to emerging information evaluated by NCEs that did not result in a minority opinion related to a pre-start, or potential pre-start, finding.

- (8) Provides NNSA management of project teams assembled to plan, prepare, and present input documentation, briefings, and demonstrations for NES evaluations of OST operations.
- (9) Establishes a process for tracking and closure of approved NES evaluation findings.
- (10) Approves/disapproves closure of approved NES evaluation findings with advice of the Chief, Nuclear Explosive Safety Branch.
- (11) Establishes a process for approving and implementing Assistant Deputy Administrator for Secure Transportation allowable changes.
- (12) Establishes and maintains auditable records of OST NES screens, NCE determinations, and approval of Assistant Deputy Administrator for Secure Transportation allowable changes.

i. NNSA Production Agencies.

- (1) Ensure the training of and certify contractor NESSG members.
- (2) Provide TAs to support NES evaluations, as needed.
- (3) Provide input, briefings, and demonstrations as required and certify the completeness and accuracy of the information.
- (4) Lead the development of safety supporting documentation for NES evaluations and ensure the completeness of the information.
- (5) Identify, train, and certify independent NES representatives to perform Contractor NES Change Evaluations (CNCE).
- (6) Prepare change packages and initiate the NEO change control process for proposed changes to authorized NEOs.
- (7) Conduct CNCEs.
- (8) Establish and maintain auditable records of CNCE determinations and approval of contractor-allowable changes.
- (9) Establish a process for approving and implementing contractor-allowable changes.
- (10) Take appropriate action on approved NES evaluation findings.

j. NNSA Design Agencies.

- (1) Ensure the training of and certify design agency NESSG members.

- (2) Provide TAs as requested by NESSG chair to support NES evaluations.
- (3) Provide input, briefings, and demonstrations as required and certify the completeness and accuracy of the information.
- (4) Take appropriate action on approved NES evaluation findings.
- (5) Inform NNSA and NNSA Production Agency contractor via the Information Engineering Release (IER) process of actionable information that has the potential to adversely impact NES for approved NEOs.

k. NNSA Project Team Leads.

- (1) Conduct NESS planning meetings and document and distribute planning meeting results.
- (2) Ensure explicit certification of the technical accuracy and completeness of NES evaluation input documentation.
- (3) Submit to the NNSA site office or OST, as applicable, a formal declaration of readiness to proceed with a NES evaluation.
- (4) Manage study preparation, including input documentation, briefings, and demonstrations for topics brought to a formal NES evaluation.
- (5) Implement, as needed, the necessary tooling, processes and procedures to ensure that their proposed change or response to emerging information will meet the NES Standards and other NES criteria.
- (6) Present all relevant information from all available sources relating to the proposed change or response to emerging information. In cases where there is a conflict in the technical opinion, present all sides of the issue for the NESSG to deliberate.

CHAPTER II

NUCLEAR EXPLOSIVE SAFETY EVALUATION OVERVIEW

1. NES EVALUATION TYPES AND TIMING. NES evaluations qualitatively assess the adequacy of controls in meeting the DOE NES Standards and other NES criteria defined in DOE O 452.2D, *Nuclear Explosive Safety*, and DOE M 452.2-1A, *Nuclear Explosive Safety Manual*. NES evaluations are required before a NEO is authorized; periodically for ongoing NEOs; and when proposed changes or emerging information—for example, discovery of anomalous conditions—affect an approved NEO. NES evaluations are initiated on request from the responsible NNSA line management and rely on descriptive documentation and analyses performed by others, as well as direct observations of NEOs and associated facilities, equipment, tooling, and management programs.

The five kinds of formal NES evaluation are NESSs, OSRs, and NCEs, which are performed by a NESSG; CNCEs conducted by qualified NNSA management and operating (M&O) contractor NES representatives; and OST NES screens performed by OST staff.

Proposed new or significantly modified operations, support facilities, and processes are evaluated by a NESS and are subject to periodic reevaluation in the form of either a NESS or an OSR. NESSs and OSRs generally alternate on a five-year cycle. However, because the timing of OSRs is dependent on operational schedules, it may be necessary or advisable to schedule an OSR as early as four years following a NESS or, with approval of the Assistant Deputy Administrator for Science, Engineering and Production Programs, to postpone the OSR beyond five years following a NESS. In either case, the next NESS must be scheduled within ten years from the previous NESS approval, unless an extension to the timing requirement is approved by the Assistant Deputy Administrator for Science, Engineering and Production Programs.

If a NESS or OSR will not be conducted within the timeframe specified the responsible NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable, must notify the Assistant Deputy Administrator for Science, Engineering and Production Programs in writing, with a copy to the Director, Office of Military Application and Stockpile Operations, Director, Nuclear Weapon Surety and Quality Division, and Chief, Nuclear Explosive Safety Branch, at least 90 days before the deadline. Requests for extensions must be submitted to the Assistant Deputy Administrator for Science, Engineering and Production Programs, with a copy to the Director, Office of Military Application and Stockpile Operations; Director, Nuclear Weapon Surety and Quality Division; and Chief, Nuclear Explosive Safety Branch, at least 30 days prior to the deadline. Requests must include:

- Reference to the NESS or OSR for which the extension is requested.
- A compelling reason for the extension.
- The rescheduled date for conducting a NESS or OSR, as appropriate.

- An assessment of the adequacy of the safety basis.
- A list of significant process, tooling, equipment, tester, and facility changes since the relevant NESS or OSR, including changes that could not be approved by the contractor due to NES considerations.
- Other pertinent data or information used as a basis for the extension request.
- Identification of any additional risks that will be incurred if the extension is granted.
- Relevant information from the status reports for approved NES evaluation findings, as detailed in Chapter VII, paragraph 4.

To grant an extension to the NESS/OSR cycle, the Assistant Deputy Administrator for Science, Engineering and Production Programs must establish that it is warranted under the circumstances specified and would not present an undue risk. The Assistant Deputy Administrator for Science, Engineering and Production Programs must document the reason for approving, including as appropriate conditions for approval, or denying the extension in correspondence that includes the requester; Director, Office of Military Application and Stockpile Operations; the Director, Nuclear Weapon Surety and Quality Division; and the Chief, Nuclear Explosive Safety Branch.

Proposed changes to approved NEOs and emerging information with the potential to impact NES are the impetus for CNCEs, OST NES screens and, in turn, sometimes to an NCE or NESS as detailed in Chapter VI of this Manual.

The following is an overview of each kind of NES evaluation. Detailed guidance is provided in Chapters IV-VI of this Manual.

- a. Nuclear Explosive Safety Studies. All NEOs must be supported by a preoperational NESS, or set of relevant NESSs, approved before operations can begin. A NESS may also be used to evaluate proposed changes, emerging information or, with the concurrence of the Assistant Deputy Administrator for Science, Engineering and Production Programs, for periodic reevaluation in lieu of an OSR in accordance with the alternating NESS-OSR evaluation cycle.
 - (1) The two kinds of NESSs are—
 - (a) Operation-specific studies evaluate proposed NEOs and interfaces with applicable master studies and other programs, procedures, and processes relevant to NES not addressed in a master study, to determine if controls are adequate to meet the NES standards and other NES criteria.

- (b) Master studies (MS) evaluate facilities, equipment, tooling, processes, and management programs that may be common to multiple NEOs to determine if they are adequately characterized and controlled to support future evaluation of their use in operation-specific NEOs.

Because a weapon-specific NEO is not being evaluated, definitive statements regarding satisfaction of the NES standards may not be possible.

For MSs only, the NESSG chair and the Chief, Nuclear Explosive Safety Branch must determine if a MS or OSR is the appropriate form of evaluation to fulfill the normally alternating NESS-OSR cycle requirement. The reason for alternating NESSs and OSRs for operation-specific studies is to capitalize on the different strengths of each and reduce the effects of their different disadvantages. For MSs, the principal difference between a NESS and an OSR (observing simulations versus actual NEOs) is not expected to be particularly relevant or impact the effectiveness of the evaluation.

- (2) An operation-specific study or master study, as appropriate, must be performed—
 - (a) for the startup of a NEO facility;
 - (b) for all proposed NEOs;
 - (c) when jointly determined to be necessary by the NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable, and the Chief, Nuclear Explosive Safety Branch;
 - (d) when the NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable, and the Chief, Nuclear Explosive Safety Branch do not agree whether an NCE or a NESS is appropriate; and
 - (e) in accordance with the alternating NESS-OSR evaluation cycle detailed above.

Detailed requirements for planning and performing a NESS are presented in Chapter IV.

- b. Operational Safety Reviews are a form of periodic NES evaluation for ongoing NEOs with a current NESS. The NESSG applies current criteria, documentation, and other information to previously NESSG evaluated and approved NEOs,

facilities, and programs. OSRs differ from NESSs in that they rely on observations of actual NEOs rather than simulations, and on approved current documentation that describes the NEO and its safety case. OSRs may be conducted for operation-specific studies and MSs, with the scope of each OSR being consistent with the associated NESS.

OSRs conducted for operation-specific studies evaluate authorized, ongoing NEOs to determine if controls remain adequate to meet NES standards and other NES criteria.

OSRs conducted for MSs evaluate whether facilities, equipment and tooling, processes, and management programs remain adequately characterized and controlled to support operation-specific NES evaluations. For illustrative purposes the NESSG may consider non-specific, representative, or worst case NEOs.

Detailed requirements for planning and performing an OSR are presented in Chapter V.

- c. Contractor NES Change Evaluations are performed by the production agency to assess proposed changes to approved NEOs. The scope is generally limited to aspects of the operations, activities or programs affected by the proposed change or emerging information that has the potential to impact NES.

Qualified NNSA M&O contractor NES representatives evaluate proposed changes and emerging information with the potential to impact NES against the criteria detailed in Chapter VI, paragraph 2c(1). Contractor NES representatives determine if the NES implications of the circumstances allow for contractor approval or if the issue must be elevated to an NCE or appropriately-scoped NESS.

The CNCE process is detailed in Chapter VI, paragraph 2.

- d. Office of Secure Transportation NES Screens are conducted by OST personnel to evaluate proposed changes or emerging information for the potential to impact NES. In the absence of NES personnel certified in accordance with the requirements detailed in Chapter III, designated OST staff utilize screening criteria set forth in OST 46XA, *Offsite Transportation Safety Manual*, Chapter 2.2, Appendix G to determine if the circumstances allow for Assistant Deputy Administrator for Secure Transportation approval or if the issue must be elevated to an NCE or appropriately-scoped NESS.

The OST NES screen process is detailed in Chapter VI, paragraph 2.

- e. NES Change Evaluations are performed to determine if approved NEOs will continue to meet the DOE NES Standards and other NES criteria after implementation of a proposed change or response to emerging information. The

scope of an NCE is generally limited to aspects of operations, activities, or programs affected by the proposed change or emerging information that has the potential to impact NES. A NESSG is convened to perform an NCE when:

- (1) The change control process determines that the circumstances do not satisfy the criteria detailed in Chapter VI, paragraph 2c for a contractor-allowable change, or OST 46XA, *Offsite Transportation Safety Manual*, Chapter 2.2, Appendix G for an OST-allowable change, and
- (2) The proposed change or emerging information does not require a NESS.

Detailed requirements for planning and performing an NCE are presented in Chapter VI, paragraph 3.

2. SECURITY OPERATIONS. NES evaluations must, as appropriate, include consideration of security operations and the potential adverse impact on NES. The NESSG does not evaluate the overall adequacy of security measures for preventing unauthorized access to nuclear explosives.
3. URGENT NES CONCERNS. If a NESSG considers any NES concern to require urgent attention, the NESSG chair must promptly inform NNSA line management and recommend whether operations should continue pending resolution of the issue.
4. NES EVALUATION SCHEDULES. The Chief, Nuclear Explosive Safety Branch must provide periodic schedule updates to NESSG member organizations.
5. PROCESS DEVIATIONS. Unless otherwise specified in this Manual, Director, Nuclear Weapon Surety and Quality Division is the approval authority for administrative and procedural deviations to Chapters IV – VII, the NES evaluation process. Deviation requests must be submitted to Director, Nuclear Weapon Surety and Quality Division for approval as far as possible in advance of the need for the deviation with a copy to Director, Office of Safety and any organization affected by the decision.

Deviation requests must include:

- a. Reference to the requirement for which the deviation is requested.
- b. A compelling reason for the deviation.
- c. Benefits to be realized through the deviation.
- d. A statement indicating whether the deviation sought is permanent or, if temporary, when compliance will be achieved.
- e. Other pertinent data or information used as a basis for requesting a deviation.
- f. A description of alternative or mitigating action that has been or will be taken.

To grant a deviation, Director, Nuclear Weapon Surety and Quality Division must establish that it does not present an undue risk and is warranted under the circumstances specified. Director, Nuclear Weapon Surety and Quality Division must document the reason for approving, including as appropriate conditions for approval, or denying the process deviation in correspondence that includes the requester; the Chief, Nuclear Explosive Safety Branch; Director, Office of Safety; and any organization affected by the decision.

CHAPTER III

NUCLEAR EXPLOSIVE SAFETY EVALUATION PERSONNEL

1. INTRODUCTION. NESSG personnel include NESSG chairs, other members, and Senior Technical Advisors (STAs).

NESSG chairs are required to be NNSA federal employees who meet the requirements of DOE-STD-1185, *Nuclear Explosive Safety Study Functional Area Qualification Standard*. Other NESSG members must be (a) NNSA federal employees who meet the requirements of DOE-STD-1185; or (b) NNSA management and operating (M&O) contractor employees who meet the requirements of the CRD (Attachment 1) and who are advising on matters related to their contracts with NNSA.

STAs are non-federal persons who are acting as individual consultants pursuant to a contract with NNSA. STAs are predominantly recruited from outside the NES community to reinforce the independence and diversity of NESSGs. Recognized, senior-level, science, engineering, and management experts are preferred. Experience in, for example, safety evaluations, panels assessing high-consequence operations, and peer reviews is considered valuable. STAs are expected to stimulate a more basic and complete consideration of the safety bases for proposed operations by the project teams, and to suggest to senior NNSA management opportunities for improvement in the NES evaluation process.

2. NESSG QUALIFICATIONS.

- a. Personal Characteristics. NESSG personnel must—

- (1) bring reasoned judgment to NES evaluations;
- (2) have the ability and willingness to question and challenge NNSA line management safety statements and rationale for issues with the potential to impact NES;
- (3) be able and willing to actively participate as part of a team and to take unpopular stands when warranted;
- (4) have the ability to—
 - (a) develop appropriate NES evaluation approaches; contribute to effective planning meeting decisions;
 - (b) critically assess input documentation, briefings, and demonstrations;
 - (c) develop and pursue relevant lines of inquiry; articulate NES concerns;

- (d) develop appropriate feedback; and
 - (5) have oral communication skills to participate effectively in deliberations and written communication skills to clearly document conclusions.
 - b. Training. The Chief, Nuclear Explosive Safety Branch must ensure that NES training courses are identified and developed to enable NESSG personnel and personnel-in-training to meet and maintain the requirements for NESSG personnel certification.
 - (1) NESSG Chairs. The Chief, Nuclear Explosive Safety Branch must establish a training program ensuring that NESSG chairs achieve and maintain the proficiencies needed to meet the requirements of DOE-STD-1185. The Chief, Nuclear Explosive Safety Branch must also ensure that a process exists for experienced NESSG chairs to convey useful knowledge to less experienced NESSG chairs.
 - (2) Other Members.
 - (a) NNSA Federal Employees. NNSA Federal organizations providing NESSG members must ensure their members receive the training required to achieve and maintain the proficiencies needed to meet the requirements of this Manual and DOE-STD-1185.
 - (b) NNSA M&O Contractors. NNSA M&O Contractors providing employees to serve as NESSG members are required to ensure their members receive the training required to achieve and maintain the proficiencies needed to meet the requirements of the CRD (Attachment 1).
 - (3) STAs. The Chief, Nuclear Explosive Safety Branch, utilizing the national laboratories and other providers as appropriate, must ensure STAs receive general orientation training on nuclear explosive operations, NES, the NES evaluation process, U.S. nuclear explosives, and other topics as needed for certification before assignment to a NESSG.
 - c. Independence. The NESSG must make objective, independent judgments regarding the NES adequacy of systems, operations, and processes. NESSG personnel must not be subject to management influence in performing their NES obligations, and must not—
 - (1) have current responsibility for the design, development, production, or testing of the specific nuclear explosive, NEO, facility, or management system under evaluation;

- (2) have responsibility for advocacy of special interests of any organization, or for defending a specific nuclear explosive, NEO, facility, or management system under evaluation; or
 - (3) participate in the preparation of NESS input technical documentation, OSR supporting documentation, NCE input, or the preparation or presentation of briefings or demonstrations.
- d. Certification. Certification authorities differ for each type of NESSG participant.
 - (1) NESSG chairs. The Chief, Nuclear Explosive Safety Branch certifies NESSG chairs based on satisfaction of the requirements for personal characteristics, training, and independence (paragraphs 2a -2c, above) and the requirements for education, experience, technical competencies, and proficiency activities established in DOE-STD-1185. Certification is documented by a certification letter retained by the Chief, Nuclear Explosive Safety Branch and is valid for one year.
 - (2) Other Members. The Director, Office of Military Application and Stockpile Operations, NNSA site office managers, laboratory directors, and NNSA M&O contractor managers, as appropriate, designate certification authorities who can objectively judge whether their NESSG members meet the requirements established in this Manual.
 - (a) NNSA Federal Employees. NNSA Federal organization certification authorities must certify each of their NESSG members based on satisfaction of the requirements for personal characteristics, training, and independence (paragraphs 2a - 2c, above) and the requirements for education, experience, technical competencies, and proficiency activities established DOE-STD-1185. Certification is documented by a certification letter to the Chief, Nuclear Explosive Safety Branch and is valid for one year.
 - (b) NNSA M&O Contractors. NNSA M&O Contractors providing employees to serve as NESSG members are required to certify each of their NESSG members based on satisfaction of the requirements for personal characteristics, training, independence, education, experience, technical competencies, and proficiency activities established in the CRD (Attachment 1).
 - (3) STAs. The Director, Office of Military Application and Stockpile Operations certifies STAs based on satisfactory completion of the required NES training and requirements set forth in this Chapter. Certification is documented in a certification letter to the Chief, Nuclear Explosive Safety Branch. STA certifications have no expiration date.

3. **NESSG FORMATION.** The NESSG chair for each NES evaluation is assigned by the Chief, Nuclear Explosive Safety Branch. Organizations providing NESSG members nominate personnel for each NES evaluation as requested by the NESSG chair. The NESSG chair selects NESSG personnel for each NES evaluation and verifies that NESSG personnel certifications will be current at the start of the evaluation. NESSG personnel should not be changed for the duration of a specific NES evaluation.
4. **NESSG COMPOSITION.** Table 1 presents the minimum NESSG composition requirements for NES evaluations. The NESSG chair may recruit additional members, including STAs or Site Office personnel, as deemed appropriate.

**TABLE 1. MINIMUM NESSG PERSONNEL REQUIREMENTS
FOR NNSA NES EVALUATIONS**

PROVIDING ORGANIZATION	NESS	OSR	NCE *
Nuclear Explosive Safety Branch	1 NESSG chair	1 NESSG chair	1 NESSG chair
Office of Military Application and Stockpile Operations	2 STAs	1 STA	–
Los Alamos National Laboratory	1	1	1
Lawrence Livermore National Laboratory	1	1	
Sandia National Laboratories	1	1	
Pantex Plant	1 (Pantex evaluations)	1 (Pantex evaluations)	1 (Pantex evaluations)
Nevada Test Site (NTS)	1 (NTS evaluations)	1 (NTS evaluations)	1 (NTS evaluations)

* The minimum personnel complement for NCEs is three, to include a NESSG chair and at least one member from any of the specified national laboratories. For other evaluations, the home organization of the third member will be at the discretion of the NESSG chair.

5. **TAs.** NESSG chairs will consider use of TAs to contribute specific expertise to NES evaluations. Based on the scope and complexity of the NES evaluation being performed, the NESSG chair may recruit one or more TAs with relevant training, experience, and recognized expertise. TA independence requirements are the same as for the NESSG detailed in paragraph 2c.
6. **NNSA CONTRACTOR NES REPRESENTATIVES.** NNSA Contractor NES representatives are specifically trained and certified to perform CNCEs. With the exception of the requirement to participate in two NNSA NES evaluations every three years, the training, certification, and independence requirements for contractor NES representatives are identical to those detailed for NNSA contractor NESSG members in paragraph 11 in the CRD.

CHAPTER IV

NUCLEAR EXPLOSIVE SAFETY STUDY PROCESS

1. INTRODUCTION. Except as detailed below, the process for the two kinds of NESSs—operation-specific studies and master studies—is the same.
2. NESS PLANNING MEETINGS. The project team is responsible for conducting planning meetings with the Nuclear Explosive Safety Branch, other NESSG personnel, and representatives from responsible NNSA line management organizations, design agencies, and the production agency, as appropriate. To ensure a successful NESS and promote a common understanding of the approach being taken, planning meeting participants will:
 - a. Define the study scope and objectives. The scope should describe boundaries with any associated NESSs (such as NES master studies) to ensure no gaps exist.
 - b. Identify topics to be addressed in input documentation, briefings, and demonstrations.
 - c. Identify organizational points of contact and assign responsibilities for compiling input documentation.
 - d. Develop schedules and, as appropriate, agendas for preparatory activities detailed in this Chapter.
 - e. Plan briefings, demonstrations, and resources required to support the NESS.

The project team is responsible for documenting and distributing planning meeting agreements, assumptions, issues, and decisions to participants and appropriate organizations.

3. NESS INPUT DOCUMENTATION. A NESS relies on detailed written information and analyses to describe and substantiate the subject activities. Compromises to the completeness or currency of the required information should be avoided to promote the timely and effective conduct of an operation-specific study or MS.

Input documentation is compiled in the form of a comprehensively-indexed single integrated input document (SIID). The project team is responsible for compiling the SIID and obtaining explicit certification of the technical content accuracy from organizations providing the inputs.

The SIID must be delivered or presented to the NESSG for their use at the orientation meeting, and available to members for comprehensive review and evaluation during the NESSG preparation period prior to the NESS.

Existing documents containing required information may be acceptable as NESS inputs. Examples include the following documents as well as their contained references: safety analysis reports (SARs), hazard analysis reports (HARs), technical safety requirements

(TSRs), basis for interim operations, and weapon safety specifications (WSSs). Existing documents used as NESS inputs should be appropriately indexed to facilitate topical searches.

Input documentation, compiled in a SIID and tailored as appropriate for each type of NESS, will include the following, if applicable.

- a. A description of the specific nuclear explosive for an operation-specific study. As appropriate to each NESS, the description will include paragraphs 3a(1)-(10) and consideration of significant differences in these items at different levels of assembly.
 - (1) A general overview and a detailing of associated modifications and alterations and their NES implications.
 - (2) One-point safety analyses, including a summary of test results and analysis of interfaces between the nuclear explosive and process tooling.
 - (3) NES theme and description of the nuclear explosive design safety features.
 - (4) Unique or unusual conditions related to the specific nuclear explosive or its components.
 - (5) Electrical circuits and their functions within the nuclear explosive.
 - (6) Characteristics of energetic devices and materials, including explosives, detonators, actuators, propellants, reactive materials, batteries, high-pressure vessels, and flammable and combustible materials.
 - (7) Weapon response data for inadvertent nuclear detonation and high explosive violent reaction (HEVR) scenarios.
 - (8) Susceptibilities of the nuclear explosive to energy sources, including, but not limited to electrostatic discharge (ESD), electromagnetic radiation, and other electrical, thermal, mechanical, and chemical energy sources.
 - (9) Potential hazards associated with, but not limited to spin rockets, parachute deployment systems, telemetry features and connectors, use control features, and instrumentation for nuclear explosive test devices.
 - (10) Non-NNSA-supplied components that are a part of the nuclear explosive while it is in NNSA custody.
- b. A description of the operation-specific NEO, including:
 - (1) Process flow.

- (2) Written procedures that are under change control and sufficiently developed to be used in the NEO upon approval.
 - (3) Unique or unusual features relating to a process, tooling, or other utilized equipment.
 - (4) Drawings, descriptions, and safety analyses of process tooling, other equipment, and interfaces with the nuclear explosive.
 - (5) Drawings, descriptions, and safety analyses of Category 1 and 2 electrical equipment (including use control equipment), including an independent safety assessment of the Category 1 electrical equipment and their interface with the nuclear explosive.
 - (6) Drawings, descriptions, and safety analyses of transportation equipment and operations including, but not limited to, shipping containers and tie-down schemes.
 - (7) Proposed tests and inspections, including supporting rationale.
 - (8) Process and equipment engineering evaluation findings that may impact NES.
- c. Safety basis information including, but not limited to:
- (1) The safety basis for evaluated NEO facilities, including seismic analyses, lightning analyses, description of fire protection and detection systems, and definition of design basis accidents.
 - (2) A hazards assessment for specific NEOs.
 - (3) Identification of all postulated accident scenarios that result in inadvertent nuclear detonation, high explosive (HE) detonation or deflagration, or fissile material dispersal from the pit.
 - (4) Analysis and vulnerability assessment of pathways leading to inadvertent nuclear detonation.
 - (5) Isolation of nuclear explosives from unwanted energy sources internal or external to the facility, including electrical, thermal, mechanical, and chemical energy sources.
 - (6) Potential threats to NES from security operations, surveillance and other inspection requirements, software-controlled equipment, human error, and such weapon-associated systems as spin rockets, parachute deployment systems, use control features, and instrumentation for nuclear explosive test devices.

- (7) Identification of controls for inadvertent nuclear detonation and HEVR hazards, including supporting rationale, test data and analyses, their respective source documents, and implementing procedures.
- d. Relevant information from existing NES evaluation reports including both open and closed findings and status of implemented and pending corrective actions for approved NES evaluation findings.
- e. Relevant occurrence reports and safety-related significant finding investigations (SFIs).
- f. For facility MSs, for each item in paragraph (1) below (Facility Master Study Items), provide the information in paragraph (2) below (Information Required), as applicable.

(1) Facility Master Study Items.

- (a) Facility safety basis documents, including applicable site-wide safety basis documentation and TSRs.
- (b) Facility structure and support areas such as electrical and mechanical rooms, loading/unloading docks, and ramps.
- (c) Facility/zone/site utilities, such as heating, ventilation and air conditioning, uninterruptible power supply, compressed air, vacuum, lighting, and water.
- (d) Facility/zone/site safety systems such as fire protection, lightning protection, radiation alarms and monitors, blast door interlock, emergency lighting, criticality, public address, telephone, conductive flooring, and waste management.
- (e) Facility special processing equipment such as the paint booth and fume hood, gas manifolds, dynamic balancer, and linear accelerator and associated general NEOs.
- (f) Facility general purpose support equipment such as flammable storage cabinets, tooling cabinets, materials requirements planning terminal, and emergency wash.
- (g) General use handling and transportation equipment such as hoists, cranes, modified transportation vehicles and trailers, forklifts, tow motors, pallet jacks, loading/unloading equipment, and tie-downs and associated general NEOs.

- (h) Facility/zone/site weapon process approved equipment including special and commercial tooling, electrical testers, supplemental electrical equipment, and qualified containers.
- (i) Support materials such as controlled consumables and other commercially-derived materials that may come in contact with a nuclear explosive.
- (j) Facility/zone/site support operations including security forces, radiation safety responders, fire protection and emergency medical service personnel, emergency management responders, facility engineers, maintenance and crafts personnel which impact NES.
- (k) Nearby facilities, vehicles, railways, and airfields which impact NES.

(2) Information Required.

- (a) Description and overview.
- (b) Associated management programs (e.g., training programs, emergency responses programs, preventive maintenance programs, procedure development and change control, etc.).
- (c) Design requirements, codes, and standards.
- (d) Design process and criteria, including natural phenomena, blast, radiation shielding, electrical grounding, and any credible abnormal events.
- (e) Construction, procurement, and fabrication processes.
- (f) Deviations from design.
- (g) Readiness assessment and/or safety and quality qualifications.
- (h) NES change control process.
- (i) Modifications, upgrades, and re-qualification.
- (j) Maintenance, repair, and surveillance processes and re-qualification.
- (k) Use, storage, access, and emergency egress controls.
- (l) Retirement process.

- (m) Engineer, technician, and first-line supervisor qualifications and training.
 - (n) Emergency communications.
 - (o) Hazards and controls, including those applicable to unauthorized acts.
 - (p) Proposed enhancements and recommendations.
 - (q) Associated technical procedures and manuals.
 - g. For other MSs, the input document requirements must be jointly determined by the project team and NESSG chair during planning meetings.
4. USE OF SAFETY BASIS DOCUMENTATION. NES evaluations assess operations, facilities, and management programs to determine if they are adequately controlled to meet the NES Standards and other NES criteria. While it is not a NESSG function to evaluate the accuracy and completeness of safety basis documentation, those documents are valuable resources for the NESSG. A comprehensive safety basis is useful to answer questions related to hazards considered by the process designers, the basis for the controls established, and whether controls important to NES are adequately protected. The NESSG may consider the broad range of applicable controls, including but not limited to those identified in safety basis documentation. However, NES evaluations generally converge on factors that more directly control or influence NEOs, such as the written procedures used by personnel performing hands on work and attributes of equipment, facilities, or management systems. If the NESSG finds that adequate controls are effectively incorporated at the working level, the safety basis documentation might help determine if those controls are likely to endure. If the NESSG finds that adequate controls are not incorporated at the working level, the safety basis documentation might help determine if a credible postulated scenario has been missed, ineffectively dealt with, or effectively dealt with in some other manner.
5. NESSG PREPARATION. To efficiently and effectively prepare the NESSG to conduct the NESS, the following pre-NESS activities should be conducted in sequence (paragraphs 5a-5d, following):
- a. Study-specific NESSG Training.
 - (1) For operation-specific studies, study-specific NESSG training is typically held at the design agency one month or less before the orientation meeting. Although specific content is defined at the planning meeting, study-specific training must address the input topics related to nuclear explosive design and the features and attributes important to NES at relevant levels of assembly. Particular focus must also be directed to characteristics important to the design of the proposed NEOs, and

susceptibilities to possible environments in which the NEOs will be performed.

- (2) For MSs, the need for study-specific training will be determined at NESS planning meetings. If study-specific training is deemed useful, the NESSG and project team will define the approach, content, provider, and venue as appropriate to each study.

- b. Input Documentation Delivery. SIID completion and availability will coincide with or shortly precede the start of the orientation meeting.
- c. Orientation Meeting. The primary objectives of the orientation meeting are to introduce the NESS subject and SIID content and organization, and to attain NESSG agreement on the planned NESS approach, agenda, and schedule. Commitments to support the agreed-upon schedule will be secured from all participants.

NESSG familiarization will focus on proposed NEOs for operation-specific studies, and on proposed facilities, equipment, processes, and management programs for MSs. SIID content, organization, and hardware/software requirements will be addressed. The level of detail in briefings and demonstrations should reflect the NESSG-familiarization objective of the orientation meeting.

The detailed NESS agenda developed at the orientation meeting will define the required content and initial schedule for NESS briefings, demonstrations, and other activities, as well as the final NESS preparation elements detailed in the following paragraph. NESS start dates and schedules are tentative until the NESSG determines that the SIID is adequate and the NESSG and project team define a suitable preparation period.

- d. NESSG Final Preparation. The NESSG will:
 - (1) Evaluate the SIID to determine if it is adequate to proceed with the NESS.
 - (2) Perform individual study and research as needed.
 - (3) Begin developing lines of inquiry (LOIs).
 - (4) Participate in periodic teleconferences with members, advisors, and the project team to assess progress, discuss LOIs, and modify the NESS plan as required.

Sufficient resources and time to accomplish these tasks—nominally three to five weeks after the input documentation is available to the NESSG members—must be allocated.

6. NESS PREREQUISITES. A NESS must not begin until preparatory work on the facilities and operations are completed and the safety basis is in formal change control and submitted to the approval authority. To ensure the most timely and effective conduct of the NESS, the project team must provide a declaration of readiness and the appropriate federal line management (Site Office Manager or Assistant Deputy Administrator for Secure Transportation) must make a formal request to initiate the NESS.

If a NESS concludes before the safety basis is approved, the NESSG Chair must review the conditions of the safety basis approval and determine if the NESS conclusions are affected before submitting the NESS report for approval.

7. NESS CONDUCT. For the timeframe of the operation-specific study or MS, the primary responsibility of the NESSG is preparing for and conducting the NESS. Conflicting assignments must be resolved in favor of NESS duties from the date the input documentation is made available until conclusion of the NESS. The timely availability of project team, laboratory, and contractor personnel supporting the NESS should be ensured. TA support should be scheduled to ensure the most efficient and effective utilization of their technical expertise in support of the NESS.

The NESSG chair has authority to suspend the NESS if unable to fulfill the requirements of this manual.

The NESS content and activity sequence are defined or modified based on NESS scope, planning meeting and in-progress decisions. The six central NESS elements are:

- a. Briefings. Briefings by subject matter experts will cover key elements of the input documentation and present the NES foundation for the proposed NEO, facility, or program under evaluation to ensure a common understanding and allow NESSG interaction with subject matter experts. The NESSG will critically consider the briefings, identify potential issues and, as appropriate, question or challenge points made or omitted in the briefings.
- b. Demonstrations. NESS demonstrations simulate proposed NEOs using trainer units or other mock-ups. NESS demonstrations for NES MSs involve facility or site walkdowns and tours of system/items of NESSG interest.
 - (1) Demonstration details, including simulation fidelity, are defined during planning meetings, but may be modified as needed during a NESS. Demonstrations allow an examination of interfaces between and among the nuclear explosive and tooling, testers, other equipment, and the facility. The NESSG critically evaluates the process to identify potential NES deficiencies and opportunities to strengthen controls used to meet the NES Standards or other NES criteria.

- (2) Demonstrations must:
 - (a) Provide the most realistic simulation practicable.
 - (b) Be conducted by trained and qualified technicians or operators.
 - (c) Use actual or representative tooling, equipment, testers, support equipment and systems.
 - (d) Use written procedures that are under change control and sufficiently developed to be used in the NEO upon approval.
 - (e) Be conducted in actual bays or cells, or in facilities representative of key conditions in which the NEO is to be performed. For example, a training area replicating the actual facility in size, layout, and work flow may be deemed by the NESSG an acceptable representative facility.

The NESSG is the final arbiter of the suitability of demonstration conditions.

- c. Deliberations. NESS deliberations are collaborative efforts among the NESSG, TAs, project team, and subject matter experts to consider all sides of issues identified during NESS preparation, training, briefings, and demonstrations. The NESSG categorizes and documents issues as conclusions develop.

Although the NESSG strives for unanimity, individual NESSG members may submit or endorse a minority opinion when their judgment differs from that of the majority. A minority opinion must be included in the NESS report in its entirety, and NESSG majority personnel must prepare a written response to the minority opinion.

While the NESSG normally conducts deliberations in open meetings and is receptive to relevant input from knowledgeable, informed sources, all NESS report content, including characterization and categorization of issues, is determined exclusively by the report signatories. At the discretion of the NESSG chair, the NESSG may also hold closed executive sessions in which only the NESSG participates.

- d. Report Generation and Concurrence. NESS report development begins while the NESS is in progress and continues throughout the study. The operation-specific study or MS report must include the following:
 - (1) Abstract.
 - (2) Table of contents.

- (3) NESSG signature page.
- (4) Study purpose and background, including identification of other relevant NESS reports.
- (5) Scope of the study.
- (6) Evaluation criteria such as the NES Standards.
- (7) NESSG evaluation activities, dates, and locations.
- (8) Summary descriptions of the management programs, facilities, equipment and tooling, processes, nuclear explosive and/or NEOs under evaluation.
- (9) Evaluation results, including:
 - (a) Issues, conclusions, and supporting rationale.
 - (b) Adequacy of:
 - 1 For an operation-specific study: controls to meet the NES Standards and other NES criteria.
 - 2 For a MS: facility, equipment, process, management system characterization and associated controls to support future evaluation of their application in operation-specific NEOs.
 - (c) Pre-start and post-start findings, if any.
 - (d) Deliberation Topics summarizing substantive discussions that did not result in findings.
 - (e) NESSG minority opinions, if any, and associated NESSG majority response.
 - (f) STA Comments, if any.
 - (g) A statement on the adequacy of resources and activities such as documentation, briefings, demonstrations, observations, time, and administrative support for the evaluation.
 - (h) Lessons learned, as appropriate, from the NESS evaluation.
- (10) References, including specific written procedures for the subject studied (by date, issue number, revision number) and other input documentation.

- (11) Appendices:
 - (a) NESS agenda.
 - (b) Participants.
 - (c) Approval correspondence [to be attached to the final report after NNSA Headquarters (HQ) approval].
 - (12) NESSG personnel sign the NESS report and are responsible for its content. Signatures represent concurrence with the report findings and conclusions, except as noted in minority opinions. No agreement by a signatory's organization is implied. If a NESS report is substantively changed after it is signed, the NESSG chair must coordinate changes with the NESSG and retain the NESSG's documented concurrence with the changes.
8. STA Comments. These comments in a NESSG report convey the impressions of a NESSG STA and are intended as constructive input to NNSA managers. They may not be strictly limited to the specified NESS scope or NESSG charter, and do not require follow-up actions unless the approval authority or other responsible NNSA manager specifies otherwise.
- The Assistant Deputy Administrator for Science, Engineering and Production Programs will assign a lead member of the STA group to compile the STA comments on an annual basis and a tracking and closure system will be maintained for STA comments for which the NESS approval authority has directed action. The Assistant Deputy Administrator for Science, Engineering and Production Programs will provide for an annual review of the STA comments and closures. STAs are encouraged to keep abreast of on-going NESS evaluations and read and comment as they feel appropriate at the annual review.
9. Feedback. Feedback is important for promoting improvement in the NESS process. NESSG personnel are encouraged to document lessons learned throughout all NESS activities, including preparation and planning.
- The Chief, Nuclear Explosive Safety Branch must establish a process to accumulate, distribute, and implement documented feedback. Distribution will include the project team, NNSA line management, and the NES community.
10. NESS Validation. In NESS validations, the NESSG personnel who participated in the associated study, if available, observe actual NEOs to confirm they are consistent with key aspects of operations demonstrated during a NESS. Validations apply to both operation-specific studies and MSs.

The NESSG recommends in the NESS report whether a NESS validation should be performed after operations have begun based on consideration of such factors as the:

- a. Fidelity and completeness of the demonstrations.
- b. Extent to which NESS briefings and input documentation included operations-ready information.
- c. Anticipated interval between the NESS and start of operations.
- d. Projected changes associated with corrective actions originating from the NESS or readiness review.

The NESSG documents in the NESS report the factors that should be considered in developing the schedule and scope of the validation. The NESSG Chair and responsible operations personnel will jointly plan and schedule validations based on the NESSG recommendations and the operations schedule.

11. NESS REPORT APPROVAL PROCESS.

- a. Post-Evaluation Briefings and Conferences. At the conclusion of the study, the NESSG chair summarizes the NESS activities, minority opinion(s), STA comment(s), and results in a briefing to the responsible NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable, the Assistant Deputy Administrator for Science, Engineering and Production Programs; the Director, Office of Military Application and Stockpile Operations; and the Director, Nuclear Weapon Surety and Quality Division, as available. The Chief, Nuclear Explosive Safety Branch will coordinate with the NESSG Chair to organize and schedule additional briefings or teleconferences as needed with the Assistant Deputy Administrator for Science, Engineering and Production Programs to inform, clarify or discuss issues related to the study or report.
- b. Report Submittal. The NESSG chair submits a coordination copy of the NESS report and an accompanying transmittal letter to the Assistant Deputy Administrator for Science, Engineering and Production Programs, the responsible NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable, the Director, Office of Military Application and Stockpile Operations, Director, Nuclear Weapon Surety and Quality Division, and Chief, Nuclear Explosive Safety Branch. As needed, the Chief, Nuclear Explosive Safety Branch organizes and leads the clarification/resolution of issues through written correspondence, teleconferences, or other means with NESSG personnel, TAs, and NNSA HQ staff, as appropriate, and submits a disposition recommendation to the Assistant Deputy Administrator for Science, Engineering and Production Programs.

The responsible NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable, may, at their discretion, submit to the Assistant Deputy Administrator for Science, Engineering and Production

Programs additional information relevant to the evaluation, including positions on findings and minority opinions.

- c. Approval Authority Actions. As the approval authority, the Assistant Deputy Administrator for Science, Engineering and Production Programs must issue a memorandum of approval including, as appropriate, conditions of approval. In this memo, the approval authority will resolve any minority opinions and direct response to NESSG findings and STA comments, as appropriate. When approving a NES evaluation, the approval authority identifies an appropriate NNSA line manager for each NESSG finding as discussed in Chapter VII, paragraph 2a.

The memorandum of approval must be sent to the responsible NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable, and the NESSG chair. In turn, the NESSG chair must provide a copy of the final report to the responsible NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable; Director, Office of Military Application and Stockpile Operations; Director, Office of Safety; Director, Nuclear Weapon Surety and Quality Division; Director, Nuclear Weapons Stockpile Division, and participating NESSG personnel.

12. RECORDS. Maintain records according to National Archives and Records Administration (NARA)-approved DOE Records Schedules.

CHAPTER V OPERATIONAL SAFETY REVIEW PROCESS

1. INTRODUCTION. OSRs focus on ongoing operations and approved current documentation to determine if controls remain adequate to meet the NES Standards and other NES criteria. OSRs are not appropriate for operations that have lapsed or which utilize documentation not maintained through NES change control.
2. OSR PLANNING MEETINGS. The NESSG Chair is responsible for conducting planning meetings with appropriate NNSA line management organizations. To ensure a common understanding of the approach being taken for an OSR, planning meeting participants will:
 - a. Define the OSR scope and objectives.
 - b. Identify required OSR supporting documentation.
 - c. Identify organizational points of contact and assign responsibilities for compiling supporting documentation.
 - d. Develop a schedule and, as appropriate, agendas for the OSR preparatory activities detailed in this Chapter.

OSR scheduling is dependent on the timing of relevant operations. If actual NEOs are not anticipated to be conducted within five years of the associated NESS, the NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable, must submit an extension request to the Assistant Deputy Administrator for Science, Engineering and Production Programs in accordance with the process detailed in Chapter II paragraph 1.

The NESSG chair is responsible for documenting and distributing planning meeting decisions, agreements, assumptions, and issues to OSR participants and appropriate organizations.

3. OSR SUPPORTING DOCUMENTATION. To ensure an adequate evaluation of NES, an OSR relies on up-to-date existing information and analyses. Compromises to the completeness or currency of the required information should be avoided to promote the timely and effective conduct of an OSR. NNSA line management is responsible for compiling and distributing complete and current OSR supporting documentation to OSR participants.

As applicable to operation-specific study based OSRs versus master study based OSRs, supporting documentation will include:

- a. Current safety basis documents, including identification of changes that required DOE/NNSA approval since the NESS.

- b. Identification of controls for inadvertent nuclear detonation, HEVR, and unauthorized acts, including supporting rationale, test data and analyses, their respective source documents, and implementing procedures.
 - c. Descriptions of changes to the configuration of a nuclear explosive or the WSS since the NESS.
 - d. Approved written procedures.
 - e. Significant process, tooling, equipment, tester, tests, inspections, interfaces, and facility changes since the NESS, including all NES -related changes that required NNSA approval.
 - f. Relevant information from NES evaluation reports, quarterly status reports of implemented and pending corrective actions for approved findings, occurrence reports, and safety-related SFIs.
4. OSR PREPARATION. NESSG personnel and TAs will consider the supporting documentation, perform individual study and research as needed, and begin developing LOIs prior to the start of an OSR. Sufficient resources and time to accomplish these tasks—nominally three weeks after the supporting documentation is available—will be allocated.

During the preparation period, the NESSG chair conducts a final planning meeting with all OSR participants and responsible NNSA line management organizations to:

- a. Refine the OSR scope and objectives.
- b. Review operational schedules and identify NEO observation opportunities.
- c. Review the status of current safety basis documents.
- d. Identify required briefing topics.
- e. Plan briefings, observations, and resources as required supporting the OSR.
- f. Develop an OSR schedule and agenda that are sufficiently detailed to enable effective ongoing management of the OSR.

The NESSG chair documents and distributes meeting results, including statements regarding the OSR scope, objectives, and schedule, to the meeting participants and appropriate organizations.

5. OSR CONDUCT. For the timeframe of the evaluation, the primary responsibility of the NESSG is preparing for and conducting the OSR. Conflicting assignments must be resolved in favor of OSR duties from the date the supporting documentation is made available until conclusion of the OSR. The timely availability of project team, laboratory,

and contractor personnel supporting the OSR should be ensured. TA support should be scheduled to ensure the most efficient and effective utilization of their technical expertise in support of the NESS.

The NESSG chair has authority to suspend the OSR if unable to fulfill the requirements of this manual.

The OSR content and activity sequence are defined or modified based on the relevant NESS scope, and planning meeting and in-progress decisions. The five central OSR elements are:

- a. Briefings. OSR briefings are intended to ensure a common understanding and facilitate productive observations. OSR briefings should be descriptive and focused on the subject NEO, facility, or program under evaluation. The NESSG may request briefings at planning meetings or during the OSR.
- b. Observations. By observing actual NEOs, the NESSG critically evaluates ongoing processes for NES deficiencies and opportunities to strengthen NES controls.
- c. Deliberations. OSR deliberations involve a collaborative effort among the NESSG, TAs, project team, and subject matter experts in considering all sides of the issues identified during OSR preparation, briefings, and observations. The NESSG categorizes and documents issues as conclusions develop.

Although the NESSG strives for unanimity, individual NESSG members may submit or endorse minority opinions when their judgment differs from that of the majority. A minority opinion must be included in the OSR report in its entirety, and NESSG majority personnel must prepare a written response to the minority opinion.

While the NESSG normally conducts deliberations in open meetings and is receptive to relevant input from knowledgeable, informed sources, all OSR report content, including characterization and categorization of issues, is determined exclusively by the report signatories. At the discretion of the NESSG chair, the NESSG may also hold closed executive sessions in which only the NESSG participates.

- d. Report Generation and Concurrence. OSR report development begins while the OSR is in progress and continues throughout the evaluation. The OSR report contents are identical to those specified for NESS reports in Chapter IV, paragraph 7d.

NESSG personnel sign the OSR report and are responsible for its content. Signatures represent concurrence with the report findings and conclusions, except as noted in minority opinions. No agreement by a signatory's organization is implied. If an OSR report is substantively changed after it is signed, the NESSG

chair must coordinate changes with the NESSG and retain the NESSG's documented concurrence with the changes.

- e. Feedback. Feedback is important for promoting improvement in the OSR process. NESSG personnel are encouraged to document lessons learned throughout all OSR activities, including preparation and planning.

The Chief, Nuclear Explosive Safety Branch must establish a process to accumulate, distribute, and implement documented feedback. Distribution will include the project team, NNSA line management, and the NES community.

- 6. OSR REPORT APPROVAL PROCESS. OSRs that have no pre-start findings or minority opinions are submitted to the responsible NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable. For OSRs that have a pre-start finding or minority opinion, the approval process is identical to that specified for NESS reports in Chapter IV, paragraph 11.
- 7. RECORDS. Maintain records according to NARA-approved DOE Records Schedules.

CHAPTER VI

NUCLEAR EXPLOSIVE SAFETY CHANGE CONTROL PROCESSES

1. **INTRODUCTION.** NES evaluation of proposed changes or emerging information begins with a CNCE for production agency NEOs, or an OST NES Screen for offsite transportation operations. One of three subsequent approval pathways—contractor or Assistant Deputy Administrator for Secure Transportation (as applicable), NCE, or NESS—will be chosen to ensure an appropriate level of rigor for each evaluation and the most efficient use of resources.

The NES change control process is separate and independent from the unreviewed safety question (USQ) process required by Title 10 CFR 830.203, *Unreviewed Safety Question Process*, and supported by DOE G 424.1-1A, *Implementation Guide for Use in Addressing Unreviewed Safety Question Requirements*.

The NNSA M&O contractor evaluates the nuclear explosive safety implications of a proposed change in two ways: (1) a USQ screen by personnel trained to provide the AB perspective, and (2) a NES review by a NES-certified representative. The USQ screen and the NES review are separate and independent processes performed by different individuals possessing specific qualifications and shall be independent of NNSA line management influence. The result of the USQ screen [or USQ Determination (USQD), if applicable] and the NES review will be known prior to approval and implementation of the proposed change. If the NES review indicates that NNSA approval is required, the NNSA must approve the proposed change prior to implementation, regardless of the outcomes of the USQ screen or USQD.

2. **ORGANIZATIONAL CHANGE CONTROL ASSESSMENTS.** CNCEs and OST NES Screens are used to determine whether the NNSA contractor or Assistant Deputy Administrator for Secure Transportation, as applicable, is the responsible approval authority, or whether the proposal or issue must be elevated to a NESSG for NES evaluation.

In the absence of NES personnel certified in accordance with the requirements of Chapter III, OST staff has less discretion than contractor NES representatives in determining the approval authority for proposed changes or emerging information. As a result, CNCEs and OST NES Screens have both shared and exclusive elements, as follows:

- a. **Focus.** CNCEs and OST NES screens consider the NES implications of:
 - (1) proposed changes to procedures, materials, tooling, testers, other equipment, facilities, facility interfaces, or management programs associated with approved NEOs and
 - (2) emerging information that has the potential to impact NES of an approved NEO.

- b. Documentation. The NNSA contractor or OST, as appropriate, takes the lead in developing the safety support documentation and compiling inputs that may be needed from the design agencies and NNSA. The NNSA contractor or OST, as appropriate, ensures the completeness of the documentation, as well as the explicit certification of its technical accuracy by the providing organizations.

Sufficient information must be provided to establish that proposed changes are not a threat to NES including, as applicable:

- (1) A complete description of the proposal or issue with process flow representations and detailed written procedures, as appropriate.
 - (2) Rationale for the proposed change, with concurrence from responsible management personnel and design agency representatives, as appropriate.
 - (3) Relevant safety basis information as needed to support a determination.
- c. Determination Processes. The determination process and decision basis differ for CNCEs and OST NES Screens.
- (1) CNCE. With a particular emphasis on potentially adverse impacts on NES, a NNSA contractor NES representative reviews the submitted documentation and presented information, and answers the following questions to determine if elevation to NNSA for NES evaluation is required.
 - (a) Does the proposed change add, delete, or modify a nuclear explosive safety rule (NESR), immediate-action procedure (IAP), or other control identified as important to NES in a relevant NES evaluation report?
 - (b) Does the proposed change involve new Category 1 electrical equipment or the addition of an electrical test of a nuclear explosive?
 - (c) Does the proposed change to Category 1 electrical equipment involve more than minor modifications that clearly do not affect the functionality, quality, safety analysis, or security controls for the equipment?
 - (d) Does the proposed change to a NEO involve a procedure, tester, equipment, tooling, facility interface or other process or feature not addressed by a currently approved NES evaluation?

- (e) Does the proposed change involve the potential application of additional electrical, mechanical, thermal, chemical, or electromagnetic energy, or the application of the above energy types to other circuitry or components of a nuclear explosive (NE) in a manner that has not been NESSG evaluated?
- (f) Does the proposed change affect one-point safety?
- (g) Does the proposed change affect lifting, rotating, or other NE movement operations not bounded by a previous NES evaluation?
- (h) Does the proposed change affect the implementation of the Two-Person Concept?
- (i) Does the proposal involve a NEO relocation that would adversely impact NES?
- (j) Does the proposed change involve a management program or process, including any form of work instructions or operating standards that would impact NES?
- (k) Has information been presented that could alter previous NES evaluation conclusions regarding an approved NEO or facility MS?

An NNSA NES evaluation is required if the answer to one or more of the preceding questions is "yes" or "unknown." If the answer to each of the preceding questions is "no," an NNSA NES evaluation is not required.

The NNSA contractor must document the basis for, and maintain an auditable record of, all CNCE determinations. These auditable records are subject to NNSA oversight.

- (2) OST NES Screen. Designated OST staff review the submitted documentation and presented information. The screening criteria detailed in OST 46XA, *Offsite Transportation Safety Manual*, Chapter 2.2, Appendix G, provide the basis for determining if qualified NES personnel must be engaged in deciding if the proposed change or emerging information must be elevated to a NESSG for NES evaluation.

If qualified NES personnel are required, OST must refer the issue to the Nuclear Explosive Safety Branch to determine if the proposed change or emerging information allows for Assistant Deputy Administrator for Secure Transportation approval, or if the issue must be elevated to an NCE

or appropriately-scoped NESS. Proposed changes to the screening criteria must also be referred to Nuclear Explosive Safety Branch for concurrence.

OST must document the basis for, and maintain an auditable record of, all determinations. These auditable records are subject to NNSA oversight.

d. Determination Outcomes.

- (1) NESSG Evaluation Required. Once a NNSA contractor NES representative or OST, as appropriate, has determined that evaluation by a NESSG is required, NNSA line management can decide whether or not to pursue the proposed changes or response to emerging information. For proposed changes or response to emerging information that NNSA line management decides to pursue, the NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable:
 - (a) Works with the Chief, Nuclear Explosive Safety Branch to jointly determine whether a NESS or NCE is the appropriate NES evaluation.
 - (b) Submits a request to the Chief, Nuclear Explosive Safety Branch to schedule the appropriate NES evaluation.
- (2) NESSG Evaluation Not Required. When it is determined that evaluation by a NESSG is not required, the NNSA contractor or Assistant Deputy Administrator for Secure Transportation, as applicable, is the approval authority. NNSA contractor and OST line management must establish a process for approving and implementing changes and responses to emerging information that do not require NESSG evaluation. The NNSA contractor and OST must maintain auditable records subject to NNSA oversight clearly establishing that NES is not adversely impacted by changes for which they have cognizance.
- (3) RECORDS. Records are maintained according to the NARA-approved DOE Record Schedules.

3. NESSG CHANGE EVALUATIONS.

- a. NCE. A NCE is performed to determine if approved NEOs will continue to meet the DOE NES Standards and other NES criteria after implementation of a proposed change or response to emerging information.
 - (1) Planning. The NESSG Chair conducts planning meetings as needed to ensure a common understanding of the approach being taken for an NCE. The need for a formal NCE planning meeting is determined through discussions between the Chief, Nuclear Explosive Safety Branch and the

organizations proposing a change or providing emerging information affecting an approved NEO. Planning meeting participants will:

- (a) Define the NCE scope and objectives.
- (b) Identify required briefing topics and demonstrations.
- (c) Plan briefings, demonstrations, and resources required to support the NCE.
- (d) Develop an NCE schedule and agenda that are sufficiently detailed to enable effective ongoing management of the NCE.

The NESSG chair is responsible for documenting and distributing planning meeting outcomes, including NCE scope, objectives, and schedule, to NCE participants and appropriate organizations.

- (2) Input Documentation. Change proposal or emerging information originators are responsible for preparing and distributing the NCE input. Input requirements for NCEs must be tailored to the subject, and include:

- (a) A complete description of the proposal or issue with, as appropriate, process flow representations and/or detailed written procedures, including dates and issue designations.
- (b) The rationale for the proposed change or response to emerging information, with concurrence from responsible management personnel and design agency representatives, as appropriate.
- (c) The inputs to and outputs from the CNCE or OST NES Screen, as appropriate.
- (d) Relevant information from NES evaluation reports, occurrence reports, and safety-related SFIs.
- (e) An assessment of the hazards associated with the proposed change or emerging information, and identification of any required new controls or changes to existing controls.

The required level of input documentation detail varies with the scope and complexity of the proposed changes or emerging information with the potential to impact NES. Information and analyses must be sufficient to show that affected NEOs will meet the DOE NES Standards and other NES criteria after the proposed change or response to emerging information is implemented.

- (3) Preparation. The NESSG and other participants must be given sufficient time and resources to evaluate the documentation of proposed changes to authorized NEOs or emerging information. The needed preparation period varies with the scope and complexity of issues to be addressed, and could range from a few hours to multiple weeks after the documentation is available. Requests for TA support should be tailored to ensure efficient and effective utilization of their technical expertise in support of the NCE.
- (4) Conduct. For the timeframe of the evaluation, the primary responsibility of the NESSG participants is preparing for and conducting the NCE. Conflicting assignments must be resolved in favor of NCE duties from the date the input documentation is available until conclusion of the NCE. The timely availability of project team, laboratory, and contractor personnel supporting the NCE should be ensured.

The NESSG chair may notify the change proposal or emerging information originator during an NCE that additional information is needed and, as appropriate, may suspend the NCE until the information is provided. The NESSG chair also has authority to suspend the NCE if unable to fulfill other requirements of this Manual.

The sequence and content of NCE elements are defined or modified based on the NCE scope and planning meeting decisions. The five central NCE elements are:

- (a) Briefings. The need for NCE briefings is determined during planning but may also be requested by the NESSG during the NCE. These briefings will cover key elements of the input documentation and present the NES foundation for change or emerging information under evaluation to ensure a common understanding and allow NESSG interaction with subject matter experts. The NESSG will critically consider the briefings, identify potential issues and, as appropriate, question or challenge points made or omitted in the briefings.
- (b) Demonstrations. The need for NCE demonstrations is determined during planning, but may also be requested by the NESSG during the NCE. NCE demonstrations are simulations that may use trainer units or other mock-ups. Demonstration details, including simulation fidelity, are established during the planning, but may be modified as needed during an NCE.

Demonstrations allow an examination of interfaces between and among the nuclear explosive and tooling, testers, other equipment, support systems, procedures, personnel, and the facility. The NESSG critically evaluates the process to identify potential NES

deficiencies and opportunities to strengthen NES controls.
Demonstrations must:

- 1 Provide the most realistic simulation practicable.
- 2 Be conducted by trained and qualified technicians or operators.
- 3 Use actual or representative tooling, equipment, testers, support equipment and systems.
- 4 Use written procedures that are under change control and sufficiently developed to be used in the NEO upon approval.
- 5 Be conducted in an actual bay, cell, or other representative facility. A training facility set-up to replicate the actual facility in size and layout may be deemed by the NESSG an acceptable representative facility. For some NCE subjects the NESSG may decide that an actual or representative facility is not needed to achieve an effective demonstration.

The NESSG is the final arbiter of the suitability of demonstration conditions.

- (c) Deliberations. NCE deliberations involve a collaborative effort among the NESSG and other participants to debate all sides of issues identified during preparation and conduct of the evaluation. The NESSG documents and categorizes the issues as conclusions develop.

Although the NESSG strives for unanimity, individual NESSG members may submit or endorse minority opinions when their judgment differs from that of the majority. Minority opinions must be included with the NCE memorandum in their entirety, and NESSG majority personnel must prepare a written response to the minority opinions.

While the NESSG normally conducts deliberations in open meetings, and is receptive to relevant input from knowledgeable, informed sources, all NCE memorandum content, including characterization and categorization of issues, is determined exclusively by the NESSG. At the discretion of the NESSG chair, the NESSG may also hold closed executive sessions in which only the NESSG participates.

- (d) NCE Memorandums. NCE memorandums must be adequate to support the approval authority's decision, and must include:
- 1 The signature of the NESSG chair and identification of other NESSG personnel.
 - 2 A summary description of the NEO, facility, management system, or emerging information evaluated, as appropriate.
 - 3 Evaluation results, including:
 - a Conclusions with supporting rationale.
 - b Pre-start and/or post-start findings, if any.
 - c NESSG minority opinions, if any, and associated majority response.
 - d A statement on the adequacy of resources and activities such as documentation, briefings, demonstrations, observations, time, NESSG composition, and administrative support for the evaluation.
 - 4 NCE input (attached or referenced).
 - 5 NCE participants.

The NESSG is responsible for the content of the NCE memorandum.

- (e) Feedback. Feedback is important for promoting improvement in the NCE process. NESSG personnel are encouraged to document lessons learned throughout all NCE activities, including preparation and planning.

The Chief, Nuclear Explosive Safety Branch must establish a process to accumulate, distribute, and implement documented feedback. Distribution will include the project team, NNSA line management, and the NES community.

(5) Approval Process.

- (a) NCEs Without Minority Opinions Involving Pre-start Findings. For NCEs with no minority opinions involving a pre-start finding or potential pre-start finding, the approval authority is the responsible NNSA site office manager or Assistant Deputy Administrator for

Secure Transportation, as applicable. The NESSG chair must brief the approval authority at the conclusion of the NCE and submit the NCE memorandum to the approval authority as soon thereafter as practicable. Copies will be sent to Director, Office of Military Application and Stockpile Operations; Director, Office of Nuclear Safety; Director, Nuclear Weapon Surety and Quality Division; and participating NESSG personnel.

The approval authority must document approval or reason for disapproval in correspondence to the originator of the change proposal or emerging information, as appropriate. Copies will be sent to the NESSG chair; Director, Office of Military Application and Stockpile Operations; Director, Office of Nuclear Safety; and Director, Nuclear Weapon Surety and Quality Division.

The NESSG chair provides a copy of the change approval or disapproval memo to participating NESSG personnel.

- (b) NCEs with Minority Opinions Involving Pre-start Findings. For NCEs with a minority opinion involving a pre-start finding or potential pre-start finding, the Assistant Deputy Administrator for Science, Engineering and Production Programs is the approval authority.

1 Post-Evaluation Briefings and Conferences. At the conclusion of the study, the NESSG chair summarizes the NCE activities and results in a briefing to the responsible NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable, and the Assistant Deputy Administrator for Military Application and Stockpile Operations, as available. The NESSG Chair will organize and schedule additional briefings or teleconferences as needed to inform the Assistant Deputy Administrator for Science, Engineering and Production Programs and/or to discuss and clarify issues related to the study or report.

2 Memorandum Submittal. The NESSG chair submits the NCE memorandum to the Assistant Deputy Administrator for Science, Engineering and Production Programs and the responsible NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable. Copies will be sent to Director, Office of Military Application and Stockpile Operations; Director, Office of Nuclear Safety; Director, Nuclear Weapon Surety and Quality Division; and participating NESSG personnel. As

needed, the NESSG Chair organizes and leads clarification/resolution of issues through written correspondence, teleconferences, videoconferences, or other means with NESSG personnel and NNSA HQ staff, and the Chief, Nuclear Explosive Safety Branch prepares a disposition recommendation to Office of Military Application and Stockpile Operations.

The NESSG chair provides a copy of the change approval or disapproval correspondence to participating NESSG personnel.

- 3 Approval Authority Actions. As the approval authority, the Assistant Deputy Administrator for Science, Engineering and Production Programs must issue a memorandum addressing the minority opinions and indicating approval (including, as appropriate, conditions of approval) or specifying reasons for disapproval. When approving a NES evaluation, the Assistant Deputy Administrator for Science, Engineering and Production Programs identifies an appropriate NNSA line manager for each NESSG finding as discussed in Chapter VII, paragraph 2a.

The memorandum of approval must be sent to the responsible NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable, and the NESSG chair. The NESSG chair will provide a copy of the final approval or disapproval correspondence to participating NESSG personnel.

Following the Assistant Deputy Administrator for Science, Engineering and Production Programs approval, the responsible NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable, may authorize implementation of the change in correspondence to the originator of the change proposal, with copies to the NESSG chair and the Director, Nuclear Weapon Surety and Quality Division.

- b. NESS. Change proposals or emerging information determined to not be candidate for one of the alternate forms of NES evaluation must be evaluated using the NESS process detailed in Chapter IV, tailored as appropriate to suit the subject.

The scope of a NESS performed for change control should be limited to aspects of the NEO or relevant MS topics affected by the proposed change or emerging

information. Such a NESS relies on at least one other previously-approved NESS (operation-specific or MS) to provide the context for the subject evaluated.

CHAPTER VII

NUCLEAR EXPLOSIVE SAFETY EVALUATION FINDINGS RESOLUTION

1. FINDING BASIS AND TYPES. Findings derive from process deficiencies that jeopardize NES. NES evaluations can yield two types of findings. Approved pre-start findings address issues that must be corrected prior to initiation or continuation of affected NEOs. Approved post-start findings address issues that can be corrected after initiation or during continuation of NEOs. NES evaluation reports may also include Deliberation Topics summarizing substantive NESSG discussions that did not result in a finding.
2. RESPONSE TO FINDINGS.
 - a. Assignment of Responsibility. When approving a NES evaluation, the NNSA approval authority identifies an appropriate NNSA line manager for each NES evaluation finding. That manager is responsible for tasking action agencies and ensuring corrective actions are both timely and effective. Typically, this is the responsible NNSA Site Office Manager or Assistant Deputy Administrator for Secure Transportation. In some cases, such as when a design agency plays a central role in the corrective action, Director, Nuclear Weapons Stockpile Division or another NNSA organization may be a more appropriate choice.
 - b. Ongoing Operations. When a NESSG generates a finding that impacts ongoing operations, the NNSA site office or OST, as applicable, must evaluate the potential implications and provide direction to appropriate operations personnel regarding the required response. Options include suspending the involved operations, implementing corrective or compensatory measures, and allowing operations to continue unchanged pending further evaluation or the approval authority's decision on the finding.
 - c. Other Applications. The NNSA site office or OST, as applicable, and the associated NNSA M&O contractor must assess whether findings are relevant to NEOs in addition to that which produced the finding.
 - d. Corrective Actions. Approval of NESS reports, OSR reports, or NCE memorandums constitutes NNSA tasking to take corrective action on NES evaluation findings unless otherwise specified by the approval authority.

The NESSG Chairs, NESSG members, or other qualified NES personnel may be consulted in support of effective corrective action development.

The responsible NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable, must provide the Assistant Deputy Administrator for Science, Engineering and Production Programs a corrective action plan (CAP) for post-start findings for which the Assistant Deputy Administrator for Science, Engineering and Production Programs was the

approval authority. The NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable, and the associated NNSA M&O contractor must ensure that corrective actions relevant to NEOs in addition to that which produced the associated finding become part of the CAP.

3. FINDING CLOSURE PROCESS. Responsible NNSA site offices and OST must ensure a process for closure of approved NES evaluation findings is defined and implemented. Each NNSA site office and OST must:
 - a. Ensure closure of approved pre-start findings prior to initiation or continuation of NEOs.
 - b. Require detailed CAPs that include assignment of responsibility, allocation of resources, and timing for closure of findings.
 - c. Ensure that proposed CAPs requiring a change to NEOs or MS topic are evaluated using the change control process detailed in Chapter VI.
 - d. Provide for tracking of findings to closure.
 - e. Ensure compilation of a closure package with all information needed to support closure decisions, including the action agency's request for closure, supporting rationale, and evidence that the corrective actions are complete and effective in addressing the NES deficiency.
4. STATUS REPORTS. For all open findings, the action agency must generate and distribute quarterly status reports documenting the planned resolution, schedule for closure, and actions taken since the previous quarterly report. Distribution will include the Assistant Deputy Administrator for Science, Engineering and Production Programs; Director, Office of Military Application and Stockpile Operations; Director, Office of Safety; Director, Nuclear Weapon Surety and Quality Division; Director, Nuclear Weapons Stockpile Division; Chief, Nuclear Explosive Safety Branch; the responsible NNSA site offices; OST (if applicable); design agencies (if applicable); and M&O contractors (if applicable).
5. CLOSURE APPROVAL. The approval authority for closure of findings is the responsible NNSA site office manager or Assistant Deputy Administrator for Secure Transportation, as applicable, with advice from the Chief, Nuclear Explosive Safety Branch.

The preferred basis for closure of approved findings is acceptance by the responsible approval authority, with advice from the Chief, Nuclear Explosive Safety Branch that effective corrective actions have been implemented.

Based on appropriate substantiation, the cognizant approval authority may also close a finding based on information that was not available to the NESSG (i.e., the factual basis for the finding is questioned), arguments that the reasoning for the finding is flawed (i.e.,

the finding does not logically derive from the factual basis), or analysis indicating that the safety benefit of the corrective action is not commensurate with its cost.

When a NES evaluation finding is closed based on rationale other than documented completion of effective corrective action, such as the arguments suggested above, the NNSA site office manager or Assistant Deputy Administrator for Secure Transportation must document the rationale in a notification to the NES evaluation approval authority (Assistant Deputy Administrator for Science, Engineering and Production Programs) with copies to the Director, Office of Military Application and Stockpile Operations; Director, Nuclear Weapon Surety and Quality Division; Director, Office of Safety; and the Chief, Nuclear Explosive Safety Branch. A similar notification is required if a finding is closed contrary to Nuclear Explosive Safety Branch advice.

CHAPTER VIII EXEMPTIONS

EXEMPTIONS.

The concurrence of the Central Technical Authority (CTA) is required prior to approval of any exemptions to this Manual. If more than one CTA is responsible for activities or operations affected by the exemption, all affected CTAs must concur.

Once CTA concurrence is obtained the Assistant Deputy Administrator for Science, Engineering and Production Programs is the final approval authority.

CONTRACTOR REQUIREMENTS DOCUMENT
DOE M 452.2-2, *NUCLEAR EXPLOSIVE SAFETY EVALUATION PROCESSES*

Regardless of the performer of the work, the contractor is responsible for complying with the requirements of this contractor requirements document (CRD) and flowing down CRD requirements to subcontractors at any tier to the extent necessary to ensure contractor compliance. This Contractor Requirements Document (CRD) establishes the requirements for Department of Energy (DOE) contractors, including National Nuclear Security Administration (NNSA) contractors with responsibilities for operation and/or management of sites or facilities and whose responsibilities include performing, managing, overseeing, or directly supporting nuclear explosive operations (NEOs) or associative activities.

All contractors with this CRD incorporated in their contracts must comply with the following requirements:

1. Ensure the training of and certify contractor nuclear explosive safety study group (NESSG) members per the requirements in CRD Appendix A.
2. Specifically train and certify nuclear explosive safety (NES) representatives to perform Contractor NES Change Evaluations (CNCEs). With the exception of the requirement to participate in two National Nuclear Security Administration (NNSA) NES evaluations every three years, the training, certification, and independence requirements for contractor NES representatives are identical to those detailed for NNSA contractor NESSG members in paragraph 15 below and the requirements in CRD Appendix A.
3. Ensure timely availability of project team, laboratory, and contractor personnel to support NES evaluations.
4. Provide Technical Advisors (TAs) as requested by NESSG chair to support NES evaluations.
5. Lead the development of safety supporting documentation for NES evaluations and ensure the completeness and accuracy of the information.
6. Provide NES evaluation input, briefings, and demonstrations as required, and certify the completeness and accuracy of the information.
7. Ensure the Single Integrated Input Document (SIID) is delivered or presented to the NESSG for their use at the orientation meeting, and available to members for comprehensive review and evaluation during the NESSG preparation period prior to the NESS.
8. Conduct CNCEs to assess proposed changes or emerging information affecting an approved Nuclear Explosive Operation (NEO) or associated master study topic.

9. Establish a process for approving and implementing contractor-allowable changes.
10. Evaluate the safety implications of a proposed change in two ways: (1) a Unreviewed Safety Question (USQ) screen by personnel trained to provide the safety basis perspective, and (2) a NES review by a NES-certified representative. If the NES review indicates that NNSA approval is required, the NNSA must approve the proposed change prior to implementation, regardless of the outcomes of the USQ screen or USQ determination.
11. Develop the Corrective Action Plan (CAP) and take appropriate action on approved NES evaluation findings.
12. For all open findings for which they are an action agency, generate and distribute quarterly status reports documenting the planned resolution, schedule for closure, and actions taken since the previous quarterly report. Distribution will include the Assistant Deputy Administrator for Science, Engineering and Production Programs; Director, Office of Military Application and Stockpile Operations; Director, Office of Safety; Director, Nuclear Weapon Surety and Quality Division; Director, Nuclear Weapons Stockpile Division; Chief, Nuclear Explosive Safety Branch; the responsible NNSA site offices; OST (if applicable); design agencies (if applicable); and M&O contractors (if applicable).
13. Ensure that NES evaluation personnel selected for a given NES evaluation will be able to devote their time for the duration of the NES evaluation. Conflicting assignments must be resolved in favor of NES evaluation duties from the date the input documentation is made available until conclusion of the NES evaluation.
14. If a NESS or OSR will not be conducted within the timeframe specified, ensure that requests for extensions for NESS or OSR are submitted to the Assistant Deputy Administrator for Science, Engineering and Production Programs in writing, with a copy to the Director, Office of Military Application and Stockpile Operations, Director, Nuclear Weapon Surety and Quality Division, and Chief, Nuclear Explosive Safety Branch, at least 30 days prior the deadline.
15. Ensure their NESSG members meet the following qualifications:
 - a. Personal Characteristics. NESSG personnel must—
 - (1) bring reasoned judgment to NEO evaluations;
 - (2) have the ability and willingness to question and challenge NNSA line management safety statements and rationale for issues with the potential to impact NES;
 - (3) be able and willing to actively participate as part of a team and to take unpopular stands when warranted;

- (4) have the ability to—
 - (a) develop appropriate NES evaluation approaches; contribute to effective planning meeting decisions;
 - (b) critically assess input documentation, briefings, and demonstrations;
 - (c) develop and pursue relevant lines of inquiry; articulate NES concerns;
 - (d) develop appropriate feedback; and
 - (5) have oral communication skills to participate effectively in deliberations and written communication skills to clearly document conclusions.
- b. Training. NNSA contractors providing NESSG members must ensure their members receive the training required to achieve and maintain the proficiencies needed to meet the requirements established in this CRD, including CRD Appendix A, *NNSA Contractor NESSG Training Requirements*. Contractors providing NESSG members must also ensure that a process exists for experienced members to convey useful knowledge to less experienced members.
- c. Independence. The NESSG must make objective, independent judgments regarding the NES adequacy of systems, operations, and processes. NESSG personnel must not be subject to management influence in performing their NES obligations, and will not—
 - (1) have current responsibility for the design, development, production, or testing of the specific nuclear explosive, NEO, facility, or management system under evaluation;
 - (2) have responsibility for advocacy of special interests of any organization, or for defending a specific nuclear explosive, NEO, facility, or management system under evaluation; or
 - (3) participate in the preparation of NESS input technical documentation, OSR supporting documentation, NCE input, or the preparation or presentation of briefings or demonstrations.
- d. Certification. NESSG member certifications must be based on satisfaction of the requirements for personal characteristics, training and independence (paragraphs 15a to 15c, above) and the requirements for education, experience, technical competencies, and proficiency activities established in CRD Appendix A, *NNSA Contractor NESSG Training Requirements*. NNSA contractors must designate certification authorities who can objectively judge whether their NESSG members

meet these requirements. Certification is documented by a certification letter to the Chief, Nuclear Explosive Safety Branch and is valid for one year.

Certification authorities must document attainment of required competencies using the following methods:

- (1) Documented evaluation of equivalencies
 - (2) Written examination
 - (3) Documented oral evaluation
 - (4) Documented observation of performance
 - (5) Documented interview by Senior Management in the applicable organization
16. Ensure CNCEs are used to determine whether the contractor is the responsible approval authority, or whether the proposal or issue must be elevated to a NESSG for NES evaluation.
17. CNCEs elements are as follows:
- a. Focus. CNCEs consider the NES implications of:
 - (1) proposed changes to procedures, materials, tooling, testers, other equipment, facilities, facility interfaces, or management programs associated with approved NEOs and
 - (2) emerging information affecting approved NEOs.
 - b. Documentation. The contractor takes the lead in developing the safety support documentation and compiling inputs that may be needed from the design agencies and NNSA. The contractor ensures the completeness of the documentation, if any, as well as the explicit certification of its technical accuracy by the providing organizations.
- Sufficient information must be provided to establish that proposed changes are not a threat to NES including, as applicable:
- (1) A complete description of the proposal or issue with process flow representations and detailed written procedures, as appropriate.
 - (2) Rationale for the proposed change, with concurrence from responsible management personnel and design agency representatives, as appropriate.
 - (3) Relevant safety basis information as needed to support a determination.

- c. Determination Process. With a particular emphasis on potentially adverse impacts on NES, a contractor NES representative must review the submitted documentation and presented information, and answer the following questions to determine if elevation to NNSA for NES evaluation is required.
- (1) Does the proposed change add, delete, or modify a nuclear explosive safety rule (NESR), immediate-action procedure (IAP), or other control identified as important to NES in a relevant NES evaluation report?
 - (2) Does the proposed change involve new Category 1 electrical equipment or the addition of an electrical test of a nuclear explosive?
 - (3) Does the proposed change to Category 1 electrical equipment involve more than minor modifications that clearly do not affect the functionality, quality, safety analysis, or security controls for the equipment?
 - (4) Does the proposed change to a NEO involve a procedure, tester, equipment, tooling, facility interface or other process or feature not addressed by a currently approved NES evaluation?
 - (5) Does the proposed change involve the potential application of additional electrical, mechanical, thermal, chemical, or electromagnetic energy, or the application of the above energy types to other circuitry or components of a nuclear explosive (NE) in a manner that has not been NESSG evaluated?
 - (6) Does the proposed change affect one-point safety?
 - (7) Does the proposed change affect lifting, rotating, or other NE movement operations not addressed by a previous NES evaluation?
 - (8) Does the proposed change affect the implementation of the Two-Person Concept?
 - (9) Does the proposal involve a NEO relocation that would adversely impact NES?
 - (10) Does the proposed change involve a management program or process, including any form of work instructions or operating standards that would impact NES?
 - (11) Has information been presented that could alter previous NES evaluation conclusions regarding an approved NEO?

An NNSA NES evaluation is required if the answer to one or more of the preceding questions is "yes" or "unknown." If the answer to each of the preceding questions is "no," an NNSA NES evaluation is not required.

The contractor must document the basis for, and maintain an auditable record of all CNCE determinations according to National Archives and Records Administration (NARA)-approved DOE Records Schedules. These auditable records are subject to NNSA oversight.

d. Determination Outcomes.

- (1) NESSG Evaluation Required. Once a contractor NES representative has determined that evaluation by a NESSG is required, the NNSA contractor can decide whether or not to pursue the proposed changes or response to emerging information. For proposed changes or response to emerging information that line management decides to pursue, the NNSA site office manager works with the Chief, Nuclear Explosive Safety Branch to jointly determine whether a NESS or NCE is the appropriate NES evaluation.
- (2) Submits a request to the Chief, Nuclear Explosive Safety Branch to schedule the appropriate NES evaluation.
- (3) NESSG Evaluation Not Required. When it is determined that evaluation by a NESSG is not required, the contractor is the approval authority. The NNSA contractor must establish a process for approving and implementing changes and responses to emerging information that do not require NESSG evaluation. The contractor must maintain auditable records subject to NNSA oversight clearly establishing that NES is not adversely impacted by changes for which they have cognizance.

18. Responsible NNSA contractors must ensure a process for closure of approved NES evaluation findings is defined and implemented. Each contractor must :

- a. Ensure closure of approved pre-start findings prior to initiation or continuation of affected NEOs.
- b. Require detailed CAPs that include assignment of responsibility, allocation of resources, and timing for closure of findings.
- c. Ensure that proposed CAPs requiring a change to NEOs or MS topic are evaluated using the change control process detailed in Chapter VI.
- d. Provide for tracking of findings to closure.
- e. Ensure compilation of a closure package with all information needed to support closure decisions, including the action agency's request for closure, supporting rationale, and evidence that the corrective actions are complete and effective in addressing the NES deficiency.

APPENDIX A

NNSA CONTRACTOR NESSG TRAINING REQUIREMENTS

1. **PURPOSE.** To establish requirements for NNSA Contractor NESSG members in attaining the competencies needed to fulfill their NESSG duties and responsibilities. These requirements are intended to ensure that NNSA Contractor NESSG members have at least the same level of competency as established for NNSA federal employee NESSG members in DOE-STD-1185, *Nuclear Explosive Safety Study Functional Area Qualification Standard*.
2. **IMPLEMENTATION REQUIREMENTS.** Organizations providing NNSA Contractor NESSG members must establish a process, subject to NNSA oversight, to ensure each of its members meets the education, experience, and technical competence requirements specified in this Appendix.
3. **EDUCATION AND EXPERIENCE.** The levels of education and experience for NNSA Contractor NESSG members are:
 - a. **Education:** Bachelor of Science degree in engineering or physics. Preferred education is a Master of Science in engineering or physics with a strong preference for individuals with a Ph.D. in a technical area.
 - b. **Experience:** Five (5) years of industrial, military, Federal, state, or other directly related experience that has provided specialized experience in nuclear explosive safety, design, assembly/disassembly, maintenance, testing, transportation, handling, or storage; or other similar experience in high consequence explosive or nuclear safety operations. Specialized experience can be demonstrated through possession of the competencies outlined below.
4. **TECHNICAL COMPETENCIES.** NNSA Contractor NESSG technical competency requirements are as follows:
 - a. **Expert-level Knowledge.** NESSG-certified personnel must have an extensive depth and breadth of knowledge in the following areas that they can provide sound advice in the absence of procedural guidance:
 - (1) DOE O 452.1D, *Nuclear Explosive and Weapons Surety Program*, dated 4-14-09, or most recent successor document.
 - (2) DOE O 452.2D, *Nuclear Explosive Safety*, dated 4-14-09, or most recent successor document.
 - (3) DOE M 452.2-1A, *Nuclear Explosive Safety Manual*, dated 4-14-09, or most recent successor document.

- (4) DOE M 452.2-2, *Nuclear Explosive Safety Evaluation Processes*, dated 4-14-09, or most recent successor document.
- b. Working-level Knowledge. NESSG-certified personnel will have sufficient knowledge in the following areas to ensure they are able to effectively monitor and assess operations and activities; apply performance and safety standards; and recognize the need to consult appropriate reference materials and/or seek expert-level advice:
 - (1) Physics of nuclear weapons and explosives.
 - (2) Materials used in nuclear weapons and nuclear explosives, and their respective hazardous properties.
 - (3) Internal design of nuclear explosives.
 - (4) Nuclear detonation safety design concepts.
 - (5) Effects of abnormal environments on nuclear explosives.
 - (6) One-point safety and related issues.
 - (7) Fusing, arming, control, and ancillary systems in nuclear weapons.
 - (8) Explosives and pyrotechnics and their applicability in nuclear explosives.
 - (9) Detonators.
 - (10) Hazards of squibs, propellants, and other pyrotechnics used in nuclear explosives.
 - (11) Facilities used to assemble, disassemble, stage, test, and handle nuclear explosives.
 - (12) Facility safety equipment that interfaces with nuclear explosives.
 - (13) Electrical isolation systems and their importance to NES.
 - (14) Fire protection systems and their importance to NES.
 - (15) Threats such as seismic disturbances, extreme weather, external fires, other natural phenomena, and aircraft crashes.
 - (16) Tooling, rigging, and hoisting equipment used for handling nuclear explosives.
 - (17) Control of electrical equipment used in nuclear explosive areas.

- (18) Requirements for the safe offsite and onsite transportation of nuclear explosives.
 - (19) Nuclear safety requirements for the safety of nuclear explosive operations at NTS.
 - (20) NESRs for NEOs conducted at the Device Assembly Facility at NTS.
 - (21) Technical communications, including demonstrated proficiency in written communication, oral communication, interpersonal communications, and proficiency in writing a defensible NESS finding.
 - (22) DOE O 5480.19, Chg. 2, *Conduct of Operations Requirements for DOE Facilities*, dated 10-23-01.
 - (23) Explosive safety requirements in DOE M 440.1-1A, *DOE Explosives Safety Manual*, dated 1-9-06, associated with general operations safety guidelines, work environment, area controls, electrical storms, lightning protection, static electricity, ESD, electrical equipment and wiring, material handling, transportation, stand-off distance.
 - (24) Requirements in DOE O 452.4A, *Security and Control of Nuclear Explosives and Nuclear Weapons*, dated 12-17-01, for protection, security, and control of nuclear explosives and nuclear weapons.
 - (25) Requirements in 10 CFR Part 712, *Human Reliability Program*.
- c. Familiarity-level Knowledge. NESSG-certified personnel will have adequate knowledge of, or exposure to, the following subjects and processes to permit effective discussions with individuals having greater knowledge:
- (1) U.S. nuclear stockpile.
 - (2) DOE STD 3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis*.
 - (3) DOE O 420.1B, *Facility Safety*.
 - (4) 10 CFR Part 851, *Worker Safety and Health*.
 - (5) 10 CFR Part 830, Subpart A, *Quality Assurance Requirements*.
 - (6) Documented Safety Analysis requirements of 10 CFR Part 830, *Nuclear Safety Management*, Subpart B, *Safety Basis Requirements*.
 - (7) The USQ process with respect to its impact on NEOs and associated activities and facilities.

- (8) TSRs as described in 10 CFR 830.205, *Technical Safety Requirements*.
 - (9) The impact of software quality assurance on NES.
 - (10) Safety analysis techniques and their application to NEOs, facilities, and associated activities.
5. PERFORMANCE REQUIREMENTS. NESSG members-in-training must be under the guidance and direction of a certified NESSG member from the candidate's organization. The certified NESSG member and NESSG chair will provide feedback to the candidate and the appropriate certification authority regarding the candidate's performance. Members-in-training may not sign NES evaluation reports. NESSG candidates must participate in a minimum of two NES evaluations as a member-in-training in the three years preceding documented completion of the competency requirements of this Appendix.
6. EVALUATION REQUIREMENTS. Certification authorities will maintain records of attainment of the required competencies including documented evaluation of equivalencies as appropriate, written examination, documented oral evaluation, and observation of performance.
7. CONTINUING EDUCATION, TRAINING, AND PROFICIENCY.

NESSG members must participate in two major NESSG activities (NESSs or OSRs), every three years to remain certified. Two NCEs, limited scope NESSs, Nuclear Weapon System Safety Group (NWSSG) studies, or ARG exercises may be substituted for one NESS/OSR with concurrence of the certifying official.

NESSG members must participate in a minimum of 30 hours of office/facility/position specific continuing training per year that includes the following elements:

 - a. Technical education and/or training covering topics directly related to the duties and responsibilities of the candidate as determined by NNSA line management. This may include courses and/or training provided by:
 - (1) DOE
 - (2) National Laboratories
 - (3) Management and Operating Contractors
 - (4) Annual Nuclear Explosive Safety Workshops
 - (5) Other government agencies
 - (6) Outside vendors, or

(7) Educational institutions

- b. Training covering topics that address identified deficiencies in the knowledge and/or skill of the candidate.
- c. Training in areas added to the technical competencies above after initial qualification.
- d. Training in new technical developments in nuclear explosive safety.
- e. Specific continuing training requirements shall be documented, retained, and available for external audit.

8. EQUIVALENCIES AND EXEMPTIONS. Equivalences to, and exemptions from, specific competencies for individual NESSG candidates must be justified, documented, and submitted to the appropriate certification authority. In accordance with the spirit and intent of this Appendix, equivalencies and exemptions should be granted sparingly following rigorous assessment of a candidate's:

- a. Knowledge, including advanced education such as graduate level courses directly related to these competency requirements.
- b. Experience and skills.
- c. Training, especially that which included examinations.
- d. Certifications, such as a Professional Engineering license.

ACRONYMS AND ORGANIZATIONAL DESIGNATIONS

AL	Albuquerque Supplemental Directive
CAP	corrective action plan
CNCE	contractor NES change evaluation
CFR	Code of Federal Regulations
CRD	contractor requirements document
CTA	Central Technical Authority
DOE	US Department of Energy
ESD	electrostatic discharge
HAR	hazard analysis report
HE	high explosive
HEVR	high explosive violent reaction
HQ	Headquarters
IAP	immediate-action procedures
LOI	line of inquiry
M	Manual
M&O	management and operating
MS	master study
NARA	National Archives and Records Administration
NCE	NES change evaluation
NE	nuclear explosive
NEO	nuclear explosive operation
NES	nuclear explosive safety
NESS	nuclear explosive safety study
NESSG	Nuclear Explosive Safety Study Group

NESR	nuclear explosive safety rule
NNSA	National Nuclear Security Administration
NTS	Nevada Test Site
O	Order
OSR	operational safety review
OST	Office of Secure Transportation
P.L.	Public Law
SAR	safety analysis report
SFI	significant finding investigation
SIID	single integrated input document
STA	senior technical advisor
STD	Standard
TA	technical advisor
TSR	technical safety requirement
USQ	unreviewed safety question
USQD	unreviewed safety question determination
WSS	weapon safety specification