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DOE LIMITED STANDARD

HAZARD ANALYSIS REPORTS FOR NUCLEAR EXPLOSIVE OPERATIONS

U.S. Department of Energy
Washington, D.C. 20585

AREA SAFT

FOREWORD

1. This Department of Energy (DOE) technical standard is approved for use by the Deputy Assistant Secretary for Military Application and Stockpile Management (DP-20), and is available for use with DOE Order (O) 452.2A, "SAFETY OF NUCLEAR EXPLOSIVE OPERATIONS," by all DOE components and their contractors who are responsible for nuclear explosive operations and associated activities and facilities.

2. Standards are used to identify methods that DOE finds acceptable for implementing the Department's requirements. Beneficial comments (recommendations, additions, and deletions) and pertinent data that may be of use in improving this document should be addressed to:

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3. The authorization basis for DOE nuclear explosive operations requires a Hazard Analysis Report (HAR) as set forth in DOE O 452.1A, "NUCLEAR EXPLOSIVE AND WEAPON SURETY PROGRAM." This technical standard clarifies existing requirements and provides guidance for the HAR development process and supplements information contained in DOE Guide 452.2A-1A, "IMPLEMENTATION GUIDE FOR DOE ORDER 452.2A, SAFETY OF NUCLEAR EXPLOSIVE OPERATIONS." Appendix A provides the definitions used in this technical standard and Appendix B gives a list of abbreviations and acronyms.

4. This standard establishes DOE expectations for the performance of the detailed hazard analysis of nuclear explosive operations. Detailed guidance on the analytic methodology, format, and content of HARs based upon identified user needs and lessons learned is documented in the HAR Handbooks. The HAR Handbooks, one tailored for the Pantex Plant and another for the Nevada Test Site, provide guidance on accepted hazard analysis concepts and techniques. The responsible Operations Offices

will maintain these handbooks to reflect site-specific unique operations and plant practices. Changes to these handbooks will require DP-20 concurrence.

5. This technical standard will be periodically revised, as appropriate, based on experience from published and approved hazard analysis studies.

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1. SCOPE AND APPLICABILITY

This technical standard applies to the conduct of hazard analyses and preparation of hazard analysis reports (HARs) for nuclear explosive operations (NEOs) conducted by the Department of Energy (DOE). This standard addresses operation-specific HARs and their interface with facility safety basis documents (Safety Analysis Reports [SARs] or other DOE-approved safety basis documents).

2. PURPOSE

The purpose of this technical standard is to clarify the requirements and provide guidance for conducting hazard analyses and preparing HARs for NEOs and associated activities. It is intended to supplement the guidance contained in DOE Guide 452.2A-1A, "IMPLEMENTATION GUIDE FOR DOE ORDER 452.2A, SAFETY OF NUCLEAR EXPLOSIVE OPERATIONS."

3. HAZARD ANALYSIS OBJECTIVE

a. The primary objective for the hazard analysis (HA) is to support DOE management decisions concerning:

   (1) NEO authorization within a specified facility or facilities;
   (2) safety commitments that constitute part of the safety basis for the operation;,
   (3) the adequacy of safety controls, which provide assurance that the operation can be conducted safely; and
   (4) the acceptability of proposed process changes.

b. To achieve its primary objective, the HAR fully documents the results of a systematic evaluation of NEO hazards and accidents having potential adverse consequences to the workers, the public, and the environment, including:

   (1) the hazards associated with the specific NEO;
   (2) those NEO accident scenarios that have the potential to result in nuclear detonation (ND), high explosive detonation or deflagration (HED/D), fire, severe worker injury, or dispersal of hazardous and/or fissile materials;

(3) characterization of potential hazard scenarios including identification and development of facility- and activity-based safety controls and requirements that prevent and/or mitigate ND, HED/D, fire, severe worker injury, or dispersal of hazardous and/or fissile materials;
(4) justification for the disposition of all identified hazards and hazard scenarios (i.e., those determined to require further analysis and those determined not to pose a safety concern);
(5) discussion of reliability and effectiveness of controls;
(6) bases for Technical Safety Requirements (TSRs) and other safety commitments; and
(7) discussion of assumptions employed in the conduct of the HA, including justification of the screening criteria used in the selection of accident scenarios and controls.

4. APPROACH, PLANNING, AND SCHEDULING FOR HAZARD ANALYSIS REPORTS

DOE prescribes the use of a graded approach to guide the conduct and depth of the HA based on the complexity of the operation and potential consequences of the activities being performed. The format, content, and level of detail presented in the associated safety documentation should be tailored to produce manageable and safety-effective information, which will provide assurance to DOE that a NEO and its associated activities are safe. Supporting safety analyses and related safety information should be documented, traceable, and auditable. Information not available in referenceable documents should be included in the HAR or its supporting documentation.

The planning and scheduling of efforts to prepare, review, approve, and update HARs shall be managed by the responsible DOE operations office. In addition, the planning process should assign organizational responsibilities and identify organizational points of contact.

5. HAZARD ANALYSIS SCOPE AND INTERFACES

DOE O 452.1A requires an approved HAR and SAR prior to authorization of a NEO. The SAR documents the safety basis for the facilities in which the NEO is performed while the HAR documents the activity-specific safety basis for the NEO and associated activities. For facilities or activities lacking an approved SAR, the expectation is that operation-specific HAs would include the safety analysis of those facilities and activities in support of the proposed NEO comparable to the level of analysis required by DOE O 5480.23, DOE-STD-3009-94, or DOE-STD-3011-94.

5.1 HAZARD ANALYSIS SCOPE

The scope of the HA must match the full scope of operations for which DOE authorization is sought. The HA must consider the operational processes, equipment, facility or facilities, operation-unique activities related to movements within or between facilities, and the specific locations where the activities are to be conducted.

The HA consists of a systematic evaluation of the hazardous materials, energy sources, and hazards associated with the NEO that could lead to serious injury to workers, damage to the environment, and adverse effects to the health and safety of the public. The primary focus of the HA is to evaluate all hazards that could lead to ND, HED/D, and fire which result in dispersal of fissile material from the pit of a nuclear explosive. This evaluation should ensure that all potential operational and facility hazards are addressed and that process-specific and common-facility controls applicable to the NEO are identified.

The HAR is not required to include a quantitative consequence assessment of all accidents. However, some qualitative consequence assessments may be required to support evaluation of facility safety basis issues.

Offsite transportation of nuclear explosives is addressed in a transportation SAR prepared in accordance with the Deputy Assistant Secretary for Military Application and Stockpile Management Transportation SAR (TSAR) Guidance which has been incorporated into DOE O 461.X, "PACKAGING, TRANSFER, AND TRANSPORTATION OF MATERIALS OF NATIONAL SECURITY INTEREST." The transportation SAR and the Over-the-Road Nuclear Explosive Safety Study (NESS) Master Study provide documentation of the safety analysis of offsite nuclear explosive transportation operations. Offsite transportation is excluded from the scope of a HA for a specific NEO. However, a HA prepared in accordance with this standard must address onsite transportation.

The safety of nuclear explosive operations overlaps with both environmental regulations and occupational safety and health regulations. Compliance with Environmental Protection Agency (EPA) rules or Occupational Safety and Health Administration (OSHA) regulations are not within the scope of the HA. Compliance with EPA rules is addressed in separate analyses and documentation and is assessed through facility-specific Integrated Safety Management Programs. Routine occupational or

industrial safety issues are dealt with through OSHA compliance efforts. Routine workplace hazards are addressed in HAs only insofar as they may become accident initiators.

The HA is not required to address deliberate unauthorized acts which are addressed under the provisions of DOE O 452.4, "SECURITY AND CONTROL OF NUCLEAR EXPLOSIVES AND NUCLEAR WEAPONS." The HA should address situations where security and use control positive measures might adversely impact nuclear explosive safety so that they can be addressed in an appropriate manner.

5.2 INTERFACES

The facility safety analysis provides a description of the facility, identification of facility and site hazards that might pose a threat to the NEO, and the derivation of facility safety controls. The SAR identifies the bounding accident consequences for the facility(ies) in which the NEOs are conducted. The HA uses the facility safety analysis information in its evaluation of the applicability and effectiveness of the facility and site safety controls relied on to prevent accidents and mitigate consequences.

Absent the existence of a facility SAR prepared in accordance with DOE O 5480.23 (or DOE O 425.1), comparable facility safety basis information must be developed through the activity-specific HA process. The HA should ensure that potential facility hazards to the NEO are addressed and common facility controls supporting the HAR objectives are identified. In addition, the HA may identify the need for additional facility TSR level controls.

Per DOE O 452.2A and DOE-STD-3015-97, the HAR is an input to the NESS Group (NESSG) deliberations. Therefore, the HAR should provide sufficient information to support the NESSG evaluation of a proposed NEO to ensure that there are adequate positive measures to minimize the possibility of unintended nuclear detonation, high-explosive detonation or deflagration, or fire, thus, ensuring that the three NES standards in DOE O 452.2A are met.

Nuclear Explosive Safety Rules (NESRs) are intended to be the highest level of safety requirements for hazard scenarios that have the potential for ND, HED/D, or fire resulting in fissile material dispersal. NESRs are approved concurrently with approval of the NESSG report. However, NESRs

and any process-specific safety requirements necessary to implement the NESR must be documented in the HAR. In addition to an evaluation of NESRs, the HAR shall contain an evaluation and identification of worker safety and other protection measures including Operational Safety Controls (OSCs) for non-NES NEO-specific hazards. OSCs formalize the implementation of safety controls that address accident scenarios with the potential to lead to severe worker injury, public, or environmental consequences other than those caused by ND, HED/D, or fire.

Institutional safety plans and programs provide facility/site nuclear safety and nuclear explosive safety commitments relating to the implementation of criticality safety, radiation protection, hazardous material protection, conduct of operations, etc. These facility nuclear safety and nuclear explosive safety commitments provide facility/site specific administrative and operational controls for all general and common nuclear explosive operations. HARs should document that these institutional safety plans and programs meet the control requirements and are applicable to the specific NEOs. In particular, the HAR should supplement the institutional safety chapters of the SAR by identifying process-specific control requirements. If there are no unique controls or programmatic requirements for the specific operation, the HAR should provide a statement to that effect.

Integrating the HA with the operation development enables safety considerations to be incorporated into the operation design. Therefore, when possible, HAs should be conducted during, and integrated with, process design and development in order to identify and evaluate potential modifications to the operations, equipment, and administrative controls.

6. HAZARD ANALYSIS (HA)

The responsibility for conducting the HA and preparing the HAR shall be assigned to an experienced HA team. The size and composition of the team depend on the combination, magnitude and type of hazards involved, the nuclear explosive, and the complexity of the operation being evaluated. To be effective, the team must include a combination of safety analysis and subject matter experts familiar with the specific NEO being analyzed.

The HA shall include a systematic evaluation of the operation to identify hazards and develop potential hazard scenarios. Throughout the entire evaluation process the HAR team will identify controls that

are already in place to prevent or mitigate accidents and the need for any additional safety controls. The HA shall provide assurance that the safety features of the nuclear explosive are not compromised.

Acceptable methods of HA include combinations of what-if/checklist analysis, process HA, hazard and operability analysis, failure modes and effects analysis, fault tree and event tree analysis, and human reliability analysis. In many cases, a combination of these techniques should be employed for the NEO HA.

The HA evaluates potential hazards associated with specific NEOs and associated activities. The HA shall consider hazards specific to the operation, including failure of equipment, tooling, support systems, and human actions. The HA shall also address hazards external to the facility where the operations are conducted (e.g., natural phenomena, transportation accidents, explosions or accidents at neighboring facilities), and hazards internal to the facility but external to the operation (e.g., fires and floods). Based on these analyses, the HA identifies and evaluates the effectiveness of relevant safety controls including systems, structures, components, tooling, and equipment that are necessary to prevent accidents or mitigate consequences. Due in part to the large uncertainty associated with accident scenario likelihood, selection of controls should use safety conservative expert judgment.

Human reliability is an important element in nuclear explosive safety and needs to be considered in both the HA and controls development. NEOs primarily entail hands-on tasks involving direct work with the nuclear explosive; as a result, the potential for human error must be considered in the development of hazard scenarios.

Generally, rare events have large uncertainties in accident frequency estimates due to a lack of data concerning occurrence frequency, accident progression, and phenomenology; therefore, qualitative estimates are sufficient for hazard scenario likelihoods. While quantitative uncertainty analysis is not required, the magnitude of the uncertainties and the potential impact of large uncertainties on the results should be discussed and documented in qualitative terms. Additional deterministic or probabilistic calculations should be employed to provide a better understanding of the largest consequence accident scenarios.

The HA must identify the safety control requirements and bases required for the NEO. For these control requirements, the HAR should include supporting analysis and documentation prepared in accordance with DOE O 5480.22 and its supporting standards.

7. HAZARD ANALYSIS REPORTS (HAR)

The HAR documents the HA of a NEO and associated activities. Site-specific HAR handbooks discuss the conduct of the analyses, analytical methodology and techniques, derivation of controls, and the format and content of HARs. As a minimum, the HAR shall include:

a. An executive summary that provides an overview of the HAR and its main conclusions.

b. An introduction that provides a discussion of: the objectives, scope of the analysis, the operations conducted, and the limitations and assumptions employed in the HA.

c. A description of the nuclear explosive and its intrinsic hazards.

d. A description of the NEO and the facility(ies) where the operation is to be conducted. The discussion should focus on the facility and nuclear explosive configurations and processes including equipment and tooling. The discussion should also include interfaces between the operation and facility having safety implications. Generic safety controls utilized during the operation should be discussed.

e. A discussion of the methodology used to conduct the HA and derive safety controls and safety requirements.

f. A summary of the identification of hazards and potential hazard scenarios under normal and abnormal conditions considering both internal and external environments for each step in the NEO.

g. A discussion of the development, characterization, and evaluation of the hazard scenarios that could lead to ND, HED/D, fire, severe worker injury, damage to the environment, or other significant offsite consequences. This evaluation shall support the identification of safety

controls, the establishment of their functional requirements and performance criteria, and the basis for the derivation of safety requirements for the operation. The justification for the disposition of all identified hazards and hazard scenarios including the basis for nuclear explosive response assumptions, criteria for screening hazard scenarios, and the use of nuclear explosive response thresholds should be well documented.

h. A summary listing of safety controls required to safely conduct the described NEO including their description, safety function, bases, functional requirement, and performance criteria. This discussion should address the effectiveness and reliability of identified controls and interfaces with the site/facility-level safety programs. The discussion should also demonstrate that institutional safety commitments address operational hazards and accidents.

i. A listing of the requirements that ensure the safety controls are in place, properly configured, and maintained. These requirements include facility- and process-specific TSRs, process-specific administrative controls, process-specific requirements for facility safety management programs, and process-specific requirements to implement NESRs.

8. HAZARD ANALYSIS REPORT REVIEWS

Following DOE approval, HARs for ongoing operations, such as those supporting the enduring stockpile, must be kept up to date by the responsible organization. The HAR must be maintained by conducting annual reviews and updated, as necessary, using the documented NEO changes which have been approved under a DOE-approved change control process. The need for HAR updates to reflect new information of safety significance should be determined by the responsible operations manager to maintain the HAR as a living document in accordance with the concepts described in DOE O 5480.21 and DOE O 5480.23.

Annual HAR reviews and updates shall consider, as a minimum:

a. lessons learned,

b. cumulative changes that have been made in the operation(s), the facility(ies), and institutional safety management programs since the last HAR update, and

c. evaluations of any new information that may affect the validity of the safety basis of the operation or the appropriateness of the safety commitments.

Completion of annual HAR reviews shall be documented in a letter report to the responsible DOE operations office.

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APPENDIX A: DEFINITIONS

Origins of the definitions are indicated in brackets. If no reference is indicated, the definition originates in and is unique to this technical standard.

Accident. An unplanned sequence of events that results in undesirable consequences [DOE-STD-3009-94].

Accident Analysis. The central activity in the HA process focusing on the development and evaluation of a comprehensive spectrum of potential accident scenarios. For each step, activity, or task associated with a nuclear explosive operation (NEO), appropriately structured methods are used to identify operational deviations, potential consequences, positive measures in place, additional controls, and to conduct an evaluation of control effectiveness. **Note:** This definition differs from that contained in DOE O 5480.23 and DOE-STD-3009-94.

Accident Sequence. An unplanned sequence of events that results in a specific undesirable consequence.

Administrative Controls (ACs). Provisions relating to organization and management procedures, record keeping, assessment, reporting necessary to ensure the safe operation of a facility [DOE O 5480.23], or the safe conduct of a NEO.

Facility. Any equipment, structure, system, process, or activity that fulfills a specific purpose [DOE O 231.1]. For the purpose of implementing this technical standard, the term "facility" specifically refers to buildings, structures, staging areas, loading docks, or locations at which the Department of Energy conducts nuclear explosive operations and associated activities.

Fissile Material Dispersal. The aerosolization and transport of fissile material by a driving force such as fire, high explosive deflagration, or high explosive detonation.

Hazard. The primary usage of the term employed in this technical standard is as follows: A source of danger (i.e., material, energy source, or operation) with the potential to cause illness, injury, or death to personnel or damage to an operation, or to the environment (without regard for the likelihood or credibility of accident scenarios or consequence mitigation) [DOE O 5480.23].

Other meanings may be encountered in Safety Analysis Reports (SARs) and/or Hazard Analysis Reports (HARs), including the seismic safety analyst's use of the term "hazard" to reflect the frequency versus severity relationship for ground motion due to earthquakes and the statistician's or reliability engineer's use of "hazard" to refer to the transition rate from a normal to a failed state.

Hazard Analysis (HA). The determination of material, system, process, and plant characteristics that can produce undesirable consequences followed by the assessment of hazardous situations associated with a process or activity. Largely qualitative techniques are used to pinpoint weaknesses in the design or operation of the facility and in the design and conduct of specific nuclear explosive operations and associated activities that could lead to accidents. The SAR and HAR hazard analyses examine the complete spectrum of potential accidents that could expose members of the public, onsite workers, facility workers, and the environment to hazardous materials or other adverse effects [adapted from DOE-STD-3009-94].

Hazard Analysis Report (HAR). A report that documents the systematic evaluation of hazards to workers, the public, and the environment for a specific nuclear explosive operation and its associated activities including information on controls which establish the safety basis for the operation [adapted from DOE O 452.2A].

Hazardous Material. Any solid, liquid, or gaseous material that is toxic, explosive, flammable, corrosive, or otherwise physically or biologically threatening to human health [DOE O 5480.23].

High Explosive Deflagration. A rapid chemical reaction in which the output of heat is sufficient for the reaction to proceed and be accelerated without input of heat from another source. Deflagration is a surface phenomenon with the reaction products flowing away from the unreacted material along the surface at subsonic velocity. The effect of a true deflagration under confinement is an explosion. Confinement of the reaction increases pressure, rate of reaction and temperature, and may cause transition into detonation [DOE Manual 440.1-1].

High Explosive Detonation. A violent chemical reaction within a chemical compound or mechanical mixture evolving heat and pressure. A detonation is a reaction that proceeds through the reacted material toward the unreacted material at a supersonic velocity. The result of the chemical reaction is exertion of extremely high pressure on the surrounding medium, forming a propagating shock wave that is originally of supersonic velocity [DOE Manual 440.1-1].

Human Reliability Analysis (HRA). A family of analytic techniques that assesses the likelihood that specified human actions, steps, or tasks will be completed successfully.

Nuclear Detonation. An energy release through a nuclear process during a period of time on the order of one microsecond in an amount equivalent to the energy released by detonating four or more pounds of trinitrotoluene (TNT) [DOE O 452.2A].

Nuclear Explosive. An assembly containing fissionable and/or fusionable materials and main charge high explosive parts or propellants capable of producing a nuclear detonation (e.g., a nuclear weapon or nuclear test device) [DOE O 452.2A].

Nuclear Explosive Area (NEA). Any area that contains a nuclear explosive or collocated pit and main charge high explosive parts [DOE O 452.2A].

Nuclear Explosive Operation (NEO). Any activity involving a nuclear explosive, including activities in which main charge high explosive parts and pit are collocated [DOE O 452.2A].

Nuclear Explosive Operation-Associated Activities. Activities directly associated with a specific nuclear explosive operation such as work on a bomb nose or tail subassembly even when physically separated from the bomb's nuclear explosive subassembly [DOE O 452.2A].

Nuclear Explosive Safety (NES). The application of positive measures to control or mitigate the possibility of unintended or unauthorized nuclear detonation, high explosive detonation or deflagration, or fire in a nuclear explosive area [DOE O 452.2A].

Nuclear Explosive Safety Rules (NESRs). Safety limits, operating limits, surveillance requirements, safety boundaries, and management and administrative controls that significantly contribute to minimizing the possibility of nuclear detonation, high explosive detonation or deflagration, or fire in nuclear explosive operations [adapted from DOE O 452.2A].

Operational Safety Controls (OSCs). Safety limits, operating limits, surveillance requirements, safety boundaries, and management and administrative controls that significantly contribute to protecting workers, the public, and the environment from hazards other than nuclear detonation, high explosive detonation and

deflagration, and fire (which are addressed by NESRs) for specific nuclear explosive operations and associated activities [adapted from DOE O 452.2A].

Positive Measures. Design features, safety rules, procedures, or other controls used individually or collectively to provide nuclear explosive surety. Positive measures are intended to ensure a safe response in applicable operations and to be controllable. Some examples of positive measures are strong-link switches; other safety devices; administrative procedures and controls; general and specific nuclear explosive safety rules; design control of electrical equipment and mechanical tooling; and physical, electrical, and mechanical restraints incorporated in facilities and transport equipment [DOE O 452.2A].

Safety Analysis. A documented process to: (1) provide systematic identification of hazards within facilities in which nuclear explosive operations and associated activities are conducted; (2) describe and analyze the adequacy of the measures taken to eliminate, control, or mitigate identified hazards; and (3) analyze and evaluate potential accidents and their associated risks [adapted from DOE O 5480.23].

Safety Analysis Report (SAR). A report that documents the results of a safety analysis to ensure that a facility can be constructed, operated, maintained, shut down, and decommissioned safely and in compliance with applicable laws and regulations [DOE O 5480.23].

Safety Basis. The collection of information relating to controlling the hazards at a facility or operation (including design, engineering analyses, and administrative controls) upon which DOE depends for its conclusion that the associated operations can be conducted safely [adapted from DOE O 5480.23].

Safety Commitments. Those actions, measures, controls, and programs established to implement and manage facility-wide programs, policies, and procedures to ensure the safe performance of an activity or operation.

Standard Industrial Hazards. Hazards that are routinely encountered in general industry and construction for which national consensus codes and/or standards (e.g., OSHA, transportation safety) exist to guide safe design and operation without the need for special analysis to define safe design and/or operational parameters [DOE-STD-3009-94].

Structures, Systems, and Components (SSCs). Structures, systems, components, tooling, or equipment whose preventive or mitigative function is a major contributor to ensuring safe nuclear explosive operations (e.g., prevention of uncontrolled material releases) and/or worker safety, as determined from HA [adapted from DOE-STD-3009-94].

As a general rule of thumb, SSC designations are limited to those structures, systems, tooling, equipment, or components whose failure is estimated to result in ND, HED/D, fire resulting in fissile material dispersal, acute worker fatality or serious injuries to workers, or significant adverse consequences to the public or the environment. The term serious injuries, as used in this definition, refers to immediately life-threatening or permanently disabling injuries (e.g., loss of an eye, loss of a limb) from other than standard industrial hazards. It specifically excludes potential latent effects (e.g., potential carcinogenic effects of radiological exposure or uptake) [adapted from DOE-STD-3009-94]. **Note**: SSCs as used in this technical standard does not distinguish between "safety-class" and "safety-significant" as used in DOE Order 5480.23 and DOE-STD-3009-94.

Technical Safety Requirements (TSRs). Those requirements that define the conditions, the safe boundaries, and the management or administrative controls necessary to ensure the safe operation of a nuclear facility and to reduce the potential risk to the public and facility workers from uncontrolled releases of radioactive materials or from radiation exposures due to inadvertent criticality. TSRs consist of safety limits, operating limits, surveillance requirements, administrative controls, use and application instructions, and the bases thereof. TSRs were formerly known as "operational safety requirements" for nonreactor nuclear facilities and "technical specifications" for reactor facilities [DOE O 5480.22].

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APPENDIX B: ABBREVIATIONS AND ACRONYMS

DOE	Department of Energy
DOE-STD	DOE Standard
DP	Office of Defense Programs
EPA	Environmental Protection Agency
HA	Hazard Analysis
HAR	Hazard Analysis Report
HED/D	High Explosive Detonation or Deflagration
LCO	Limiting Condition for Operation
LCS	Limiting Control Setting
M&O	Management and Operating
ND	Nuclear Detonation
NEO	Nuclear Explosive Operation
NEOP	Nuclear Explosive Operation Procedure
NES	Nuclear Explosive Safety
NESR	Nuclear Explosive Safety Rule
NESS	Nuclear Explosive Safety Study
NESSG	Nuclear Explosive Safety Study Group
NEWS	Nuclear Explosive and Weapon safety
OSC	Operational Safety Control
OSHA	Occupational Safety and Health Administration
SAR	Safety Analysis Report
SSC	Structures, Systems, and Components
TSAR	Transportation Safety Analysis Report
TSR	Technical Safety Requirement
USQ	Unreviewed Safety Question

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CONCLUDING MATERIAL

Review Activity:		**Preparing Activity:**
DOE	Field Offices	DOE-DP-21
DP	Albuquerque Operations Office	
EH	Amarillo Area Office	**Project Number:**
EM	Kirtland Area Office	SAFT-0052
NE	Los Alamos Area Office	
NN	Nevada Operations Office	
	Oakland Operations Office	

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