

DDESB

Guidance for Explosives Safety Site Plans



Department of Defense Explosives Safety Board

Alexandria, Virginia

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FOREWORD

Technical Paper (TP) 26 provides Department of Defense Explosives Safety Board (DDESB) guidance for Explosives Safety Site Plans. This paper elaborates on the explosives safety site plan requirements outlined in Department of Defense Instruction 6055.16, “Explosives Safety Management Program,” August 31, 2018, and Defense Explosives Safety Regulation (DESR) 6055.09, Edition 1, Change 1, “DoD Explosives Safety Standards,” February 23, 2024. The intent of this guidance is to support explosives safety site plan preparation and facilitate efficient review at all levels.

This TP will be kept current and will be updated as new information becomes available. The latest version of the TP can be found on the DDESB Website:
<http://www.denix.osd.mil/ddes/ddesb-technical-papers/>.

This TP has been reviewed by the DDESB staff and coordinated with the DDESB Publications Panel.

JOSE A. RULLAN-RODRIGUEZ
Executive Director

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FIGURE

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CHAPTER 1

INTRODUCTION

1.1. Background

1.1.1. Per Department of Defense Directive (DoDD) 6055.09E (Reference (a)), DoDD 4715.1E (Reference (b)), and DoD Instruction (DoDI) 6055.16 (Reference (c)), it is DoD policy to:

1.1.1.1. Provide the maximum possible protection to people and property from the damaging effects of DoD military munitions (also referred to as ammunition and explosives (AE) or ordnance).

1.1.1.2. Comply with DESR 6055.09 (Reference (d)) and, when outside the United States (U.S.), comply with host nation, multinational (MN), or U.S. explosives safety standards, whichever are more stringent, unless standards applicability is mandated by international agreement.¹

1.1.1.3. Minimize exposures consistent with safe and efficient operations (i.e., exposing the minimum number of people for the minimum time to the minimum amount of explosives or chemical agents (CAs)).

1.1.1.4. Give precedence to explosives safety management principles and requirements that provide for immediate protection of people and property while complying with applicable environmental regulations.

1.1.1.5. Conduct appropriate munitions response actions on real property known or suspected to contain munitions and explosives of concern (MEC) according to appropriate environmental law, including chapter 103 of title 42, United States Code, and part 300 of title 40, Code of Federal Regulations (References (g) and (h)), using the most appropriate technology to protect public safety, health, and the environment, consistent with the current land use or appropriate future use of the property.

1.1.1.6. Ensure, through a host-tenant agreement, that all DoD tenants and non-DoD tenants comply with all applicable laws and DoD policies relating to environment, safety, and

¹ The United States has ratified North Atlantic Treaty Organization (NATO) Standardization Agreements 4440 Edition 1 and 4657 Edition 1 covering explosives safety criteria found, respectively, in Allied Ammunition Storage and Transport Publication (AASTP)-1 and AASTP-5 (References (e) and (f)), for use by U.S. forces at U.S.-leased bases located within NATO and partner nations and when participating in NATO multinational operations. Reference (e), which is generally more stringent than Reference (d), will be applied to protect host nation assets, except when application of the safety rules of either the host nation (international agreement) or the U.S. affords greater protection to life, property, or the environment. Inside the U.S.-leased bases in NATO and partner nations, DoD explosives safety criteria will apply to protect U.S. assets. Reference (f) was ratified by the U.S. as a standalone implementing document for use by U.S. forces participating in multinational NATO operations.

occupational health requirements and, for overseas installations, implement this policy to the extent possible under stationing and international agreements.

1.1.2. Reference (c) requires:

1.1.2.1. The Secretaries of the Military Departments ensure communication of the potential risks associated with DoD operations involving DoD military munitions by notifying, as appropriate, affected local U.S. government officials and, in coordination with the U.S. Embassy, affected host nation government officials.

1.1.2.2. The Combatant Commanders coordinate Explosives Safety Management Program decisions, as appropriate, with affected commands, Military Services, and local U.S. and host nation government officials.

1.1.3. Reference (d) is used to manage the potential risks associated with DoD military munitions and other AE (e.g., foreign, commercial, non-DoD, improvised explosive devices, laboratory samples, and standards). It provides only the minimum criteria for protecting against loss of life or serious injury and damage to property or the environment. Its criteria do not provide risk-free protection. When necessary to preserve mission or operational capability and/or when practicable, DoD Components should provide for greater than minimal protection.

1.2. Explosives Safety Site Planning Process Overview

1.2.1. The explosives safety site planning process includes conducting and documenting a comprehensive assessment of existing and/or future potential explosion sites (PESs) and exposed sites (ESs).

1.2.1.1. PESs include facilities or operations that involve DoD AE, regardless of location, and/or non-DoD AE when either located on a DoD installation or encumbering DoD personnel, facilities, or AE.

1.2.1.2. ESs are any locations exposed to the potential hazardous effects (e.g., blast, fragments, debris, or heat flux) from an explosion at a PES. Such locations may or may not be munitions-related and could be another PES.

1.2.1.3. Effective explosives safety site planning consists of evaluating PESs and ESs with respect to Reference (d) and applicable DoD Component explosives safety policies and criteria, risk management policies and procedures, mission criticality, operational and security requirements, and, when appropriate, economic, public opinion, environmental, and legal considerations to meet the DoD Component's mission policies, goals, and objectives.

1.2.2. Reference (d) provides criteria and guidance for developing explosives safety site plans and submitting specific explosives safety site plans for Department of Defense Explosives Safety Board (DDESB) final review and approval. Typically, the Executive Director, DDESB,

approves an explosives safety site plan on the DDESB's behalf; however, circumstances may require an explosives safety site plan be reviewed and approved by the Board.

1.2.3. Reference (c) divides the explosives safety site planning process into four integrated phases:

1.2.3.1. Development and Evaluation Phase. The DoD Component creates the explosives safety site plan package, ensuring applicable portions of paragraph V1.E5.2.3.3 of reference (d) are included while coordinating with relevant installation departments.

1.2.3.2. Submission Phase

1.2.3.2.1. The DoD Component submits an explosives safety site plan through command channels to the appropriate Military Service-level explosives safety office or its equivalent for review and approval, and for forwarding, if required, to the DDESB staff for review and approval.

1.2.3.2.2. The U.S. Army Technical Center for Explosives Safety, the U.S. Naval Ordnance Safety and Security Activity, the U.S. Marine Corps Systems Command Program Manager for Ammunition, and the U.S. Air Force Safety Center are the Military Service-level explosives safety offices.

1.2.3.3. DDESB Review Phase. Accomplished by the DDESB staff, which recommends, as appropriate, the Executive Director, DDESB, approve or return the explosives safety site plan to the submitting Military Service-level explosives safety office or its equivalent. The DDESB staff reviews an after action report (AAR) submitted upon completion of a munitions response conducted per a DDESB-approved explosives safety site plan and informs the Executive Director, DDESB, of the response action's outcome.

1.2.3.4. Implementation Phase. The DoD Component maintains a record of the approved explosives safety site plan and executes its conditions, monitoring for any changes which require entering into a new development and evaluation phase.

1.3. Scope

1.3.1. This technical paper (TP):

1.3.1.1. Focuses primarily on the development and evaluation and submission phases of the explosives safety site planning process.

1.3.1.2. Provides additional guidance for consideration when submitting an explosives safety site plan per References (c) and (d). Use of this guidance will help facilitate both the development of high-quality, accurate, and complete explosives safety site plan submissions and efficiency of their review.

1.3.1.3. Provides guidance on:

1.3.1.3.1. Submissions of explosives safety site plans to the DDESB, including examples to help clarify when a DDESB-approved explosives safety site plan is required.

1.3.1.3.2. Explosives safety site plans that involve new or modified protective construction designs (see Chapter 9).

1.3.1.3.3. The use of Explosives Safety Site Planning tools during the development of site plans (see Chapter 10).

1.3.2. Throughout the rest of this TP, “explosives safety site plans” will be referred to as “site plans.” Except where it is noted that a DDESB approval is not required (i.e., section 2.3.), the guidance provided applies to site plans that require DDESB review and approval. The five categories of site plans are described in section 2.5.

CHAPTER 2

GENERAL SITE PLAN GUIDANCE

2.1. Quantity-Distance (QD) Principles. Site plans are developed to ensure explosives safety requirements are met between facilities and to personnel. A site plan does not prevent explosive accidents. It is intended to mitigate the consequences and provide an acceptable level of protection to exposed personnel and property that balances mission requirements and safety.

2.1.1. The categories of level of protection are:

2.1.1.1. Intermagazine Distance (IMD). IMD is the distance to be maintained between two AE locations to allow them to be treated as separate potential explosion sites (PES). This distance prevents prompt propagation. IMD is the basis of QD and should never be waived. If this distance is not met, the two AE locations need to be combined and treated as a single PES. At this distance, unstrengthened buildings will suffer damage approaching total destruction.

2.1.1.2. Intraline Distance (ILD). ILD is the distance to be maintained between any two AE-related buildings or sites within an AE-related operating line. At this distance, direct propagation is not expected, damage to unstrengthened buildings may approximate 50 percent or more of the total replacement cost, and personnel may suffer serious injuries from fragments, debris, firebrands, or other objects.

2.1.1.3. Public Traffic Route Distance (PTRD). PTRD is the distance provided to low and medium-density public traffic routes, as well as unrelated personnel in the open. Although personnel in the open are not expected to be killed or seriously injured by blast effects, fragments and debris may cause some injuries. The extent of these injuries will largely depend upon the PES structure, the NEW, and the fragmentation characteristics of the AE involved. Unstrengthened buildings can be expected to sustain damage that equates to approximately 10 percent of the replacement cost.

2.1.1.4. Inhabited Building Distance (IBD). IBD is the distance provided to unrelated personnel in a structure and high-density public traffic routes. Personnel in buildings are provided a high degree of protection from death or serious injury; however, glass breakage and building debris may still cause some injuries. Unstrengthened buildings can be expected to sustain damage that equates to approximately five percent of the replacement cost.

2.1.1.5. Minimum Separation Distance (MSD). MSD is the minimum distance between a PES and personnel, assets, or structures required to provide the appropriate level of protection from a detonation (either intentional or unintentional) at the PES.

2.1.2. *The NEWQD of the HD requiring the greatest separation establishes the QD for the facility when the facility is used for multiple operations.*

2.1.3. QD Measurements are determined as follows:

2.1.2.1. *Separation distances are measured along straight lines. For large intervening topographical features such as hills, measure over or around the feature, whichever distance is shorter. For golf courses, measure to the nearest edge of the tee or green and to the centerline of fairways. For airfields, measure to the nearest point of the taxiway and to the centerline of the runway.*

2.1.2.2. *Measurements of distance for determining the maximum allowable quantity of AE must be made to the nearest part of an ES from:*

2.1.2.2.1. *The nearest wall of the PES.*

2.1.2.2.2. *The exterior of the nearest intervening wall to the controlling AE stack, when the PES is subdivided.*

2.1.2.2.3. *When no structure is involved, measure from the nearest points of the AE stack.*

2.2. Site Plans Requiring DDESB Review and Approval

2.2.1. Reference (d) requires that a site plan be submitted through command channels and the appropriate Military Service-level explosives safety office or its equivalent to the DDESB for the following actions. Reference (d) requirements are italicized to distinguish them from guidance in support of the requirements.

2.2.1.1. *New construction of AE facilities (paragraph V1.E5.2.1.1. of Reference (d)).*

2.2.1.2. *New construction of non-AE related facilities within QD arcs of a PES (paragraph V1.E5.2.1.1.2. of Reference (d)).*

2.2.1.3. *Facility modifications, change of mission, or change of operations that increase explosive hazard (e.g., personnel exposures, NEW, change in HD, nature of operation) (paragraph V1.E5.2.1.2. of Reference (d)).* The following examples are provided as guidance:

2.2.1.3.1. *Changing the use of a facility so that more stringent explosives safety quantity distance (ESQD) criteria is applicable to or from the facility (e.g., converting an AE storage facility to an operating location; converting a field office to an AE operating location; converting a non-AE facility to an AE facility; changing the use of a facility located at K9 from a PES such that K18 separation or greater would be required; converting an inert storage location to an operating location; or using an interchange yard or inspection station as an AE holding area).*

2.2.1.3.2. *Introduction of an AE operation of a greater hazard (e.g., adding an operation that requires remote-controlled operation protection for personnel to a facility that was previously used for attended operations; intentional detonations versus accidental detonations).*

2.2.1.3.3. Net explosive weight (NEW) increases that result in greater explosives safety or CA risks, or increase an ESQD arc.

2.2.1.3.4. Changes in hazard divisions (HDs) that increase the potential risks or an ESQD arc.

2.2.1.3.5. PES modifications that result in an increase in the overall ESQD footprint for the PES. A vertical addition may not result in an increase in the overall ESQD footprint of the PES, but if the addition is on a PES where the ESQD is applied based on the presence of a barricade between the PES and an ES, a site plan would be necessary to address the adequacy of the barricade for the PES/ES pair.

2.2.1.3.6. Modifications that compromise, or could compromise depending on the situation, the effectiveness of built-in safety features or protective construction (e.g., constructing an opening in a substantial dividing wall (SDW), replacing the doors of a 7-bar earth-covered magazine (ECM) with doors having less than the requisite strength, changing the floor such that the door supports of a 7-bar or 3-bar magazine are modified, replacing a heavy wall or roof with a lesser strength wall or roof, removing a barricade, making changes in frangible surfaces or openings).

2.2.1.3.7. ES modifications that result in the reduction of separation distance from a PES (e.g., an addition to an ES on the side closest to a PES). While a vertical addition may not result in a reduction in separation distance from a PES, for an addition to an ES where ESQD is applied based on the presence of a barricade between the ES and a PES, a site plan would be required to address the adequacy of the barricade for the PES/ES pair.

2.2.1.3.8. Addition of personnel performing a different (new) function to a PES or ES that requires application of more stringent criteria (e.g., consolidation of operations normally conducted at intraline distance (ILD); addition of an operation or function that requires K18 separation to a facility that was sited at K9 distance from other facilities; relocation of personnel who should be provided inhabited building distance (IBD) protection to an ES that is within IBD arcs; assigning personnel to a previously unoccupied ES; allowing personnel not directly related to the explosives mission to access inert storage locations previously accessed by personnel related to the explosives mission).

2.2.1.3.9. Changes in PES or ES occupancies/missions that involve different tenants, Military Services, or non-DoD entities. *AE storage or operating locations of one DoD Component shall be separated from AE operating locations of another DoD Component by IBD; although ILD separation is permissible when the explosives operations present a similar degree of hazard or involve joint or support operations. AE storage or operating locations of one DoD Component shall also be separated from AE tactical facilities of another DoD Component by IBD; although for joint or support operations, the separation distance may be determined as though both facilities belonged to a single DoD Component (paragraph V4.E5.6.2. of Reference (d)).*

2.2.1.3.10. Modification to a PES that impacts the effectiveness of the lightning protection system (LPS) (e.g., a vertical addition to a PES may require modification to the LPS to ensure zone of protection coverage is adequate and there are no side flash issues). If a PES footprint is increased as a “by-product” of an LPS modification/improvement (e.g., increased mast height or additional masts result in a larger LPS-protected area, and AE is placed in that enlarged area), a site plan is required as discussed in paragraph 2.2.1.3.5.

2.2.1.4. *Change of use of non-AE-related facilities that require application of more stringent explosives safety criteria. (For example, an airfield restricted to DoD use only, changed to joint DoD and non-DoD use) (paragraph V1.E5.2.1.3. of Reference (d)).* Another example is construction of a structure at an open inert storage location that is encumbered by an ESQD arc and accessed by personnel not directly related to the explosives mission.

2.2.1.5. PESs and encumbered ESs at enduring locations (e.g., main operating bases (MOBs)) outside the U.S. (paragraph V6.E3.2.2.1. of Reference (d))

2.2.1.6. PESs and encumbered ESs at non-enduring locations (e.g., contingency bases) that support joint or MN combat and contingency operations where the geographic combatant commanders (GCCs) have determined that site plans are required (paragraph V6.E3.1.1. of Reference (d)).

2.3. Site Plans that Do Not Require DDESB Review and Approval

2.3.1. Reference (d) states that a site plan or amendment to an approved site plan need not be submitted to the DDESB for the situations listed below. However, it generally requires that the DoD Components specify siting, procedural, and documentation requirements for such situations, and that the conditions Reference (d) outlines are met (see paragraphs 2.3.1.3., 2.3.1.4., 2.3.1.5., 2.3.1.10., and 2.3.1.11.).

2.3.1.1. *Facility modifications, mission changes, or changes in operations, NEW increases, or HD additions that do not: increase explosives safety or CA risks; identify requirements for additional or increased explosives or CA hazard controls; or increase any QD arcs (paragraph V1.E5.3.10. of Reference (d)).*

2.3.1.2. *Storage and associated handling of HD 1.4S (paragraphs V1.E5.3.1. and V3.E3.4.3. of Reference (d)).*

2.3.1.3. *Interchange yards when used exclusively: for the interchange of vehicles or railcars containing AE between the commercial carrier and DoD activities; to conduct external inspection of the trucks, trailers, or railcars containing AE; or to conduct visual inspection of the external condition of the cargo in vehicles (e.g., trucks, trailers, and railcars) that passed the external inspection (paragraphs V1.E5.3.2. and V4.E5.5. of Reference (d)).*

2.3.1.4. *Inspection stations when used exclusively for: external visual inspection of the railcars or motor vehicles; visual inspection of the external condition of the cargo packaging in*

vehicles that have passed the aforementioned external visual inspection; or interchange of trucks, trailers, or railcars between the common carrier and the DoD activity (paragraphs V1.E5.3.3. and V4.E5.9. of Reference (d)).

2.3.1.5. Parking of aircraft loaded with HD 1.2.2 gun AE, 30 mm or less; HD 1.3 Captive missiles, aircraft defensive flares, or chaff; or HD 1.4 AE while in designated aircraft parking areas that meet airfield criteria (when evaluated as a PES), and the associated handling of these munitions, provided the quantity of munitions involved in the operation is limited to a single aircraft load (paragraphs V1.E5.3.4. and V4.E3.5.2. of Reference (d)).

2.3.1.6. The handling of ≤ 300 lbs NEW [≤ 136.1 kg] HD 1.3 and HD 1.4 material necessary for ships' security and safety at sea (paragraphs V1.E5.3.5. and V4.E4.1.2.2. of Reference (d)).

2.3.1.7. Storage of, and operations involving, limited quantities of HD 1.2.2, HD 1.3 (such as document destroyers, signaling devices, riot control munitions, and the like) or HD 1.4 (such as small arms AE and riot control munitions), for reasons of operational necessity, in facilities such as hangars, arms rooms, troop buildings, and manufacturing or operating buildings. Storage of limited quantities of those HD 1.4 munitions may also be in small magazines next to those facilities (paragraphs V1.E5.3.6. and V3.E3.2.11., footnote a of Table V3.E3.T14., and footnote g of Table V3.E3.T15. of Reference (d)).

2.3.1.8. Non-enduring locations that support Joint or MN combat and contingency operations (e.g., Combat Operating Base (COB) or Combat Outpost (COP)) where the GCC has determined that site plans are not required, given operational and force protection considerations (paragraph V1.E5.3.7. of Reference (d)).

2.3.1.9. Inert storage accessed by personnel related to the explosives mission (paragraph V1.E5.3.8. of Reference (d)).

2.3.1.10. Locations used for a demilitarization processing operation of expended .50-caliber and smaller cartridge casings that are located outside of IBD from all PES and meet the following requirements: (1) The cartridge casings are screened prior to processing to ensure that only .50-caliber and smaller are processed, and to remove unused .50-caliber and smaller cartridges; (2) testing has shown that the demilitarization processing equipment is capable of containing overpressure, fragment, and thermal hazards associated with a worst-case reaction involving a single live round of the most energetic cartridge that could be processed in the equipment; (3) the demilitarization processing equipment is operated within the manufacturer's specifications and restricted only to the processing of expended .50-caliber and smaller cartridge casings; (4) the demilitarization processing equipment is inspected and maintained to ensure safe operation; (5) the DoD Component has approved the use of the specific demilitarization processing equipment; and (6) the DoD Component has established and implemented procedures for (a) screening and segregating the material to be processed, (b) operating, inspecting, and maintaining the demilitarization processing equipment to ensure safe operation, and (c) dispositioning of processed material (paragraphs V1.E5.3.9., V4.E5.18.1., and V4.E5.18.2. of Reference (d)).

2.3.1.11. *Roll-on/roll-off (RORO) operations where: a sited location is not available; the RORO location is as remote as practicable from populated areas to minimize exposure of unrelated personnel; the total net explosive weight for quantity-distance (NEWQD) present does not exceed 30,000 pounds; the only AE present (e.g., trailers, trucks, barges) is associated with the RORO operation being conducted; and the AE is located on-site for the minimum time necessary, but not longer than 24 hours (paragraphs V1.E5.3.11. and V4.E5.11. of Reference (d)).*

2.3.1.12. *Movement of security force ammunition issued to security force for designated missions (paragraph V1.E5.3.12 of Reference (d)).*

2.3.1.13. Responsibilities delegated to the Secretary of the Air Force for commercial space launch operations on DAF installations.

2.3.2. Paragraph 2.d.(5)(b) of Enclosure 10 of Reference (c) requires that the DoD Components provide copies of DoD-Component (Military Service) site approval or cancellation documents to the DDESB. The DDESB recommends that the Military Service-level explosives safety offices or their equivalent forward information copies of such documents to usarmy.pentagon.hqda-dod-esb.mbx.ddesb@army.mil. The subject line of the e-mail should include the words “For Info” or similar language indicating that it is being provided as information, not for DDESB review.

2.3.3. Paragraph V1.E5.2.2. of Reference (d) does not require, but recommends site plans be submitted to the DDESB for construction of vulnerable facilities (e.g., schools, hospitals, high-rise buildings, day care centers, restaurants, family housing) located on an installation that are outside but near ESQD arcs. DoD Components should have a policy for evaluating the hazards and mitigating or managing the potential risks associated with such construction on a DoD installation. Such a policy should also consider actions that could be taken to address vulnerable facility construction off an installation but near ESQD arcs.

2.4. Site Plan Guidance

2.4.1. Personnel Involvement and Coordination

2.4.1.1. Site Plan Development and Evaluation Phase. In the site plan development and evaluation phase, installation-level coordination should include representatives from command safety; explosives safety; the installation master planning office; operating units, including units involved in AE operations; the facility engineers or public works office; logistics office; environmental and health offices; and security and/or fire department.

2.4.1.1.1. When a tenant’s, joint base’s, or host nation’s PESs or ESs are involved, coordination should be accomplished per the policies of the DoD Components involved and documented in the site plan.

2.4.1.1.2. When non-DoD property is involved (e.g., encumbered land owned or managed by government agencies or a private party), coordination should be accomplished and

permission obtained, when applicable and appropriate, from the affected non-DoD entity, with documentation (e.g., restrictive easement) included in the site plan.

2.4.1.2. Site Plan Submission Phase. In the site plan submission phase, the installation forwards a site plan through the appropriate Military Service-level explosives safety office or its equivalent for review and approval. The Military Service-level explosives safety offices are the U.S. Army Technical Center for Explosives Safety, the U.S. Naval Ordnance Safety and Security Activity, the U.S. Marine Corps Systems Command Program Manager for Ammunition, and the U.S. Air Force Safety Center. Once the Military Service has approved the site plan, if required, the Military Service-approved site plan is forwarded to the DDESB for review and approval. A non-Military Service agency requesting the DDESB review an explosives safety-related matter should submit its plan or documentation through an explosives safety office that is equivalent to the Military Service-level explosives safety offices. The following recommendations address site plan coordination for tenant, joint base, host nation, and joint or MN locations. Where coordination varies from that recommended, the DDESB recommends the rationale for the coordination process be addressed in the site plan. For DoD, the key principle is to ensure coordination is accomplished between those commands or agencies involved, their chains-of-command, and the Military Service-level explosives safety offices or their equivalent.

2.4.1.2.1. Tenant Coordination

2.4.1.2.1.1. Tenant PESs and ESs

2.4.1.2.1.1.1. Tenants should coordinate site plans for PESs and/or ESs with their chain-of-command and the host installation.

2.4.1.2.1.1.2. The host installation should submit tenant site plans through command channels to its Military Service-level explosives safety office or its equivalent for review and approval per DoD Component policy.

2.4.1.2.1.1.3. Prior to providing Military Service-level approval, the host installation’s Military Service-level explosives safety office or its equivalent should coordinate the site plan with the tenant’s Military Service-level explosives safety office or its equivalent. Once this coordination is completed, the approving Military Service-level explosives safety office or its equivalent should forward the Military Service-level approved site plan to the DDESB for review and approval.

2.4.1.2.1.2. Tenant Exposure from a Host Installation PES

2.4.1.2.1.2.1. Tenants should provide the host installation with written acknowledgment of exposures and the associated risk, and documentation indicating their acceptance of the potential risk. The host installation should include this documentation with the site plan submitted through command channels to its Military Service-level explosives safety office or its equivalent.

2.4.1.2.1.2.2. Prior to providing Military Service-level approval, the host installation's Military Service-level explosives safety office or its equivalent should coordinate the host installation's site plan with the tenant's Military Service-level explosives safety office or its equivalent. Once this coordination is completed, the approving Military Service-level explosives safety office or its equivalent should forward the Military Service-level approved site plan to the DDESB for review and approval.

2.4.1.2.2. Joint Base/Operations Coordination. The Joint Base Command (i.e., lead Military Service) responsible for joint base facilities and installation master planning should establish joint base policy for coordination of site plans. Such a policy should require that all units assigned to the joint base coordinate site plans per the joint base and applicable DoD Component policies and provide the lead Military Service with the information needed to maintain the joint base master planning documentation. The coordination process used should be discussed in the site plan submission.

2.4.1.2.2.1. Unit PESs and ESs

2.4.1.2.2.1.1. Units assigned to a joint base should coordinate their PES or ES requirements with the lead Military Service per joint base and applicable DoD Component policies.

2.4.1.2.2.1.2. The lead Military Service should submit site plans through command channels per the DoD Component policy to its Military Service's explosives safety office for review and approval.

2.4.1.2.2.1.3. Concurrently, the lead Military Service should provide a copy of the site plan to affected units for information and coordination with their command channels as required by their DoD Component policy.

2.4.1.2.2.1.4. Prior to providing Military Service-level approval, the lead Military Service's explosives safety office should coordinate the site plan with the appropriate non-lead Military Service's explosives safety office or its equivalent. Once this coordination is completed, the approving Military Service-level explosives safety office should forward the Military Service-approved site plan to the DDESB for review and approval.

2.4.1.2.2.2. Lead Military Service Unit PES Exposing Non-Lead Military Service Units

2.4.1.2.2.2.1. The lead Military Service should coordinate with those units assigned to the joint base that are affected to obtain written acknowledgement of the exposure and the associated risk, and acceptance of the potential risk. The lead Military Service should include this documentation with the site plan submitted through command channels to its Military Service-level explosives safety office.

2.4.1.2.2.2.2. Prior to Military Service-level approval, the lead Military Service-level explosives safety office should coordinate the site plan with the non-lead Military

Service units' Military Service-level explosives safety offices or their equivalent. Once this coordination is completed, the lead Military Service-level explosives safety office should forward the Military Service-level approved site plan to the DDESB for review and approval.

2.4.1.2.3. Host Nation Coordination for MOBs

2.4.1.2.3.1. Host Nation Exposures from DoD Military Munitions

2.4.1.2.3.1.1. Paragraph 4.g. of Enclosure 2 of Reference (c) requires Secretaries of the Military Departments coordinate with the U.S. Embassy to notify, when appropriate, host nation government officials of the potential risk associated with DoD operations involving DoD military munitions. Notification of the host nation's responsible government authority should only be made after consulting legal counsel and, when necessary, the U.S. Department of State representatives. Such notification must comply with applicable laws, state-to-state agreements, including status-of-forces agreements (SOFAs) and U.S. Command policies. When possible and appropriate, an attempt should be made to obtain host nation concurrence. The responsible U.S. authority should consult legal counsel and, when necessary, a U.S. Department of State representative.

2.4.1.2.3.1.2. The Military Service-level explosives safety office should ensure information regarding notifications and/or coordination with the host nation that are required by applicable laws, state-to-state agreements, including SOFAs and U.S. Command policies and, where obtained, host nation approval decisions, are included in the Military Service-approved site plan forwarded to the DDESB for review and approval.

2.4.1.2.3.2. DoD Exposures from Host Nation PESs

2.4.1.2.3.2.1. A site plan for a DoD PES or ES encumbered by a host nation's PES should include enough information to show that the DoD exposure is located at the minimum required separation distance from the host nation's PES.

2.4.1.2.3.2.2. The DoD unit preparing the site plan should request this information from the host nation responsible authority per applicable laws, state-to-state agreements, including SOFAs and U.S. Command policies. When specific information is not available, an explanation regarding the lack of information plus any rationale for assumptions regarding the host nation PES should be included in the site plan. The Military Service-level explosives safety office should provide its position with those assumptions in the Military Service-approved site plan forwarded to the DDESB for review and approval.

2.4.1.2.4. Coordination for Non-Enduring Locations Supporting Joint or MN Combat or Contingency Operations (e.g., Contingency Base, Combat Operating Base, Combat Outpost). In accordance with Chairman of the Joint Chiefs of Staff Instruction 4360.D01E (Reference (i)), include site planning requirements for contingency locations where the GCC has determined that site plans are required. The lead service, appointed by the GCC, should prepare and submit a site plan through the Military Service component commander's and Military Service's chains of command. The Military Service-level explosives safety office

should review, approve, and forward the site plan to the DDESB for review and approval (see paragraph 2.4.1.2.).

2.4.2. Timeliness

2.4.2.1. Prepare and submit site plans per the DoD Component policy, allowing sufficient time for the completion and return of the required reviews and approvals. Complex site plans (e.g., those involving new or modified protective construction design, numerous PES/ES relationships, analyses supporting application of reduced distances) require more review time than less complex site plans. Review of a site plan that involves new or modified protective construction design can, depending on the complexity, take a year or more.

2.4.2.2. Complete and accurate site plans can be processed more quickly than incomplete or inaccurate ones. The quality of a site plan affects the length of time needed to complete the required reviews and obtain approval. Depending on the type of site plan, specific submission requirements are detailed in Chapters 3 through 9. To facilitate the review process, the Military Service-level explosives safety office or equivalent transmittal documents should include “Expedited” or “Expeditious” in the subject line when requesting the DDESB staff expedite its review and identify the date by which approval is needed and the reason for requesting the expedited review (e.g., construction award date, construction start date).

2.4.3. Site Plan Submission Methods. Site plan submissions should be in electronic portable document format (PDF) files, submitted by e-mail or uploaded directly to Defense Explosives Safety Knowledge Enterprise Service (DESKES).

2.5. Site Plan Categories. The five categories of site plans (see paragraph 1.b. of Enclosure 10 of Reference (c)) are:

2.5.1. Quantity-Distance Site Plan (QDSP). A QDSP evaluates the relationships between PESs and ESs based on the deterministic quantity-distance (QD) criteria of Reference (d) for exposure, placement, and construction of the PESs and ESs. Application of QD criteria does not provide for risk-free protection, nor does it quantify the assumed risk. Reference (d) defines the required content for QDSP submissions. Chapter 3 elaborates on the Reference (d) requirements and provides additional guidance to facilitate and enhance the development and review of QDSPs.

2.5.2. Chemical Safety Submission (CSS). There are three types of CSSs: system, operational, and storage. Chapter 4 elaborates on the Reference (d) requirements and provides additional guidance to facilitate and enhance the development and review of CSSs.

2.5.2.1. System CSS. A system CSS involves evaluating the CA and explosives containment capabilities (i.e., evaluating the protective construction design) of a system used in demilitarization operations. A system may be fixed facilities or transportable equipment, and can be designed either as a total containment or vapor containment system, depending on the hazard to be mitigated.

2.5.2.2. Operational CSS. An operational CSS (e.g., demilitarization, laboratory operations, training operations) involves evaluating the spatial relationships between PESs and ESs based on the deterministic CA criteria and, if applicable, the QD criteria of Reference (d) for exposure, placement, and construction of PESs and ESs. An operational CSS also involves the evaluation of risk assessments conducted to determine applicable protection measures. A demilitarization operational CSS involves an approved total containment or vapor containment system.

2.5.2.3. Storage CSS. A storage CSS involves evaluating the spatial relationships between PESs and ESs based on the deterministic CA criteria and, if applicable, the QD criteria of Reference (d) for exposure, placement, and construction of magazines, as well as containment and monitoring measures.

2.5.3. Munitions Response Safety Submission (MRSS). There are two types of MRSSs, chemical and conventional (i.e., explosives).

2.5.3.1. Munitions Response Chemical Safety Submissions (MRCSSs). MRCSSs address the potential effects of an inadvertent release of CA from a chemical munition, or a configuration that is not a munition, during munitions response activities (e.g., intrusive field work). MRCSSs involve either the intentional physical contact with MEC (i.e., chemical munitions) or CAs in other than munitions configurations, or the conduct of ground-disturbing or other intrusive activities in areas known or suspected to contain MEC or CAs in other than munitions configurations. When explosive hazards are known or suspected to exist along with CA hazards within a munitions response area (MRA) (e.g., the MRA or munitions response site), a submission that addresses both explosives and CA safety is required. Chapter 5 provides additional guidance for the development of an MRCSS. This guidance is intended to facilitate the development and review of an MRCSS that complies with the requirements of Reference (d).

2.5.3.2. Munitions Response Explosives Safety Submissions (MRESSs). MRESSs (formerly called explosives safety submissions) address explosives safety requirements for munitions responses (e.g., field activities) that involve either the intentional physical contact with MEC or the conduct of ground-disturbing or other intrusive activities in areas known or suspected to contain MEC. Chapter 6 provides additional guidance for the development of an MRESS. This guidance is intended to facilitate the development and review of an MRESS that complies with the requirements of Reference (d).

2.5.4. Risk-Based Site Plan (RBSP). RBSPs address PESs and ESs that do not meet the deterministic QD criteria in Reference (d), but meet DDESB-approved, risk-based siting acceptance criteria. RBSPs are prepared using a quantitative risk assessment (QRA) tool such as the Safety Assessment for Explosives Risk (SAFER[®]) in accordance with DDESB TP 19 (Reference (j)), or an equivalent DDESB-approved risk assessment tool. RBSPs are evaluated using the risk-based criteria in Enclosure 5 of Volume 6 of Reference (d). Chapter 7 provides additional guidance regarding the Reference (d) and (j) requirements to facilitate and enhance the development and review of RBSPs.

2.5.5. Hybrid Site Plan (HSP). HSPs address facilities and operations that do not completely conform to Reference (d) deterministic QD criteria or meet the risk-based criteria in Reference (d). Once a DoD Component accepts the explosives or CA safety risk for the nonconforming part of an HSP via the DoD Component’s waiver and exemption approval process, the HSP is forwarded to the DDESB for approval of the conforming portion. Chapter 8 provides guidance for developing and reviewing HSPs.

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CHAPTER 3

QDSPs

3.1. General. This chapter discusses the requirements of Reference (d) and provides additional guidance for QDSPs for conventional site plans and the conventional explosives safety aspects of CA site plans (see Chapter 4). Reference (d) requirements are italicized to distinguish them from guidance in support of the requirements.

3.2. Preliminary Versus Final QDSPs. A preliminary QDSP is used to establish that QD criteria will be met to and from a proposed facility before specific facility design details have been developed. Submission of a preliminary QDSP may prove beneficial and help improve explosives safety, particularly for new construction, facility expansion, and protective construction projects.

3.2.1. A preliminary QDSP for new construction or facility expansion projects ensures that potential ESQD violations or concerns are identified early in the planning process when relocation or design changes are more feasible and cost-effective.

3.2.2. For protective construction projects, a preliminary QDSP helps ensure that concerns with the construction are addressed early in the planning/design process. A preliminary QDSP also allows reviewers an opportunity to provide technical guidance and recommendations for the design and supporting analysis required for the final QDSP. It is recommended that a preliminary QDSP with protective construction be submitted at the earliest stage possible that permits understanding of the protective construction approach, such as the conceptual design.

3.2.3. Review and approval of a preliminary QDSP prior to letting a contract for construction helps ensure the planned facility can be sited at the proposed location with the desired explosives limit.

3.2.4. A preliminary QDSP should provide all the information discussed in section 3.3. A final QDSP should provide all the information discussed in sections 3.3. and 3.4.

3.3. Preliminary QDSP Requirements and Guidance. *Per paragraph V1.E5.2.3.1. of Reference (d), preliminary site plan submissions shall, at a minimum, include:*

3.3.1. Transmittal Document. *The DoD Component's approval in the transmittal document of the site plan, along with any changes, modifications, or specific precautionary measures considered necessary (paragraph V1.E5.2.3.3.1. of Reference (d)). The final transmittal document from the DoD Component (i.e., the letter from the Military Service-level explosives safety office or equivalent) should:*

3.3.1.1. Identify the reason for the site plan (e.g., construction of a new PES or ES, NEW increase in an existing previously approved PES, change of use of an existing PES or ES, addition of a remotely controlled operation to a PES).

3.3.1.2. Describe the design characteristics or construction of existing and planned PESs and ESs (e.g., include structural strength designators and internal dimensions for ECMs; characterize aboveground facilities as open, light, or hardened construction; describe protective construction features).

3.3.1.3. Indicate how each PES or ES will be used (e.g., storage, operating location, remotely controlled operation, field office, breakroom, inert storage facility), including the personnel who will have access to it and the HDs and NEWs to be stored or processed in each PES. A hazard analysis/mishap risk assessment will determine whether remotely controlled operation criteria should be applied.

3.3.1.4. Identify, when applicable, any changes or modifications, including additional requirements or precautionary measures, made to the site plan during the review process. The changes, modifications, and additional requirements introduced by the review chain are evaluated during the DDESB review.

3.3.1.5. Identify and explain the purpose of any attachments, enclosures, and/or tabs included with the site plan.

3.3.1.6. Include applicable excerpts from referenced documents (e.g., letters, memoranda, e-mail, procedures) for which the DDESB would not have copies and provide web link information for referenced publications (e.g., Military Service publications, CFRs, Environmental Protection Agency publications).

3.3.1.7. Address any limitations or contingencies associated with the requested siting (e.g., facilities to be evacuated during remote operations or when NEW exceeds a certain value, facilities or rooms within a building that cannot be used concurrently, restrictive easements, specific emission control procedures).

3.3.1.8. Address, if applicable, risks associated with the site plan that do not violate explosives safety criteria (see Table 8.1.) (e.g., glass hazards, lack of adequate lightning protection with warning system and personnel evacuation, storage of HD 1.4 within intermagazine distance (IMD) from PESs, on-base roads).

3.3.1.9. Include Military Service-level recommendation for DDESB approval.

3.3.1.10. Outline, if applicable, the coordination made with tenants, joint base units, or host nations, including for joint/MN non-enduring locations.

3.3.1.11. Identify, if applicable, the additional information that will be submitted in the final QDSP.

3.3.2. Maps and Drawings. *Drawings, at a scale of 1 inch equals not more than 400 feet or metric equivalent. (Smaller scale drawings may periodically be necessary to properly reflect certain distance and structure relationships within the area surrounding a given project.) When*

standard drawings exist for a building or group of buildings that the DDESB has reviewed and declared acceptable (the Definitive Drawing), the drawing does not need to be resubmitted. In such cases, the site plan must note the Definitive Drawings for each building or structure to be constructed (paragraph V1.E5.2.3.3.2. of Reference (d)).

3.3.2.1. Guidance for Maps

3.3.2.1.1. Maps should be current, include the installation or area, and the date that the maps were prepared or last updated. Facility and exposure identifiers and labels should be legible and consistent with wording used in the rest of the site plan documentation.

3.3.2.1.2. Accurate scales should be available on maps and drawings. Clarity and legibility should be considered when determining the scale for a map. For electronic site plan submissions, the scale size is not as critical if an accurate, measurable scale is provided.

3.3.2.1.3. When a PES is being sited, the map should show the IBD arc and the site plan should include detailed tabular data that identifies all PESs and ESs within that arc, all PESs that encumber the PES being sited, PES/ES relationships, the required distances, the basis for the required distances, and the actual separation distances.

3.3.2.1.3.1. An alternative would be to provide a map showing the ESQD arcs for the PES being sited, as well as for PESs having explosives arcs that encumber the one being sited. The arcs should be clearly drawn and labeled, with PES/ES data annotated on the map.

3.3.2.1.3.2. If maps are provided, in lieu of the map/detailed tabular data combination discussed in paragraph 3.3.2.1.3. for complex site plans (e.g., those involving several PESs and ESs), it may be better for clarity to provide multiple maps that separately depict ESQD arcs (e.g., a map showing IBD and public traffic route distance (PTRD) arcs, another showing the ILD arcs, and another showing the IMD arcs). Additional maps that show ESQD arcs from other PESs to the one being sited may also be helpful for clarity.

3.3.2.1.4. Scaled drawings of a facility layout should be included when a site plan involves internal siting issues and considerations.

3.3.2.1.5. When an ES with no explosives is being sited, maps should show all PESs that encumber the ES, and the site plan should include detailed tabular data that identifies each PES/ES relationship, the required distances, the basis for the required distances, and the actual separation distances. An alternative would be to provide a map showing ESQD arcs for any PESs that encumber the ES, with PES/ES data annotated on the map.

3.3.2.1.6. Use of imagery (e.g., Google Earth, Digital Globe) can be helpful; however, be aware of the date of the imagery being used. Overhead imagery converted to a map is preferred. All PESs and ESs, including installation boundaries, traffic routes (roads, railways, waterways), power and utility lines (above and below ground) and associated facilities, fuel tanks, water tanks, flight-lines and associated facilities, airfields, helicopter pads, piers, wharves, waterfront facilities, anchorages, recreation facilities, ponds, lakes, rivers, and training areas

should be clearly identified on the maps. Barricades and PES orientation should also be clearly identified.

3.3.2.1.7. A site plan should include a map showing the PES or ES being sited relative to surrounding facilities and the rest of the installation or geographic area. Maps with a scale larger than 1:400 are normally necessary to show the location of the PES or ES being sited relative to the rest of the installation.

3.3.2.2. Guidance for Drawings

3.3.2.2.1. Protective construction designs allow the application of either reduced ESQD criteria (e.g., an IBD based only on overpressure distance due to the ability of the design to contain fragments, zero IBD for a system capable of containing explosives hazards, hardening to provide IBD-equivalent protection to an ES located at less than the IBD) or reduced maximum credible event (MCE) (e.g., siting based only on the NEW in a single container or cell based on its ability to prevent or delay propagation to another container or cell). ECMs are protective construction designs. See Chapter 9 for guidance and information on site plans that involve protective construction designs.

3.3.2.2.2. Site plans involving ECMs should identify applicable drawing numbers and specify their structural strength designators (i.e., 7-bar, 3-bar, or undefined) and internal dimensions. See section 9.2. for additional guidance on site plans that involve a previously approved protective construction design.

3.3.2.2.2.1. If a particular arched ECM design is not listed in DDESB TP 15 (Reference (k)) or the ECM does not have DDESB approval for a specific structural strength designation, it will be treated as undefined until DDESB approves a different structural strength designation. Per paragraphs V2.E5.5.2.4.1. and V2.E5.5.2.4.2. of Reference (d), 3-bar and 7-bar arched ECMs are required to withstand certain blast loads on their headwalls and doors.

3.3.2.2.2.2. Smokeless Powder and Projectile magazines may be sited as ECMs when determining the required ILD, PTRD, and IBD to exposed sites and may be sited in accordance with Table 1 of Reference (l) for IMD to/from other PESs. Other flat-roof ECM designs not listed in Tables AP1-1 or AP1-2 of Reference (k) that do not have DDESB approval for a specific structural strength designation, are treated as a barricaded AGM (provided that the earth cover meets barricade requirements) until DDESB approves an ECM structural strength designation. Per paragraphs V2.E5.5.2.4.1. through V2.E5.5.2.4.3. of Reference (d), 3-bar and 7-bar flat-roof ECMs are required to withstand certain blast loads on their headwalls, doors, and roof. Additionally, per paragraph V2.E5.5.2.4.3. of Reference (d), an undefined flat-roof ECM is required to withstand a certain blast load on the roof.

3.3.3. Distances. *Distances between the facility to be constructed or modified [the construction project] and all ESs within QD arcs impacted by the project, to include on- and off-installation power transmission and utility lines; the installation's boundary; public railways; and public highways (paragraph V1.E5.2.3.3.3. of Reference (d)).*

3.3.3.1. For a PES being sited:

3.3.3.1.1. The actual and required distances between that PES and all ESs (including exposed PESs) within the IBD arc should be provided.

3.3.3.1.2. The actual and required distances between any PES that encumbers, but is outside of the IBD arc of, the PES being sited (i.e., construction project) should also be provided.

3.3.3.1.3. When a loading density calculation is necessary for determining the required IBD and PTRD from an undefined ECM, the volume calculation should be based on the shape of the ECM. For box or rectangular ECMs, use volume = length x width x height. For arch ECMs, use volume = $(\pi \times \text{height}^2 \times \text{length})/2$.

3.3.3.1.4. Paragraph V4.E5.20.1.4. of Reference (d) provides recommendations for minimizing the hazards from the open door of a reduced QD magazine to surrounding exposures. A site plan for a reduced QD magazine should address those recommendations using this guidance:

3.3.3.1.4.1. The distance from the door of a reduced QD magazine and from any authorized AE operation at the magazine to any occupied space or facility should be 50 feet minimum for up to 30 pounds (lbs) net explosive weight for quantity-distance (NEWQD), 100 feet minimum for 30-50 lbs NEWQD, and K40 minimum for greater than 50 lbs NEWQD. At these minimum distances, facilities are expected to have minor damage from blast overpressure; glass window breakage would be expected which would present risk to personnel in exposed facilities; and exposed facilities are not protected from fragments (barricades should be considered to provide protection from high velocity, low angle fragments.)

3.3.3.1.4.2. When a reduced QD magazine design has an approved MCE that is less than the total NEW allowed in the magazine, the MCE may be used to determine the distance from the door and any authorized AE operation at the magazine to any occupied space or facility (e.g., for magazines such as the Explosive Ordnance Disposal (EOD) Ready Service Locker, the Advanced EOD Magazine, and the Canine Training Aid Explosives Storage Magazine, use the MCE; for magazines such as the GOLAN containers and NABCO storage vessels, use the total NEW).

3.3.3.1.4.3. For orienting a reduced QD magazine's door away from occupied spaces or facilities, use a 120-degree sector from the door.

3.3.3.2. For an ES being sited, the actual distances and required distances from all PESs that encumber it should be provided.

3.3.3.3. For each ESQD relationship between a PES and ES, the ESQD criteria being applied should be cited (e.g., fire separation distance, IMD, ILD, PTRD, IBD).

3.3.3.4. If there is no required ESQD separation, the basis for this determination should be identified (e.g., inert storage accessed only by related personnel, risk acceptance for water storage tanks and associated components, road exclusively accessed by AE-related personnel).

3.3.4. ES Description. *Description of the use and occupancy of each ES within IBD, or the risk-based evaluation distance for risk-based site plans, of the facility to be constructed or modified. If an installation's boundary falls within the IBD arc of a PES, the Service must certify IBD protection does not apply to the encumbered area (paragraphs V1.E5.2.3.3.4. and V3.E3.1.1.6.2. of Reference (d)).*

3.3.4.1. The information provided should be detailed enough to clarify each ES's relationship to a PES being sited and allow the reviewer to determine if the QD criteria applied is correct.

3.3.4.2. When a PES's IBD arc extends beyond the installation's boundary, the transmittal documentation should explain:

3.3.4.2.1. Rationale for not applying IBD protection to the encumbered area (e.g., accessibility is naturally prohibited; area is government land not open to the public; access is restricted or controlled by a restrictive easement, a memorandum of understanding (MOU), or memorandum of agreement (MOA)).

3.3.4.2.2. Procedures used to monitor the status of the encumbered area. Applicable restrictive easements, MOUs, or MOAs should be included or referenced if the DDESB was previously provided a copy in a site plan.

3.3.5. NEW. *The NEW for each AE HD that will be stored or handled in the facility to be constructed or modified or that will impact the project (paragraph V1.E5.2.3.3.5. of Reference (d)).*

3.3.5.1. When a PES is being sited, HD and NEW information should be provided for the PES, all PESs within its IBD arc, and all other PESs with IBD arcs that encumber the PES being sited. In addition:

3.3.5.1.1. For HD 1.2.1, the MCE should be provided.

3.3.5.1.2. For HD 1.2.3, the MCE and parenthetical fragment distance should be provided.

3.3.5.1.3. For HD 1.6, the largest single round NEWQD should be provided.

3.3.5.1.4. If applicable, parenthetical fragment distances should be provided for HD 1.1 and HD 1.3.

3.3.5.2. When siting a PES for multiple HDs, the site plan should address application of the HD mixing rules.

3.3.5.3. If IMD is not met between two or more PESs, then the NEWQD for those PESs needs to be summed and treated as a single PES.

3.3.6. Personnel. *Anticipated personnel limits for the new or modified facility, to include a breakdown by room or bay, when appropriate* (paragraph V1.E5.2.3.3.6. of Reference (d)). The functions and relationship of personnel in PESs and ESs should be identified in the site plan to facilitate reviewers' determination of appropriate application of explosives safety criteria.

3.3.7. Deviation Information. *An indication of any deviations from pertinent safety standards that local conditions cause* (paragraph V1.E5.2.3.3.12. of Reference (d)). In the past, this information has been helpful in determining if new construction or facility modifications required a Secretarial Certification for Service approval or met applicable criteria for DDESB approval. Reference (c) introduced the HSP (see Chapter 8), which allows DoD Components to seek DDESB approval for a site plan that involves a deviation from the explosives safety criteria of Reference (d). References (a) and (c) require that DoD Components submit copies of deviations from Reference (d) to the DDESB.

3.4. Final QDSP Requirements and Guidance. Per paragraph V1.E5.2.3.2. of Reference (d), *final site plan submissions shall, at a minimum, include the information required for preliminary site plan submissions* (see section 3.3.), *plus the following information:*

3.4.1. Approved Drawings and/or Construction Details. A site plan should contain *approved drawings or, when approved drawings are not used, general construction details to include materials used, dividing walls, vent walls, roofs, operational shields, barricades, exits, types of floor finish, fire protection system installations, electrical systems and equipment, ventilation systems and equipment, hazardous waste disposal systems, lightning protection systems, static grounding systems, ordnance grounding systems, process equipment and auxiliary support structures* (paragraph V1.E5.2.3.3.7. of Reference (d)).

3.4.1.1. General Design Information. The final site plan should include information about a facility's layout; construction materials, including glass panels; utilities (e.g., fuel, water, communication lines); electrical services; surge suppression; and auxiliary support structures and services.

3.4.1.2. Protective Construction Designs. When protective construction is being used to justify a reduced MCE or QD, the site plan should include information about materials used, dividing walls, vent walls, firewalls, roofs, operational shields, and process equipment, as applicable (see Chapter 9).

3.4.1.3. Barricades. When barricaded IMD or barricaded ILD is being applied, the final site plan should provide information, including drawings, that clearly indicates compliance with the applicable barricade design and construction requirements in paragraph V2.E5.4. of Reference (d).

3.4.1.3.1. Reference (k) provides information about DDESB-approved barricade designs. The site plan should identify the design drawing used and indicate that the barricade’s use is consistent with the applications and constraints of the drawings and/or the applicable DDESB approval memoranda for the barricade design.

3.4.1.3.2. Site plans that rely on the use of a natural barricade should include topographical maps of the terrain, photos, and/or other means to describe the barricade and should indicate compliance with the applicable barricade design requirements of Reference (d).

3.4.1.4. Hazardous Locations. Site plans for munitions operating facilities (e.g., manufacturing, demilitarization) that are considered hazardous locations per the National Electric Code (i.e., where explosives dusts, sublimation, or condensation may occur) should include information about the design and installation of:

3.4.1.4.1. Electrical equipment and wiring rated for such conditions. If the DoD Component determines that the environment at the location is such that Class I or Class II, or both, will not provide adequate protection, the site plan should identify measures (e.g., use of intrinsically safe equipment; use of purged, pressurized, temperature-limited equipment; exclusion or isolation of electrical equipment from hazardous atmospheres) to take to maintain safe operations in a hazardous environment.

3.4.1.4.2. Ventilation systems and equipment. See Chapter 4 for guidance on CSSs.

3.4.1.5 Hazardous Waste Disposal Systems. See Chapter 4 for guidance on CSSs.

3.4.1.6. Other Construction Details. When a DoD Component has determined the need for specific floor finishes, static grounding systems, fire protection system installation, etc., the site plan should include that information.

3.4.1.7. Lightning Protection System (LPS) Designs. A site plan should clearly outline the design of the LPS and include the following components: strike termination devices, down conductors, grounding electrodes, interconnecting conductors, connectors and fittings, surge protection devices. The plan should provide a detailed layout of the LPS, indicating the materials, sizes, and quantities of each component.

Furthermore, it should address side-flash protection, including calculations for the side-flash distance between the ground overhead conductor and the top of storage/facility for catenary LPS. Additionally, scaled diagrams showing the zone of protection (both in elevation and plan views) must be included, representing the worst-case scenario placements of a 100-foot radius sphere against LPS air termination devices from any orientation. Worst-case placements place the 100-foot radius sphere closest to the protected object. Zone of protection diagrams should show the air terminals, masts, overhead grounded wires, and the protected PESs. See DDESB TP 22 (Reference (m)) for LPS guidance.

3.4.1.7.1. LPS design details for ECMs that meet Faraday-like shield requirements of paragraph 8.3.2 of NFPA 780 should include drawings showing all metal parts (e.g., reinforcement in floor, precast walls and roof panels, louvers, ventilators, doors, and door frame) are electrically continuous by bonding.

3.4.1.7.2. Photos, descriptions, and/or analyses – including recent test results, such as visual and electrical tests - should be used to verify that the ground and bond are still effective for existing facilities where LPS drawings cannot be obtained.

3.4.1.8. Information Supporting Lack of an LPS. Paragraph V2.E4.4. of Reference (d) permits specific, conditional exceptions to LPS requirements. A site plan for an AE facility for which an LPS exception is required should include the information outlined in the applicable paragraph below.

3.4.1.8.1. The use of a local lightning warning system that permits operations to be terminated before the incidence of an electrical storm; the plans for providing all personnel with PTRD-equivalent protection (based on airblast overpressure) from the AE facility at the approach of an electrical storm (e.g., evacuation); and the DoD Component’s acceptance of the risk of loss or damage associated with a lightning strike.

3.4.1.8.2. The DoD Component’s rationale for believing that the AE present cannot be initiated by lightning and that no fire hazard exists.

3.4.1.8.3. The DoD Component’s rationale for believing that personnel in the AE facility will not sustain injury during a lightning storm, and the DoD Component’s acceptance of risk for the economic loss of the structure, its contents, and/or surrounding facilities in the event of a lightning strike.

3.4.1.8.4. The DoD Component’s guidance when airfield or flight-line criteria conflicts with LPS requirements.

3.4.2. Summary of Design Procedures for Protective Construction Not Previously Approved (paragraph V1.E5.2.3.3.8. of Reference (d)). See paragraph 9.4.1. for guidance on site plans involving new protective construction designs.

3.4.3. Explosives Operations or Chemical Processing Equipment (paragraph V1.E5.2.3.3.9. of Reference (d)). Site plans should provide information (e.g., type and arrangement of explosives operations or processing equipment for demilitarizing chemical munitions) that is necessary to explain the rationale for the ESQD criteria applied. See Chapters 4 and 5 for guidance on CSSs and MRCSSs.

3.4.4. Topography Map (paragraph V1.E5.2.3.3.10. of Reference (d)). Site plans involving the use of a natural barricade should provide a topography map with contours when terrain features provide natural barricading or the topography influences a facility’s layout. See Chapter 4 for guidance on CSSs.

3.4.5. CA-Related Information (paragraph V1.E5.2.3.3.11. of Reference (d)). See Chapters 4 and 5 for guidance on CSSs and MRCSSs.

3.5. Additional Information Recommended for Inclusion in Final Site Plans

3.5.1. Changes from the Preliminary Site Plan. Changes (e.g., addition of a new ES, increase in a requested NEW, shift/change in planned location, change in planned footprint) from information provided for preliminary site plan approval should be clearly identified in the final site plan.

3.5.2. Glass Breakage Risk Assessments. *DoD Components shall consider personnel exposures in risk assessments for new or modified operations and facilities involving AE, and to perform a glass breakage personnel hazards risk assessment; recommend the use of mitigation measures (i.e., minimizing the number and size of glass panels in an ES and, if possible, orienting the ES to minimize blast loads on glass panels) when a risk assessment indicates that a glass hazard is present; and also recommend avoiding the use of glass panels in new construction. When a DoD Component determines that the use of glass panels is operationally necessary for new construction or for modifications to existing ESs and a risk assessment has determined there will be an associated glass hazard, it is required that the glass panels be designed (as determined by an engineering analysis) such that they will not break and that the framing and sash of such panels be of sufficient strength to retain the panels in the structure for the expected blast loads from an explosion at any PES (paragraphs V1.E9.2.2. and V1.E9.4.7. of Reference (d)).*

3.5.2.1. Final site plans for construction of new facilities or modifications to existing ESs that contain glass panels should include a copy of the glass breakage personnel hazards risk assessment. When the risk assessment indicates the presence of a glass hazard to personnel, the site plan should also contain the design details and engineering analysis demonstrating that the glass panels will not break, and that the frames and sashes of the panels are of sufficient strength to retain the panels until the point of structural failure.

3.5.2.2. Glass hazards to personnel in existing ESs should be considered as part of the risk assessment for a new or modified PES. The final site plan for that PES should include information about the results of the glass hazard analysis, any mitigation actions implemented, and the DoD Component's acceptance of any remaining risk to personnel from glass breakage.

3.5.3. Hazards of Electromagnetic Radiation to Ordnance (HERO) Evaluation and Controls. A site plan for a PES should indicate the DoD Component has evaluated and addressed HERO hazards to AE at the PES. A site plan for an ES that emits electromagnetic radiation should indicate that the DoD Component has evaluated and addressed HERO hazards to AE at affected PESs.

3.5.4. On-Base Road Risk Assessments. When installation-related personnel are allowed to transit on-base roads at less than the required level of protection, the site plan should indicate

that the risk assessment required by paragraph V3.E3.1.1.4.2. of Reference (d) has been completed.

3.5.5. Compensatory Measures and Risk Acceptance. A site plan should provide specific information regarding implementation of compensatory measures (e.g., evacuation of encumbered area or facilities, measures associated with tiered site plans) where required separation distances are not met. Additionally, when applicable, the DoD Component’s acceptance for loss of facilities, assets, and/or mission capability should be provided.

3.5.6. Expedited Site Plans. The transmittal document for a site plan that requires expedited review from the Military Service-level explosives safety office or equivalent should include “Expedited” or “Expeditious” in the subject line. The transmittal document should also clearly identify the date by which approval is required and the reason for requesting the expedited review (e.g., construction award date, construction start date).

3.6. Guidance for Requesting Modifications to Previously Approved Site Plans

3.6.1. The transmittal document for a site plan modification or amendment from the Military Service-level explosives safety office or equivalent should reference the previous DDESB approval and identify the changes that affect the previously approved site plan. Inclusion of the previous DDESB approval memoranda and, if necessary, the associated approved site plan with the transmittal document is helpful. If the site plan modification or amendment increases explosives safety risk, identifies requirements for additional or increased explosives hazards controls, or increases an ESQD arc, the transmittal document should provide that information. See section 9.3. for guidance on site plans that involve modification of a previously approved protective construction design.

3.6.2. A modification request should be submitted for installation or modification of the LPS on an AE facility when the previous DDESB approval was granted based on the LPS exception discussed in paragraph 3.4.1.8.1. The modification request should include the LPS design information discussed in paragraph 3.1.4.7.

3.7. Additional Site Planning Process Recommendations

3.7.1. Submission Phase. The Military Service-level explosives safety office or its equivalent is responsible for ensuring that site plans are up-to-date at the time of Military Service approval and transmittal to the DDESB.

3.7.2. Implementation Phase

3.7.2.1. The Military Service-level explosives safety office or its equivalent is responsible for ensuring that changes made to a site plan by the review chain are communicated through the review chain to the originator.

3.7.2.2. The site plan originator is responsible for monitoring the traffic density for roads that were evaluated as low traffic density or medium traffic density public traffic routes in

approved site plans, and submitting a site plan modification when the traffic density increases to the next density level as defined in paragraph V3.E3.1.2.1.1.5. of Reference (d).

3.7.3. Development and Evaluation Phase. The Military Service-level explosives safety offices or their equivalent should evaluate existing PES/ES relationships for installations affected by BRAC to determine the impact, if any, of BRAC on the installations' site plans. When appropriate, site plan amendments or modifications should be submitted to the DDESB for review.

3.8. Frequently Missed Portions of QDSPs. The items below are from site plan submissions that are frequently lacking and/or questioned during review. Ensure that site plans include the following if applicable to reduce potential delays in obtaining approval.

3.8.1. If maps do not include imagery, they should be checked against the latest available imagery to make sure they match. Any differences should be identified and explained.

3.8.2. IBD for HD 1.1 is determined by paragraph V3.E3.1.2.1.1. of Reference (d). Just because AE is in a structure does not necessarily mean the "Structure" column of Table V3.E3.T2. of Reference (d) can be used. Details like whether AE is fragmenting/non-fragmenting, whether the structure is capable of stopping primary fragments, whether doors and openings are barricaded, etc. need to be included in the site plan package to justify the IBD being applied.

3.8.3. All exposed sites should have a general description with enough detail to explain what QD (including no QD) is being applied. For example, stating something is an inhabited building does not give enough detail on whether ILD or IBD applies.

3.8.4. NEWQDs for all HDs that will be present at the AE facility should be listed in the package and not just the highest HD. All HDs that will be present need to be evaluated for QD, including intentional detonations and burns.

3.8.5. When entering HD 1.2.1 MCE into an automated site planning tool, putting 450 lbs. limits the items that can be present to those with an MCE \leq 450 lbs. In order to have no MCE restrictions, a value of 451 lbs. or greater needs to be entered.

3.8.6. HD 1.2.3 limits need to include a parenthetical (XX) fragment distance and an MCE.

3.8.7. For intentional detonations, the residual risk to any unoccupied exposures (e.g., buildings, PTRs, power lines) inside the non-essential personnel MSD must be accepted by the DoD Component or owner of the structure or asset (paragraph V5.E3.2.10.4.3. of Reference (d)).

3.8.8. Using barricaded ILD needs to include not only a barricade in between the two facilities, but also the relationship between the two facilities must be identified and listed in one of the subparagraphs of V3.E3.1.1.1.1. of Reference (d).

3.8.9. Barricades need to meet all portions of section V2.E5.4. of Reference (d), which includes height, width, length, slope, material, and orientation requirements. Ensure the barricade blocks line of sight between all portions of the facilities.

3.8.10. Drawing numbers should be provided for ECMs and reduced QD magazines. ECMs with a flat roof should be checked to see if they are instead flat-roof magazines.

3.8.11. Packages should include signed risk acceptances and not just reference them. Risk acceptances should be relevant to the specific site plan. For example, a generic on-base road risk acceptance for the installation should not be provided if all roads within IBD are only used by explosives-related personnel, but if an on-base road within IBD is accessed by non-related personnel, a specific qualitative risk assessment (paragraph V3.E3.1.1.4.2.1. of Reference (d)) should be provided.

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CHAPTER 4

CSSs

4.1. General. This chapter:

4.1.1. Discusses requirements of Reference (d) and provides additional guidance for CSSs for stockpiled chemical warfare materiel (CWM) (i.e., chemical munitions and CA in other than munitions configurations); non-stockpile CWM (i.e., recovered CWM (RCWM)); and CAs used in research, development, test, and evaluation.

4.1.2. Addresses requirements for technologies used to demilitarize CWM. MRCSSs are addressed in Chapter 5. Reference (d) requirements are italicized to distinguish them from guidance in support of the requirements.

4.2. Types of CSSs. CSSs involving stockpiled CWM and RCWM are classified as follows:

4.2.1. System CSS. Demilitarization of CWM and RCWM requires systems capable of containing the explosives and CA hazards associated with demilitarization operations. Such systems may be fixed facilities or transportable equipment and are designed either as a total containment system (TCS) or a vapor containment system (VCS), depending on the hazard to be mitigated. TCSs are protective construction designs.

4.2.1.1. Fixed systems are permanent structures that house operating lines for demilitarizing CWM and RCWM. Such systems normally include support operating buildings (e.g., toxic CA laboratories) and support facilities (e.g., administrative, security, environmental). Support facilities that are encumbered by CA or explosives arcs may be considered part of the fixed facility. Examples of fixed facilities are the CA demilitarization facilities at Tooele, Blue Grass, and Pueblo. The Blue Grass and Pueblo facilities are the last fixed CA demilitarization structures approved for construction in the U.S. At the end of a CWM demilitarization campaign, these facilities are normally demolished per the Chemical Weapons Convention.

4.2.1.2. Transportable systems are demilitarization chambers that generally can be disassembled and reassembled in a different location. Transportable systems may include several components (e.g., chamber, air pollution system, and control room) that directly support a demilitarization operation. After decontamination to an appropriate level, most of these systems can be reused at a different location. DDESB-approved transportable systems are listed in Table 4.1.

4.2.1.3. Fixed and transportable systems require DDESB approval prior to use. They may be designed to be either a TCS or a VCS.

4.2.1.3.1. A TCS is capable of containing both explosives and CA hazards, while a VCS is capable of containing only the CA hazard.

4.2.1.3.2. A VCS can only be used when the CWM to be demolished does not contain energetics, unless CWM item-specific testing demonstrates that the VCS will not lose negative pressure.

Table 4.1. Approved Transportable Systems

Name	NEW	CA	Description
Rapid Response System (RRS)	None	Lewisite and Mustard	RRS consists of three trailers: control trailer, operation trailer, and utility trailer. It is designed to access and chemically neutralize CA in chemical agent identification set (CAIS) ampoules or bottles (CAIS items) that contain Lewisite or Mustard.
Single CAIS Access And Neutralization System (SCANS)	None	Lewisite and Mustard	SCANS is a one-time use, 3-gallon capacity, transportable, chemical treatment container. It is used to access and chemically neutralize CA in CAIS ampoules or bottles (CAIS items) that contain Lewisite or Mustard.
Explosive Destruction System (EDS) Phase 3 Vessel 31	24 lbs HD 1.1	All CA except VX	EDS is a multiple-version system. The most recent version is approved for up to 24 lbs HD 1.1 equivalent. The EDS is a sphere chamber and uses shaped charges to access and chemically neutralize the CA inside munitions.
Static Detonation Chamber (SDC) 1200 CM	2.2 lbs of TNT or 6.6 lbs of non-mass detonating	Mustard	The SDC consists of gastight double chambers, a pollution abatement system, and a scrap handling system. High temperatures up to 1022°F and 1112°F (may reach 1508°F at the bottom of the chamber) are used to auto-initiate the munitions and then thermally neutralize the CA.
Detonation of Ammunition in a Vacuum Integrated Chamber (DAVINCH) USA DV-60	132 lbs of HD 1.1	up to 23.4 lbs of Mustard	The DAVINCH system consists of gastight double chambers, a pollution abatement system, and a scrap handling system. The system uses high explosives detonation to destroy the CA. It is also believed that shockwaves and plasma (pollution abatement system) may assist in agent destruction.
Area Ten Liquid Incineration Chamber (ATLIC)	None	Tabun/Lewisite	The ATLIC system consists of primary and secondary furnaces operating at 2700°F and 2000°F, respectively. The furnaces burn agent or waste, and exhaust the resulting gases to a scrubber system, a pollution abatement system, and a filtration system.

4.2.2. Operational CSS. CSSs are required for CWM and RCWM demilitarization, laboratory, and training operations.

4.2.3. Storage CSS. A CSS is required for a CWM storage location.

4.3. System CSS Guidance

4.3.1. A preliminary System CSS may be submitted, if necessary, to operate the system to collect data (e.g., treatment efficiency data) required to support a final System CSS.

4.3.2. The following information should be provided in the final System CSS for DDESB review and approval.

4.3.2.1. Engineering design and an analysis showing:

4.3.2.1.1. A TCS or VCS is a closed system that is capable of containing any CA vapor resulting from an MCE. A description of the filtration system used should be included.

4.3.2.1.2. A TCS's structure complies with the protective construction criteria in Unified Facilities Criteria 3-340-02 (formerly TM 5-1300) (Reference (n)) or is certified by test. See section 9.4. for site plans that involve new protective construction designs.

4.3.2.2. An explanation of each stage of the demilitarization operation from the time the CWM is removed from its storage location through destruction.

4.3.2.3. Test data that provides sufficient information about the technology's capabilities and limitations. When a technology and associated procedures are first submitted to the DDESB for review and acceptance, data must be submitted to show that the system is capable of destroying CWM as claimed. Supporting data are not required for a system when the technology and associated procedures have been previously reviewed and approved by the DDESB.

4.3.2.4. Documentation verifying that a risk assessment, when applicable, has been completed. This documentation should provide information about the protection measures for the public, demilitarization workers, and assets (facilities and equipment).

4.3.2.5. Description of the:

4.3.2.5.1. Destruction methods used.

4.3.2.5.2. CA monitoring and, if conducted, sampling plan.

4.3.2.5.3. Level of personal protective equipment required for each stage of operation.

4.3.2.5.4. Treatment and disposal of any CA-contaminated waste.

4.3.2.5.5. Site closure plan.

4.3.2.6. Provide LPS information as discussed in paragraph 3.4.1.7.

4.4. Operational and Storage CSS Guidance

4.4.1. Preliminary CSS. Operational and Storage CSSs require the calculation of both ESQD and CA hazard distances (public exclusion distances) per Reference (d) and DDESB TP 10 (Reference (o)). A preliminary Operational or Storage CSS (also known as a CA Site Plan) may be submitted to establish the physical layout of a site and the relationships between all PESs and ESs before the information required for a final CSS approval is available. In addition to the information discussed in section 3.3., the following information should be provided for a preliminary Operational or Storage CSS:

4.4.1.1. Identify the CA of concern. The CA hazard distance calculations should be based on Reference (o), using DDESB-approved software. The CA hazard distance will be equal to the 1% lethality arc. If the 1% lethality arc is not established for the CA, acute exposure guideline level-2 (AEGl-2) may be used to establish a CA arc for the site. The selected exposure time for AEGl-2 should be provided in the CSS.

4.4.1.2. Depict ESQD and CA hazard distance for each PES on maps. The public area exclusion zone or public access exclusion distance (PAED), which is the larger of the ESQD and CA hazard distance, should also be labeled on the map (see paragraph 3.3.2.1.).

4.4.1.3. Depict and identify all exposures (e.g., buildings, roads, utilities, waterways) within the public area exclusion zone on the map.

4.4.2. Final CSS. A final CSS must provide the information required by paragraph V1.E5.2.3.3.11. of Reference (d) (*personnel protective clothing and equipment to be used; treatment of all effluent and waste materials and streams; the adequacy of medical support; the average wind speed and direction; other support facilities pertinent to chemical safety; the warning and detection systems to be used; and any hazard analysis performed*). In addition to the information discussed in sections 3.3. and 3.4. and paragraph 4.4.1., the following information should be provided in a final Operational or Storage CSS, as applicable:

4.4.2.1. Operational CSS

4.4.2.1.1. Description of the operation; type of munitions involved, including CA type; the NEW, if applicable; the HD; the technology involved (fixed facility or transportable); the type of containment to be used; CA monitoring; and, if conducted, sampling.

4.4.2.1.2. Documentation verifying that a risk assessment, when applicable, has been completed. This documentation should provide information about the protection measures for the public, demilitarization workers, and assets (facilities and equipment).

4.4.2.2. Storage CSS. Description of the storage facility, including building type and structural strength designator (for ECMs); type of munitions, HD, NEW, and CA type; CA monitoring; and, if conducted, sampling.

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CHAPTER 5

MRCSSs

5.1. General. Paragraphs V7.E4.5.8. and V7.E4.5.9. of Reference (d) include the requirements for MRCSSs. This chapter provides additional guidance for MRCSSs.

5.2. MRCSS Documents. MRCSSs should provide the following information:

5.2.1. A brief description of the site, including its location and historical use, a site layout, the types of munitions and category (i.e., unexploded ordnance (UXO), discarded military munitions) expected to be encountered, the type of CA expected to be encountered, the munitions response action (e.g., investigation, removal) to be conducted, and the work schedule.

5.2.2. Maps depicting the ESQD, CA hazard distance, and PAED. The CA hazard distance calculation must be based on Reference (o). Maps should also depict the location of the interim holding facility and its layout; the storage location, if needed, for demolition material; and the location of the demolition area for conventional munitions, if needed. See paragraph 3.3.2.1. for guidance regarding map quality.

5.2.3. Description of the VCS to be used, if any, during response actions, and the actions during which a VCS will be used.

5.2.4. A summary of the soil sampling plan, if required.

5.2.5. A summary of the monitoring plan that addresses the type of monitors to be used and the CA of concern.

5.2.6. A description of the:

5.2.6.1. CWM storage plan (e.g., its location; the type of structure to be used; its construction; the HD and NEW, if applicable); security measures, including fencing and lighting; the type of utilities in the area; LPS, if applicable; and storage configuration of recovered munitions (e.g., overpacked in multiple round containers).

5.2.6.2. Conventional AE storage plan and procedures for their destruction (see Chapter 3 for guidance regarding QDSPs).

5.2.7. Protective action plan in the event of a CA release that, among other matters, addresses emergency responses, shelter and/or evacuation plans, CA event reporting, public affairs, security, medical support, environmental monitoring, and logistical support.

5.2.8. Description of the coordination made or planned with civil authorities with regard to response actions and emergencies.

5.2.9. A description of the site closure plan.

5.3. Residual Risk Management. Some residual explosive and/or chemical hazards are expected to remain after completion of a munitions response because of technology limitations and the inherent uncertainty of response actions. MRCSSs should address residual risk management, to include land use controls (LUCs) and long-term management plans. A land's (property's) current use, which is generally used for munitions response actions involving Formerly Used Defense Sites (FUDS); determined use, which is generally used for property affected by a BRAC decision; or reasonably anticipated end use, which is normally the basis for certain response actions conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), is a key element for designing a munitions response that is protective of human health and the environment. Residual risk management plans should be submitted as, or part of, an MRCSS.

5.4. AARs. Paragraphs V7.E4.3.1.1.7. and V7.E4.7.2. of Reference (d) address the requirement for an AAR. An AAR must be submitted upon completion of a munitions response conducted per a DDESB-approved MRCSS. An AAR provides the DDESB with the means to close out its files. AARs do not require DDESB approval.

CHAPTER 6

MRESSs

6.1. General. Paragraph V7.E4.5. of Reference (d) includes the requirements for MRESSs. This chapter provides general guidance for MRESSs.

6.2. Munitions Response Actions

6.2.1. Although several munitions response actions (e.g., investigations, removal, remedial) may involve AE-related operations, from an explosives safety perspective such operations generally fall into two categories. These are munitions response actions that may result in an unintentional detonation and those actions that involve intentional detonation or burning operations.

6.2.1.1. Munitions response actions that may result in an unintentional detonation generally fall into three subcategories.

6.2.1.1.1. Manual operations that include, but may not be limited to, UXO-qualified personnel digging detected anomalies selected for investigation.

6.2.1.1.2. Actions involving mechanized equipment (e.g., post-hole diggers, back hoes) used to support operations (e.g., installation of an environmental monitoring well, placement of fence posts) in areas known or suspected to contain munitions that employ anomaly avoidance.

6.2.1.1.3. Mechanized or remote-controlled operations in areas known or suspected to contain munitions where intentional contact with MEC is expected. Such actions are further subdivided as:

6.2.1.1.3.1. Low-input operations.

6.2.1.1.3.2. High-input operations.

6.2.1.2. Intentional detonation and open burning operations generally only occur at locations or within areas for which an explosives site plan has been submitted. Exceptions include detonations accomplished as part of an explosives or munitions emergency. DDESB-approved engineering controls (ECs) may be used to control fragments to reduce the ESQD required. Paragraph C6.2.7.5. of Reference (k) lists, and provides information about, DDESB-approved ECs. Paragraph C6.4. of Reference (k) addresses structures and chambers capable of containing the pressure and fragment effects produced by an intentional detonation of unexploded ordnance.

6.2.2. For AE-related operations, minimum separation distances (MSDs) are established to provide adequate protection of human health and the environment. An MSD is generally determined in one of two ways:

6.2.2.1. Identification of the munition with the greatest fragmentation distance (see Table 6.1.) that is reasonably expected (based on research or characterization) to be encountered in any particular area. The MSD may be reduced using a DDESB-approved EC or analysis.

6.2.2.2. Establishment of an MCE based on the total NEW expected to be involved.

Table 6.1. MSDs for Munitions Response Actions Involving MEC

MEC Operation	MSD to:		
	Essential Personnel	Other Explosive Operations and Team Separation	Non-Essential Personnel
Manual equipment (i.e., using non-powered hand tools) to remove MEC.	N/A	Note 1	Note 2
Anomaly avoidance using mechanized equipment (e.g., using powered hand tools, earth-moving equipment, dredges) for removal of soil or other media on real property known or suspected to contain MEC, when intentional contact with MEC is not expected.	N/A	Note 1	Note 2
Operations involving the use of mechanized low-input equipment or procedures (e.g., heating below the autoignition temperature; using powered hand tools, earth moving equipment, dredges, screeners) for removal of soil or other media on real property known or suspected to contain MEC where, although intentional contact with MEC is expected, the equipment and procedures used are not expected to cause an unintentional detonation.	Note 3	Note 2 or 3	Note 2
Operations involving the use of mechanized high-input equipment or procedures (e.g., heating above the autoignition temperature; using powered hand tools, band saws, earth moving equipment, dredges, screeners) for the removal of soil or other media on real property known or suspected to contain MEC where the equipment or procedures used will more than likely cause a detonation.	Note 3	Note 2 or 3	Note 4
Intentional detonations.	Note 4	Note 4	Note 4
Intentional open burning of buildings and installed equipment known or suspected to contain MEC.	Note 5	Note 5	Note 5

Table 6.1. MSDs for Munitions Response Actions Involving MEC, Continued

MEC Operation	Essential Personnel	MSD to: Other Explosive Operations and Team Separation	Non-Essential Personnel
Notes:			
1. Unintentional Detonation Distance. Use K40 of the NEW of the MCE.			
2. Unintentional Detonation Distance			
a. For fragmenting munitions, use:			
<ul style="list-style-type: none"> • The greater of K40 of the NEW for the MCE (i.e., the munition or material that contains the fragmentation distance (MGFD)); 			
<ul style="list-style-type: none"> • A conservative analogous munition with a fragmentation data review form (FDRF), if the NEW and munition type (i.e., extremely heavy case, robust, non-robust, or non-fragmenting) of the analogous munition are all equal or greater than the MGFD; 			
<ul style="list-style-type: none"> • The HFD from the generic equations calculator from DDESB TP 16 (Reference (p)). 			
b. For non-fragmenting MEC, use K40 of the NEW of the MCE.			
3. Remote Operator Protection. Must provide both blast overpressure and fragment protection.			
a. For blast overpressure protection from fragmenting or non-fragmenting MEC, use K24 of the NEW of the MCE or K18 of the NEW of the MCE if essential personnel are provided hearing protection with greater than 9 decibels attenuation.			
b. For fragment protection from fragmenting munitions, use distance, shields, or ECs:			
(1) For distance protection, use the HFD of the MGFD.			
(2) For shielding protection, use Reference (p) to determine material and thickness for the MGFD; or use a conservative analogous munition with an FDRF, if the NEW and munition type (i.e., extremely heavy case, robust, non-robust, or non-fragmenting) of the analogous munition are all equal or greater than the MGFD.			
(3) For EC protection, use an appropriate DDESB-approved EC.			
c. Fragment protection from non-fragmenting MEC is not required. However, if shielding is supplied, determine the thickness as follows: assume the NEW of the MCE is HD 1.1; select an item from Reference (p) with approximately the same NEW; use the material and thickness for that item.			
d. A risk assessment per paragraphs V7.E4.5.8.3.5.1. and V7.E4.5.8.3.5.2.2.2. of Reference (d) may justify not providing remote operator protection to essential personnel.			
4. Intentional Detonation Distance			
a. For fragmenting munitions, use the greater of K328 of NEW of the MCE or maximum fragment distance of the MGFD, but not less than 200 feet.			
b. For non-fragmenting MEC, use K328 of the NEW of the MCE, but not less than 200 feet.			
5. Use the greater of K328 of the NEW of the MCE or 1,250 feet.			

6.2.3. Paragraph V7.E4.5.6.8. of Reference (d) requires that ECs to be used during AE-related operations be addressed in the MRESS.

6.2.4. The information identified in paragraphs 6.2.1., 6.2.2., and 6.2.3. should be provided for each facility/building/location that is part of an MRESS.

6.3. Munitions Response Operation MSDs. *MSDs for the various operations expected to be performed during a munitions response action must be shown on the explosives safety quantity-distance (ESQD) maps submitted with the MRESS* (paragraphs V7.E4.5.6.6. and V7.E4.5.8.3.7. of Reference (d)). Table 6.1. summarizes Reference (d) ESQD criteria for determining the MSDs for MEC operations.

6.4. Collected Material Potentially Presenting an Explosive Hazard (MPPEH), MEC, and Donor Demolition Materials. MRESSs should provide information on how MPPEH or MEC will be processed and whether donor materials will be stored on-site or delivered as needed. Per paragraph V7.E6.3.2. of Reference (d), MPPEH and MEC processing operations (e.g., consolidation, inspection, sorting, storage, transfer, release) should be sited as ESs at a minimum of ILD from surrounding PESs. As PESs, MPPEH, and MEC processing areas are typically sited based on the HFD for the HD 1.1 MCE NEW. QDSPs should be submitted for the on-site storage of donor materials (see Chapter 3).

6.5. Residual Risk Management. Some residual explosive hazards are expected to remain after completion of a munitions response because of technology limitations and the inherent uncertainty of response actions. MRESSs should address residual risk management, to include LUCs and long-term management plans. A land's (property's) current use, which is generally used for munitions response actions involving FUDS; determined use, which is generally used for property affected by a BRAC decision; or reasonably anticipated end use, which is normally the basis for certain response actions conducted under the CERCLA, is a key element for designing a munitions response that is protective of human health and the environment. Residual risk management plans should be submitted as, or part of, an MRESS.

6.6. AARs. Paragraphs V7.E4.3.1.1.7. and V7.E4.7.2. of Reference (d) address the requirement for an AAR. An AAR must be submitted upon completion of a munitions response conducted per a DDESB-approved MRESS. An AAR provides the DDESB the means to close out its files. AARs do not require DDESB approval.

CHAPTER 7

RBSPs

7.1. General. References (c) and (d) address RBSPs. If the ESQD requirements of Volume 3 of Reference (d) cannot be met, Enclosure 5 of Volume 6 of Reference (d) allows a quantitative risk-based approach for siting. RBSPs are evaluated using a QRA tool such as SAFER[®] or an equivalent DDESB-approved QRA tool. This chapter discusses the requirements of Reference (d) and provides additional guidance for RBSPs. Reference (d) requirements are italicized to distinguish them from guidance in support of the requirements. It should be noted that SAFER[®] may only be used when all PESs meet the IMD requirements of Reference (d), or the individual NEWQD for each PES (that does not meet the IMD) is summed and those PESs are treated as a single PES.

7.2. QRA Tools. RBSPs should be prepared and evaluated using a DDESB-approved QRA tool such as SAFER[®] (see Reference (j)). Although the latest approved version of SAFER[®] should be used, DoD Components may submit an RBSP that was initiated under previous versions of SAFER[®].

7.3. RBSP Guidance. Paragraph V1.E5.2.3. of Reference (d) includes general requirements for site plans, and paragraphs V6.E5.3. and V6.E5.4. include specific requirements for an RBSP. The following guidance and tips are provided to enhance the RBSP process:

7.3.1. The final transmittal document from the DoD Component (i.e., the letter from the Military Service-level explosives safety office or equivalent) should provide:

7.3.1.1. A copy of the waiver, exemption, or Secretarial Certification or the DoD Component-approved justification for the proposed siting. Paragraphs V6.E5.3.1. and V6.E5.4.1. of Reference (d) require that *the DoD-Component-approved justification for not meeting QD be provided with the RBSP for information purposes, and clarify that the justification is not subject to DDESB approval*. This requirement is emphasized in this TP because the DDESB has received RBSPs that did not include the DoD-Component approved justification and there was no QD waiver, exemption, or Secretarial Certification in place.

7.3.1.2. Documentation of the DoD Component's acceptance of the risks not evaluated by the DDESB-approved QRA tool (i.e., risks to facilities, equipment, assets, and mission). See paragraph V6.E5.3.8. of Reference (d).

7.3.2. An RBSP should include:

7.3.2.1. A map showing the risk-based evaluation distance (the greater of the IBD or the distance from a PES where the probability of fatality (P_f) (individual risk) is equal to 1×10^{-8} for an individual present in the open for 24 hours a day, 7 days a week, 365 days a year).

7.3.2.2. ES occupancy and use information for each ES within the risk-based evaluation distance.

7.3.2.3. PES occupancy and use information.

7.3.2.4. The SAFER.sfs file or its equivalent.

7.3.3. For inputs used in SAFER[®]:

7.3.3.1. Reference (j) guides the user through each input screen and provides explanatory information to aid the user in determining which inputs would best match a specific siting scenario.

7.3.3.2. Attachment 3 of DDESB TP 14 (Reference (q)) provides the rationale for the input options available in SAFER[®] and guidance for selecting an input when an input option is not available (e.g., actual weapon type is not a choice in SAFER[®]) or the user does not have complete information (e.g., ES roof type is not known).

7.3.4. The highest individual and group risks from the site plan reports for the PESs involved should be compared to the risk-based siting acceptance criteria in Table 7.1., which reflects the criteria in Table V6.E5.T7. of Reference (d). Paragraph 6.4 of Reference (j) explains how to generate PES Site Plan Reports in SAFER[®].

Table 7.1. Risk-Based Siting Acceptance Criteria

Risk to:	Criteria:
Any 1 related individual	Related $P_f < 1 \times 10^{-4}$ per year
All related individuals	Related $E_f < 1 \times 10^{-3}$ per year
Any 1 unrelated individual	Unrelated $P_f < 1 \times 10^{-6}$ per year
All unrelated individuals	Unrelated $E_f < 1 \times 10^{-5}$ per year
P_f = probability of fatality E_f = expected number of fatalities	

7.4. Inclusion of PESs and ESs in SAFER[®] for RBSPs

7.4.1. Appendix A of Reference (j) explains how to perform risk-based explosives siting with regard to defining which PESs and ESs to include in the analyses for various explosives siting scenarios and provides multiple examples.

7.4.2. The following simplistic example illustrates the steps for determining the PESs and ESs that should be included in a SAFER[®] submission based on the siting scenario depicted in Figure 7.1:

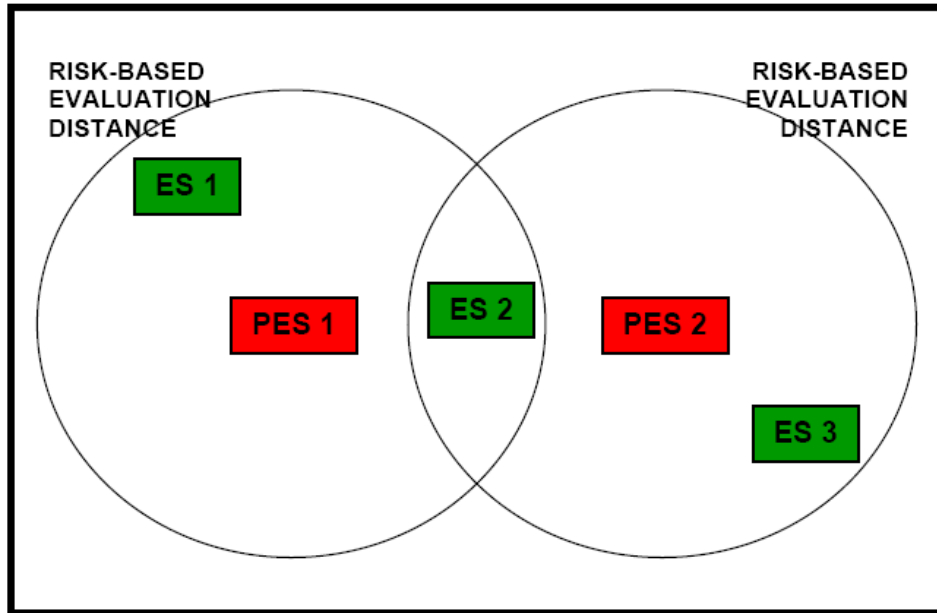
7.4.2.1. Draw the risk-based evaluation zone around the PES of the PES/ES pair in violation.

7.4.2.2. Evaluate all ESs within this evaluation zone.

7.4.2.3. For each ES within this zone, add any other PESs that have a risk-based evaluation zone that encumbers that ES.

7.4.3.4. For example, if the QD violation is between PES 1 and ES 1, the effects of PES 1 on ESs 1 and 2 and the effect of PES 2 on ES 2 should be included in the SAFER[®] evaluation. The effect of PES 2 on ES 3 should not be included.

Figure 7.1. SAFER[®] Siting Example



7.5. Review and Reevaluation of RBSPs

7.5.1. Review of RBSPs

7.5.1.1. Per paragraph V6.E5.5.1. of Reference (d), RBSPs *must be reviewed by the originating DoD Component a minimum of every 5 years to ensure that siting conditions have not changed. If conditions have not changed, this information must be documented in the site plan files at the installation and at the DoD Component confirming the continued acceptable status of the site plan. If conditions have changed, paragraph V6.E5.5.2. shall be applied. See paragraph 7.5.2.*

7.5.1.2. Per paragraph V6.E5.5.2. of Reference (d), RBSPs *must be reviewed whenever the DDESB-approved siting assumptions and the risk-based program inputs change and those changes have a potential increase on individual or group risk, or if there is uncertainty as to what the risk impact will be. Examples of changes that might increase individual and group risk are adding additional personnel to an ES, adding a new ES, increasing NEWQD at a PES, adding a new PES, a change in PES mission, and changes in ES construction. In such cases, the*

existing risk-based explosives safety site plan shall be updated and reevaluated to determine the risk impact of the changes. The latest approved version of the QRA tool that was used to develop the original RBSP should be used for reevaluation of the RBSP.

7.5.2. Post RBSP Reevaluation Actions

7.5.2.1. Per paragraph V6.E5.5.2.1. of Reference (d), if an RBSP reevaluation shows that *the risk does not violate the acceptance criteria in Table V6.E5.T1. (Table 7.1. repeats that criteria), a revised risk-based explosives safety site plan shall be prepared in accordance with the procedures in sections V6.E5.3. and V6.E5.4. and submitted to the DDESB for approval.*

7.5.2.2. Per paragraph V6.E5.5.2.2. of Reference (d), if an RBSP reevaluation shows that *the risk violates the acceptance criteria in Table V6.E5.T1. (Table 7.1. repeats that criteria), but does not increase beyond the DDESB-approved risk-based siting criteria in effect at the time the explosives safety site plan was previously approved, a revised risk-based explosives safety site plan shall be prepared in accordance with the procedures in sections V6.E5.3. and V6.E5.4. and submitted to the DDESB for approval.* The revised RBSP should include a discussion about the criteria change.

7.5.2.3. Per paragraph V6.E5.5.2.3. of Reference (d), if an RBSP reevaluation shows that *the risk violates both the acceptance criteria in Table V6.E5.T1. (Table 7.1. repeats that criteria) and the DDESB-approved risk-based siting acceptance criteria in effect at the time the explosives safety site plan was previously approved, the DDESB-approved risk-based siting is no longer valid and the DDESB must be so notified.* The DDESB recommends that the Military Service-level explosives safety office or its equivalent provide written notification that also addresses actions to resolve the site plan issue (e.g., Service-approved deviation or implementation of compensatory measures).

CHAPTER 8

HSPs

8.1. General. Although Reference (c) defines an HSP, Reference (d) does not have specific criteria for an HSP. This chapter provides guidance for development of an HSP.

8.2. HSP Guidance. HSPs address facilities and operations that do not fully conform to criteria in Reference (d). Under an HSP, the DoD Component accepts, per applicable policy (see References (a), (c), and (d)) and DoD Component procedures, the explosives or CA safety risk for the nonconforming parts of an HSP. The conforming portions of an HSP are forwarded, with documentation of the DoD Component's risk acceptance, to the DDESB for approval. The DDESB reviews all QD relationships in the HSP and the DoD Component's documentation of risk acceptance for the nonconforming portions of the HSP. When appropriate, the DDESB approves the conforming portions and ensures the DoD Component has accepted the risk for the nonconforming portions.

8.2.1. The conforming portion of the HSP must comply with Reference (d) QD criteria and include the information specified in paragraph V1.E5.2.3. of Reference (d) (see Chapters 3, 4, 5, and 6 of this TP). The conforming portion of an HSP may only be submitted using risk-based criteria when the nonconforming portion involves a non-QD violation of Reference (d) criteria.

8.2.2. For the nonconforming portion of an HSP, the following information should be provided to the DDESB:

8.2.2.1. Documentation of the DoD Component's acceptance of the explosives or CA safety risk for nonconforming parts of the HSP (i.e., Secretarial Exemption or Certification, exemption, or waiver), including a description of the DoD Component-developed methodology or explosives risk management tool used to assess the risk and results and, if applicable, the CA hazard mitigation methodology. When a DoD Component-developed methodology or explosives risk management tool is not used, the following information should be provided for review. Although DoD Component-developed methodology for risk acceptance may be used, DDESB TP 23 (Reference (r)) provides a tool, Automated Safety Assessment Protocol-Explosives (ASAP-X), that can be used to assist in the assessment of the HSP nonconforming explosives risk:

8.2.2.1.1. A description of the AE operation.

8.2.2.1.2. A statement of the operational necessity.

8.2.2.1.3. Projected time period for the deviation.

8.2.2.1.4. The number of exposed personnel, both related and unrelated.

8.2.2.1.5. The types and quantities of AE involved.

8.2.2.1.6. A description of any buildings (e.g., magazine, operating location, inert storage) involved.

8.2.2.1.7. ASAP-X results associated with the deviation.

8.2.3. The transmittal document for the HSP should indicate:

8.2.3.1. The conforming portion for which DDESB review and approval is requested.

8.2.3.2. The nonconforming portions; the conditions, if applicable, under which nonconformance may occur; and any mitigating measures to be implemented to address the nonconforming portions.

8.2.4. The DDESB approval of the conforming portion of an HSP is contingent on the DoD Component's acceptance of the explosives or CA safety risk for the nonconforming portions. DoD Components should provide DDESB written notification for these changes:

8.2.4.1. The DoD Component no longer accepts the risks associated with the nonconforming portions based on cancellation or expiration of a Secretarial Exemption or Certification, exemption, or waiver for the nonconforming portions. If the nonconforming portions are no longer applicable, but there remains a need for the DDESB's approval of the conforming portions, the following apply:

8.2.4.1.1. If the conforming portions have not changed, the DoD Component's notification document may request approval to convert the DDESB's approval of the HSP (i.e., the conforming portions) to the appropriate site plan (e.g., QDSP, RBSP, MRSS).

8.2.4.1.2. If the conforming portions have changed, the DoD Component's notification document may request approval to convert the DDESB's approval of the HSP to the appropriate site plan and include a site plan modification or amendment for review and approval of changes to the conforming portions.

8.2.4.2. The DoD Component modifies the nonconforming portions (e.g., modifying a waiver or exemption, approving a Secretarial Exemption or Certification for construction that does not meet ESQD criteria). The DoD Component's notification document should include documentation of the DoD Component's acceptance for the change in risk.

8.2.4.3. Conditions cause conforming portions to be out of compliance with Reference (d). In such cases, the DoD Component's notification document may request approval of a modification or amendment to the HSP. The modification or amendment should provide, among other information (see paragraphs 8.2.2. and 8.2.3.), the DoD Component's acceptance of the additional risk. Should the DoD Component elect not to amend the HSP in such cases, the DoD Component's notification document should advise the DDESB that the HSP is no longer applicable.

8.2.4.4. Modifications to an HSP that meet ESQD criteria (e.g., new construction, changing an ES’s use from nonconforming to conforming). If the modification requires DDESB approval per paragraph V1.E5.2.1. of Reference (d), the DoD Component’s notification document may request approval of a modification or amendment to the HSP. The modification or amendment should provide applicable information (see paragraphs 3.6., and 8.2.1. through 8.2.3.).

8.3. Non-Deviation Risk Acceptance in a Site Plan. Reference (d) permits the DoD Components to accept certain risks without approval of a Secretarial Exemption or Certification, exemption, or waiver as defined in Enclosure 3 of Volume 1 of Reference (d). As discussed in paragraph 3.3.1.8., the DoD Component’s final transmittal document for a site plan should address any applicable non-deviation risk acceptances. A site plan that includes such risk acceptance documentation is in compliance with Reference (d) criteria and is not considered an HSP. Table 8.1. is a compilation of non-deviation risk acceptances that are specifically addressed in Reference (d). It also addresses non-deviation risk acceptances that have been approved as part of a DDESB-approved site plan in the past, without the DoD Component’s formal approval of the deviation from Reference (d) criteria.

Table 8.1. Non-Deviation Risk Acceptances

	Risk Acceptance Description	Reference (d) Citation	Notes/Comments
A	Glass breakage personnel hazards	V1.E9.2.2. and V1.E9.4.7.	For major modifications to existing ESs and new construction, an engineering analysis must be performed prior to risk acceptance, in accordance with DESR 6055.09, paragraph V1.E9.4.7.1.
B	Damage or loss from a lightning strike when an LPS is absent or inadequate, a warning system is used, and personnel are evacuated	V2.E4.4.1.	
C	Economic loss of structure, contents, and surrounding facilities when an LPS is absent and personnel are not expected to sustain injury	V2.E4.4.3.	
D	Providing less than 60% of an IBD to installation-related personnel transiting on-base roads	V3.E3.1.1.4.2.	
E	Storage of HD 1.4 within an IMD from PESs	Table V3.E3.T15. Footnote e	
F	Using reduced distance for storage of HD 1.6 packed in nonflammable pallets or packing and stored in an ECM	Table V.E3.T16. Footnote c	

	Risk Acceptance Description	Reference (d) Citation	Notes/Comments
G	AE in prohibited areas (accident potential zones I and II and clear zones of all aircraft landing facilities) as defined in DoD Component airfield/airspace criteria directives	V4.E3.3.	Risk to AE facilities is accepted by the DoD Component airfield/airspace waiver process. If a DoD Component accepts risk to AE facilities via an explosives safety deviation from paragraph V4.E3.3. criteria, the site plan would be considered an HSP.
H	Siting runways and taxiways outside the U.S. at a minimum of K4.5 from PESs	V4.E3.T1. Notes m and s	
I	AE in static storage in ship magazines and intended for the service of shipboard armament or aircraft	V4.E4.1.2.1.	Applicable Secretary of the Military Department must formally accept the explosives risk associated with such storage.
J	Siting a small bulk storage tank of hazardous material at less than IBD, with spill containment provided	V4.E5.13.2.	
K	Loss of unprotected service tank of hazardous material and collateral damage a fire might cause resulting from tank being punctured by fragments when sited at IBD blast with a 400-foot minimum distance (pipe system supplying tank must be designed to resist blast and fragments; adequate spill containment must be provided)	V4.E5.13.3.	
L	Loss of unprotected aboveground water storage tank at less than IBD	V4.E5.14.1.	
M	Loss of water storage tanks and associated components when no QD is applied	V4.E5.14.2.	
N	Residual risk to unoccupied exposures inside non-essential personnel MSD of intentional burning and intentional detonation operations.	V5.E3.2.10.4.3., V5.E3.2.10.4.3.2.	

Risk Acceptance Description		Reference (d) Citation	Notes/Comments
O	For RBSPs, the risk to facilities, equipment, assets, and mission (i.e., the risk not evaluated by the DDESB-approved risk tool)	V6.E5.3.8.	
P	Facility, assets, equipment, and or/mission at less than required ILD, PTRD, or IBD provided that personnel are evacuated		See paragraph 3.5.5. The evacuation compensatory measure should be realistic. Per paragraph V1.E3.4.1. of Reference (d), personnel evacuation does not relieve the requirement for a Secretarial Certification for new construction.
Q	Noncompliance with DoD Component-specific explosives safety criteria (i.e., criteria either not addressed by Reference (d) or more stringent than Reference (d))		A DoD Component may use the waiver/exemption process to address the noncompliance and risk acceptance; inclusion of such information in a site plan will not render it an HSP.
R	PESs sited as complexes because IMD is not met between the individual PESs.		

CHAPTER 9

SITE PLANS INVOLVING PROTECTIVE CONSTRUCTION

9.1. General. This chapter addresses site plans involving protective construction and supplements Reference (d) requirements.

9.1.1. Protective construction is used to allow the application of either reduced QD criteria (e.g., an IBD based only on overpressure distance due to the ability of the structure to contain fragments) or reduced MCE (e.g., siting based only on the NEW in a single room based on the design of the room preventing or delaying propagation to another room). Accordingly, protective construction may be designed to:

9.1.1.1. Achieve personnel protection to a level equivalent to that provided by the applicable QD.

9.1.1.2. Protect facilities and equipment to a level equivalent to that provided by the applicable QD.

9.1.1.3. Prevent or delay propagation of explosives to limit the MCE on which the QD is based.

9.1.2. Protective construction can:

9.1.2.1. Involve a facility, a wall or room within a facility, a barricade or shield, a metal box or container, etc.

9.1.2.2. Apply to an ES, a PES, or a barricade or other structure placed in between them.

9.1.2.3. Be used to control the potential hazard associated with an accidental or intentional detonation. ECM designs are examples of protective construction.

9.1.3. Protective construction is typically designed per UFC 3-340-02 (Reference (n)). For ECM designs, the design loads are specified in paragraph V2.E5.5.2. of Reference (d). Paragraph V2.E5.5.2.4.3. of Reference (d) also contains a blast design requirement that applies to undefined ECMs with flat roofs.

9.1.3.1. UFC 3-340-02 is appropriate for analysis and design related to blast overpressures, (hazardous) primary fragments, and ground shock from a single, accidental detonation. For thermal hazards, alternate design and analysis methods are required, such as those provided by the US Army Engineering and Support Center Huntsville's Technical Report HNDED-CS-93-7, Rev 1, "HD 1.3 Passive Structural Systems Design Guide." Alternative analysis methods may be acceptable if validated for explosives safety applications; use of these methods should be coordinated with the Service and DDESB.

9.1.3.2. In some instances, protective construction is validated through testing. Prior to conducting tests to validate the design of a protective construction design, the DoD Component explosives safety office and the DDESB should be consulted.

9.1.3.3. Other design and/or analysis methodologies (e.g., Reference (p) for fragmentation effects, DDESB TP 13 (Reference (s)) for building debris characterization, and the DDESB SDW policy memorandum (Reference (t)) may be used, as applicable, to support protective construction designs.

9.1.3.4. If elements of the design are outside the scope of UFC 3-340-02, thorough validation of any alternative analysis methods will be provided.

9.1.4. Only engineers who are experienced in the field of structural dynamics and who use design procedures accepted by professionals in that field may design explosion-resistant facilities.

9.1.5. It is highly recommended that design teams involve a competent DoD blast design agency, such as the Naval Facilities Engineering and Expeditionary Warfare Center (NAVFAC EXWC) or the U.S. Army Engineering & Support Center, Huntsville (CEHNC), as early in the design process as possible. Contact information for these organizations is provided in Table 9.1.

9.2. Previously Approved Protective Construction Designs

9.2.1. Sources for Information on Previously Approved Protective Construction

9.2.1.1. DDESB Technical Paper 15. Reference (k) provides background information on various protective construction designs (e.g., ECMs, reduced QD magazines, barricades, specific aircraft/missile configurations, full containment detonation chambers) and includes appendices that summarize protective construction designs approved by the DDESB for new construction. New protective construction designs approved by the DDESB are incorporated into Reference (k) during periodic updates. Until these updates occur, information and documented DDESB approvals for these new designs may be obtained from the DoD Component explosives safety offices or their equivalent.

9.2.1.2. Whole Building Design Guide (WBDG) Website. The WBDG website—<https://www.wbdg.org/dod>—augments Reference (k). This site has design drawings, background documentation, and, when available, DDESB approval documentation for standard ECM designs.

9.2.1.3. Previously Approved Site Plans. The DDESB may approve protective construction as part of a QDSP. In general, approval is specific to the respective QDSP; therefore, the design is not appropriate for use at other locations. However, some designs may be appropriate to modify and utilize at other locations. There is no convenient way (e.g., Reference (k), WBDG website) to search for this type of protective construction designs, but DDESB can assist in locating design documentation associated with specific site plans.

9.2.2. Site Plan Submission Requirements for Previously Approved, Site-Adaptable Protective Construction. The following requirements of Reference (d) and guidance apply to site plans that involve DDESB-approved, site-adaptable protective construction designs where siting complies with the DDESB approval memorandum’s conditions and limitations.

9.2.2.1. Preliminary Site Plans. The preliminary site plan must:

9.2.2.1.1. Identify the design or drawing numbers used, and the date of the design/drawings, if available. If a standard ECM design (e.g., one of the designs listed in Reference (k), Table AP1-1) will be used, but the exact design has not yet been chosen, this site plan should indicate such and identify the intended structural strength designator (i.e., 7-bar, 3-bar, undefined).

9.2.2.1.2. Reference the DDESB’s design approval memorandum (e.g., The DDESB may request a copy of the design and supporting analyses to allow for general approval of the design.

9.2.2.1.3. Specify that the protective construction will be used in the same manner as stated in the referenced DDESB-approval documentation.

9.2.2.1.4. State that the structural design has not been altered in any manner that impacts the design’s integrity or its ability to provide the required level of protection from the effects of an explosion.

9.2.2.2. Final Site Plan. In addition to addressing the requirements identified in paragraph 9.2.2.1., the final site plan must state that any site-specific adaptations of the design (e.g., foundation design) have been reviewed and are appropriate for the site conditions.

Table 9.1. NAVFAC EXWC and CEHNC Contact Information

NAVFAC EXWC	CEHNC
Division Director Explosion Effects and Consequences Division NAVFAC EXWC Code SH21 1100 23rd Avenue Port Hueneme, CA 93043-4370 Phone: 805-982-3398	Mailing address: U.S. Army Engineering & Support Center, Huntsville ATTN: EDC-S P.O. Box 1600 Huntsville, AL 35807-4301 Street address: U.S. Army Engineering & Support Center, Huntsville ATTN: EDC-S 300 Secured Gateway Redstone Arsenal, AL 35808 Phone: 256-895-1650

9.3. New or Modified Protective Construction Designs. The following site plan requirements apply to new protective construction designs.

9.3.1. Preliminary Site Plan. The preliminary site plan must:

9.3.1.1. Include conceptual drawings and documentation to allow understanding of protective construction approach. Significant changes to a facility’s layout after the concept design are likely to raise major objections from the designer and/or contractor on design-build projects and result in change orders or additional contract costs. To be cost-effective, decisions on facility layout, bay NEW limits, and protective construction requirements should be made very early in the process, prior to completion of the program or project development brochure and submittal of the funding request. DDESB recommends:

9.3.1.1.1. A design charette meeting among the design engineer, facility user, and an explosives safety and blast design expert from a DoD blast design agency (e.g., NAVFAC EXWC or CEHNC) as soon as the designer’s contract is awarded.

9.3.1.1.2. Continued DoD explosives safety and blast design agency involvement throughout the design process.

9.3.1.2. Include early validation of the critical protective construction components, if the DoD Component requires, to illustrate that the protective construction approach is feasible.

9.3.1.3. Identify all PES information, ES locations, and the required separation distance and equivalent protection level that is desired to achieve via protective construction. This is particularly important for intra-building operations which contain multiple PES and ES locations,

as all locations within the building where personnel may be located during a PES operation must be clearly identified.

9.3.2. Final Site Plan. The final site plan must provide:

9.3.2.1. The basis of design and the explosives safety protection being afforded by the new or modified design.

9.3.2.2. Structural design drawings that are a minimum of 95 percent complete, with all protective construction design data sufficiently developed for validation. The key is for the structural or protective construction designs to be far enough along for the DDESB to validate compliance with Reference (d) requirements. Subsequent changes to the structural aspects of drawings submitted to the DDESB that affect the blast response of the facility require DDESB review and approval.

9.3.2.3. *Design calculations for all critical structural elements.*

9.3.2.4. Supporting blast analyses, experimental data reports, blast design calculations, and other pertinent technical information. Blast analyses and design calculations will satisfy the requirements of References (d) and (n), except as noted in Paragraph 9.1.3.3.

9.3.2.5. If applicable, the design or drawing numbers and DDESB approval memorandum for the standard design being modified and a complete description of the structural modifications made, the reasons for such modification, and any explosives safety impact from the modifications made.

9.3.2.6. A memorandum from the DoD Component's explosives safety office verifying that the protective construction design complies with Reference (d) and (n) requirements. This verification will be based upon a quality control review (unless a more detailed independent technical review is warranted based upon either the lack of experience by the designer or the use of a new, unvalidated blast analysis or design approach) by a DoD blast design agency, such as NAVFAC EXWC or CEHNC. Because both of these organizations operate on a cost-reimbursable basis, projects must arrange payment for these organizations' services.

CHAPTER 10

AUTOMATED SITE PLANNING TOOLS

10.1. General. This chapter provides guidance for the use of an automated site planning tool (e.g., Explosives Safety Siting (ESS)) to develop or assist in the development of a site plan.

10.2. Principles

10.2.1. Use of an automated site planning tool does not replace the need for knowledgeable personnel in the site planning process. Therefore, only personnel knowledgeable about the application of the Reference (d) QD requirements should prepare and review site plans.

10.2.2. Automated site planning tools do not address all the required elements of a site plan (e.g., drawings, LPS, glass breakage) (see sections 3.4. and 3.5.).

10.2.3. Automated site planning tool results should be reviewed at all levels of the site plan review chain. If the results look questionable, inputs should be double-checked. Data input should be validated during database development. Default facility type codes used in a particular site plan submission should be verified.

10.2.4. During review, the Military Service-level explosives safety office or its equivalent should coordinate changes to the site planning tool outputs with the submitting activity. Should the DDESB identify needed changes, it will coordinate them with the Military Service-level explosives safety office or its equivalent.

10.2.4.1. If a user error is identified (e.g., incorrect program input, misunderstanding of applicable QD criteria), the Military Service-level explosives safety office or its equivalent should work with the submitting activity and user to resolve the error.

10.2.4.2. If the Military Service-level explosives safety office or its equivalent determines there is an error in the site planning tool's program or the program does not adequately address a situation, the matter should be addressed with the DDESB.

10.3. Guidance. The following guidance applies to the QD aspects of QDSPs created using an automated site planning tool. See Reference (d) and the guidance provided in Chapter 3.

10.3.1. The HDs and NEWs identified in the transmittal document from the Military Service-level explosives safety office or its equivalent should match the HDs and NEWs on the forms generated by the automated site planning tool. If they vary, the transmittal document should provide an explanation.

10.3.2. The forms generated by the automated site planning tool should include detailed tabular data that identifies all PESs, HDs, NEWs, ESs, PES and ES relationships, PES and ES occupants, the required distances, the basis for the required distances, and the actual distances.

10.3.2.1. For ECMs, the forms should identify structural strength designators, internal dimensions, applicable drawing numbers, and orientation.

10.3.2.2. When siting a PES, reviewers should ensure that the forms:

10.3.2.2.1. Include complete and accurate information for all ESs and PESs with ESQD arcs that encumber that PES.

10.3.2.2.2. Include information that supports:

10.3.2.2.2.1. Not applying QD to an ES.

10.3.2.2.2.2. Designating an ES as related to the PES.

10.3.2.3. When siting an ES, reviewers should ensure that the forms have complete and accurate information for all PESs that have ESQD arcs that encumber that ES.

10.3.3. The organization or unit, if applicable, that uses or occupies the PES or ES should be identified in either the owning command space on the forms generated by the automated site planning tool or the transmittal document.

10.3.4. The version of the automated site planning tool used to create the site plan submission should be identified in the transmittal document or on the forms generated by the automated site planning tool.

10.3.5. When the form generated by the automated site planning tool indicates a QD violation, the transmittal document should provide the rationale for submitting a site plan with such a violation.

10.3.6. A map should be included for each PES or ES being sited. When the PES is an ECM or hardened aircraft shelter, sectors must be shown on the map (e.g., front, side, and rear).

10.3.7. Facility type code is usually not enough to adequately describe the facility. If a description of the facility is not provided, reviewers will need to send a request for additional information to determine if the proper QD is being applied, which will slow down the process and result in more time until approval can be granted. For example, facility type code IHB could be an unrelated facility requiring IBD, a range classroom requiring PTRD, a field office requiring K18, a security alert force requiring K9, etc.

10.3.8. A justification or description should be entered in the notes section of all exposures not requiring QD.

10.3.9. With automated site planning, utilities that historically have not been identified have been added to maps, databases, and site planning analyses. Utilities that do not require QD do not need to be added to the dataset as this would increase the amount of data in the database and slow down the analysis. If included, use the UNA type code. Utilities that do not require QD are services provided to individual or grouped explosives facilities when that service is not also secondarily provided to other parts of the installation or community and do not have a required separation distance specified in Reference (d).

10.3.10. Although specific criteria are given in Reference (d), when checking to see if aboveground utilities are being provided the correct separation distances, compare the results to the following table:

Table 10.1. Utility Separation Guidance

	Manned	Unmanned
Vital or Unrelated to AE - Serves entire or major portion of installation - Loss causes immediate loss of a vital function - Loss causes an immediate secondary hazard - Does not serve any PESs	IBD from all PESs	IBD from all PESs
Serves multiple PESs	ILD from all PESs	ILD from all PESs
Serves a single or grouped PES	ILD from all PESs	No QD from any PES NFPA to all PESs

10.4. Training Materials. The following training resources are available to assist users with ESS.

10.4.1. ESS Web Application user Guide. This training provides step by step guidance on how to add/configure/update data, generate ESQD arcs, mitigate violations, and develop a submittal form/drawing. It is for use with the Alameda training data set.

10.4.2. Air Force Safety Center’s ESS Training Manual. The Purpose of this manual is to provide training in the basic use of ESS. Although it is not intended to cover all capabilities built into ESS, it provides the user with a working knowledge to cover the most commonly used tools and capabilities to successfully use the ESS software. This material can be used in a classroom with an instructor or as a standalone instruction manual for students who may not be able to attend a formal class or those deploying with a need to refresh their ESS skills.

10.4.3. Naval Ordnance Safety and Security Activity’s ESS Data Configuration Guide. This manual is designed to provide data configuration guidance once the initial ESS database has been created. This training focuses on the different types of features within the ESS database, such as piers, airfields, buildings, roads, and explosives sites, and provides information on the ESS Type Codes, properties, relations, data updates, and Geographic Information System data that should be used. This training also provides information on the different types of data that can be updated in ESS and the software tools used to perform the updates.

10.4.4. U.S. Army Technical Center for Explosives Safety's User Guides. These guides have been created to train the user in various aspects of ESS and include topics such as preparing data and folder structure, new data base wizard, setting facility relationships, setting barricades, viewing analysis results, creating custom arcs, ESS databases, submittal forms/drawings, and more.

REFERENCES

- (a) DoD Directive 6055.09E, Change 3, “Explosives Safety Management (ESM),” June 26, 2019
- (b) DoD Directive 4715.1E, Change 2, “Environment, Safety, and Occupational Health (ESOH),” December 30, 2019
- (c) DoD Instruction 6055.16, Change 3, “Explosives Safety Management Program,” August 31, 2018
- (d) DESR 6055.09, Edition 1, Change 1, “DoD Explosives Safety Standards,” February 23, 2024
- (e) Allied Ammunition Storage and Transport Publication (AASTP)-1, Edition C, Version 1, “NATO Guidelines for the Storage of Military Ammunition and Explosives,” March 2023
- (f) Allied Ammunition Storage and Transport Publication (AASTP)-5, Edition B, Version 1, “NATO Guidelines for the Storage, Maintenance and Transport of Ammunition on Deployed Missions or Operations,” July 16, 2024
- (g) Chapter 103 of Title 42, United States Code
- (h) Part 300 of Title 40, Code of Federal Regulations
- (i) Chairman of the Joint Chiefs of Staff Instruction 4360.D01D, “Explosives Safety and Munitions Risk Management for Joint Operations Planning, Training, and Execution,” August 5, 2023
- (j) DDESB Technical Paper 19, “User’s Reference Manual for the Safety Assessment for Explosives Risk Software,” Revision 1, July 21, 2009
- (k) DDESB Technical Paper 15, Revision 4, “Approved Protective Construction,” July 26, 2020
- (l) DDESB-PD Memorandum, “Explosives Safety Quantity-Distance for Type I, Type IIA and Type IIB Smokeless Powder/Projectile Magazines,” March 07, 2016
- (m) DDESB Technical Paper 22, “Lightning Protection for Explosives Facilities,” March 2010
- (n) Unified Facilities Criteria 3-340-02, Change 2, “Structures to Resist the Effects of Accidental Explosions,” September 1, 2014
- (o) DDESB Technical Paper 10, Change 3, “Methodology for Chemical Hazard Prediction,” June 1980

- (p) DDESB Technical Paper 16, Revision 4, “Methodologies for Calculating Primary Fragment Characteristics,” November 12, 2016
- (q) DDESB Technical Paper 14, Revision 4, “Approved Methods and Algorithms for DoD Risk-Based Explosives Siting” July 21, 2009
- (r) DDESB Technical Paper 23, Revision 2, “Assessing Explosives Safety Deviations, Risks, and Consequences,” June 3, 2019
- (s) DDESB Technical Paper 13, Change 3, “Prediction of Building Debris for Quantity-Distance Siting,” April 1991
- (t) DDESB Memorandum, “Revised Guidance for 12-inch Substantial Dividing Walls,” June 25, 2020

GLOSSARY

A&E	architect and engineer
AAR	after action report
AASTP	Allied Ammunition Storage and Transport Publication
AE	ammunition and explosives
AEGL	acute exposure guideline level
AGM	aboveground magazine
ASAP-X	Automated Safety Assessment Protocol-Explosives
ASHS	Assessment System for Hazard Surveys
ATLIC	Area Ten Liquid Incineration Chamber
BRAC	base realignment and closure
CA	chemical agent
CAIS	chemical agent identification set
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSS	chemical safety submission
CWM	chemical warfare materiel
DAVINCH	detonation of ammunition in a vacuum integrated chamber
DDESB	Department of Defense Explosives Safety Board
DoD	Department of Defense
DoDD	Department of Defense directive
DoDI	Department of Defense instruction
EC	engineering control
ECM	earth-covered magazine
EDS	Explosive Destruction System
E _f	expected number of fatalities
EOD	Explosive Ordnance Disposal
ES	exposed site
ESQD	explosives safety quantity distance
ESS	Explosives Safety Siting
FDRF	fragmentation data review form
FUDS	Formerly Used Defense Site
GCC	geographic combatant commander
HD	hazard division
HERO	hazards of electromagnetic radiation to ordnance
HFD	hazardous fragment distance
HSP	hybrid site plan
IBD	inhabited building distance

ILD	intraline distance
IMD	intermagazine distance
lbs	pounds
LPS	lightning protection system
LUC	land use control
MCE	maximum credible event
MEC	munitions and explosives of concern
MGFD	munition with the greatest fragmentation distance
MN	multinational
MOA	memorandum of agreement
MOB	main operating base
MOU	memorandum of understanding
MPPEH	material potentially presenting an explosive hazard
MRA	munitions response area
MRCSS	munitions response chemical safety submission
MRESS	munitions response explosives safety submission
MRSS	munitions response safety submission
MSD	minimum separation distance
NATO	North Atlantic Treaty Organization
NAVFAC EXWC	Naval Facilities Engineering and Expeditionary Warfare Center
NEW	net explosive weight
NEWQD	net explosive weight for quantity-distance
PAED	public access exclusion distance
PES	potential explosion site
P _f	probability of fatality
PTRD	public traffic route distance
QD	quantity-distance
QDSP	quantity-distance site plan
QRA	quantitative risk assessment
RBSP	risk-based site plan
RCWM	recovered chemical warfare material
RORO	roll-on/roll-off
RRS	Rapid Response System
SAFER [®]	Safety Assessment for Explosives Risk
SCANS	Single Chemical Agent Identification Set (CAIS) Access and Neutralization System
SDC	static detonation chamber
SDW	substantial dividing wall
SOFA	status-of-forces agreement

TCS	total containment system
TP	technical paper
U.S.	United States
USAESCH	U.S. Army Engineering and Support Center, Huntsville
VCS	vapor containment system
WBDG	whole building design guide