Hazard Assessment for Munitions and Explosives of Concern: Workgroup Briefing Book

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GLOSSARY OF TERMS

Anomaly. Any identified subsurface mass that may be geologic in origin, unexploded ordnance (UXO), or some other man-made material. Such identification is made through geophysical investigation and reflects the response of the sensor used to conduct the investigation.

Anomaly reacquisition. The process of confirming the location of an anomaly after the initial geophysical mapping conducted on a range. The most accurate reacquisition is accomplished using the same instrument used in the geophysical survey to pinpoint the anomaly and reduce the area the excavation team needs to search to find the item.[1]

Baseline Risk Assessment – An assessment conducted based on the data collected during the RI to characterize the current and potential threats to human health and the environment that may be posed by contaminants migrating to ground water or surface, releasing to air leaching through soil, remaining in the soil, and bioaccumulating in the food chain. (NCP 300.430(d)(4))

Buried munitions. Munitions that have been intentionally discarded by being buried with the intent of disposal. Such munitions may be either used or unused military munitions. Such munitions do not include unexploded ordnance that become buried through use.

Chemical warfare agent. A substance that is intended for military use with lethal or incapacitating effects upon personnel through its chemical properties.[3]

Clean up. Actions taken to deal with a release or threat of release of a hazardous substance that could affect humans and/or the environment. The term "cleanup" is sometimes used interchangeably with the terms remedial action, removal action, response action, or corrective action. [13]

Clearance. The removal of UXO from the surface or subsurface at active and inactive ranges.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLA, commonly known as Superfund, is a Federal law that provides for the cleanup of releases from abandoned waste sites that contain hazardous substances, pollutants, and contaminants.[5]

Conceptual Site Model (CSM). The CSM is a description of a site and its environment that is based on existing knowledge and updated regularly. It describes sources of MEC at a site; actual, potentially complete, or incomplete exposure pathways; current or reasonably anticipated future land use; and potential receptors. The source-receptor interaction is a descriptive output of a CSM. The CSM serves as a planning instrument, a modeling and data interpretation aid, and a communication device among the team.[20]

Department of Defense Explosives Safety Board (DDESB). The DoD organization charged with promulgation of ammunition and explosives safety policy and standards, and with reporting on the effectiveness of the implementation of such policy and standards.[6]

Defense Sites. Locations that are or were owned by, leased to, or otherwise possessed or used by the Department of Defense. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used for or was permitted for the treatment or disposal of military munitions.[12]

Discarded Military Munitions (DMM). Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations.[12]

Disposal. The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwaters.[7]

Explosion. A chemical reaction of any chemical compound or mechanical mixture that, when initiated, undergoes a very rapid combustion or decomposition, releasing large volumes of highly heated gases that exert pressure on the surrounding medium. Also, a mechanical reaction in which failure of the container causes sudden release of pressure from within a pressure vessel. Depending on the rate of energy release, an explosion can be categorized as a deflagration, a detonation, or pressure rupture.[3]

Explosive. A substance or mixture of substances, which is capable, by chemical reaction, of producing gas at such a temperature, pressure and rate as to be capable of causing damage to the surroundings.

Explosives safety. A condition in which operational capability, personnel, property, and the environment are protected from the unacceptable effects of an ammunition or explosives mishap.[7]

Exposure. The amount of radiation or pollutant present in a given environment that represents a potential health threat to living organisms. [13]

Formerly Used Defense Site (FUDS). Real property that was formerly owned by, leased by, possessed by, or otherwise under the jurisdiction of the Secretary of Defense or the components, including organizations that predate DoD.[2]

Fragmentation. The breaking up of the confining material of a chemical compound or mechanical mixture when an explosion occurs. Fragments may be complete items, subassemblies, or pieces thereof, or pieces of equipment or buildings containing the items.[3]

Fuze. 1. A device with explosive components designed to initiate a train of fire or detonation in ordnance. 2. A nonexplosive device designed to initiate an explosion in ordnance.[4]

Hazard. A condition with the potential to cause injury, illness, or death of personnel; damage to or loss of equipment or property; or mission degradation. See also *risk*.[8]

Hazardous substance. Any substance designated pursuant to Section 311(b)(2)(A) of the Clean Water Act (CWA); any element, compound, mixture, solution, or substance designated pursuant to Section 102 of CERCLA; any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by an Act of Congress); any toxic pollutant listed under Section 307(a) of the CWA; any hazardous air pollutant listed under Section 112 of the Clean Air Act; and any imminently hazardous chemical substance or mixture with respect to which the EPA Administrator has taken action pursuant to Section 7 of the Toxic Substances Control Act.[9]

Hazardous waste. A solid waste, or combination of solid waste, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (a) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.[6] Chemical agents and munitions become hazardous wastes if (a) they become a solid waste under 40 CFR 266.202, and (b) they are listed as a hazardous waste or exhibit a hazardous waste characteristic; chemical agents and munitions that are hazardous wastes must be managed in accordance with all applicable requirements of RCRA.[10]

Inactive range. A military range that is not currently being used, but that is still under military control and considered by the military to be a potential range area, and that has not been put to a new use that is incompatible with range activities.[10]

Institutional controls. Nonengineering measures designed to prevent or limit exposure to hazardous substances left in place at a site to ensure effectiveness of the chosen remedy. Institutional controls are usually, but not always, legal controls, such as easements, restrictive covenants, and zoning ordinances.[11]

Land use controls. Any type of physical, legal, or administrative mechanism that restricts the use of, or limits access to, real property to prevent or reduce risks to human health and the environment. Institutional Controls are a subset of land use controls. The term land use controls incorporates physical controls while the term institutional controls does not.

Lead agency. The agency that provides the on-scene coordinator or remedial project manager to plan and implement response actions under the National Contingency Plan (NCP). EPA, the U.S. Coast Guard, another Federal agency, or a State operating pursuant to a contract or cooperative agreement executed pursuant to section 104(d)(1) of CERCLA, or designated pursuant to a Superfund Memorandum of Agreement (SMOA) entered into pursuant to subpart F of the NCP or other agreements may be the lead agency for a response action. In the case of a release or a hazardous substance, pollutant, or contaminant, where the release is on, or the sole source of the release is from, any facility or vessel under the jurisdiction, custody or control of a Federal agency, that agency will be the Lead Agency.[5]

Military munitions. Military munitions means all ammunition products and components produced for or used by the armed forces for national defense and security, including

ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components thereof.

The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components, other than non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed. (10 U.S.C. 101 (e)(4). [12]

Most probable munition. The round with the greatest hazardous fragment range that can reasonably be expected to exist in any particular MRA.[2]

Munitions constituents (MC). Any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.(10 U.S.C. 2710 (e)(4))[12] Munitions constituents may be subject to other statutory authorities, including, but not limited to, CERCLA (42 U.S.C. 9601 et seq.) and RCRA (42 U.S.C. 6901 et seq.).

Munitions and Explosives of Concern (MEC). This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means: (1) Unexploded ordnance (UXO); (2) Discarded military munitions (DMM); or (3) Munitions Constituents (e.g. TNT, RDX) present in high enough concentrations to pose an explosive hazard. Formerly known as Ordnance and Explosives (OE). [12]

Munitions response. Response actions, including investigation, removal and remedial actions to address the explosives safety, human health, or environmental risks presented by unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC).[12] The term is consistent with the definitions of removal and remedial actions that are found in the National Contingency Plan. The response could be as simple as administrative or legal controls that preserve a compatible land use (i.e. institutional controls) or as complicated as a long-term response action involving sophisticated technology, specialized expertise, and significant resources. [18]

Munitions Response Area (MRA). Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A munitions response area is comprised of one or more munitions response sites. An MRA is equivalent to a response area on a range that was formerly referred to as closed, transferred or transferring (CTT). [12]

Munitions Response Site (MRS). A discrete location within a MRA that is known to require a munitions response.[12]

National Oil and Hazardous Substances Pollution Contingency Plan, or National Contingency Plan (NCP). The regulations for responding to releases and threatened releases of hazardous substances, pollutants, or contaminants under CERCLA.[5]

National Priorities List (NPL). A national list of hazardous waste sites that have been assessed against the Hazard Ranking System and score above 28.5. The listing of a site on the NPL takes place under the authority of CERCLA and is published in the *Federal Register*.[5]

Net Explosive Weight (NEW). (DOD) The actual weight in pounds of explosive mixtures or compounds, including the trinitrotoluene equivalent of energetic material, that is used in determination of explosive limits and explosive quantity data arcs. [8]

Pathway. The physical course a chemical or pollutant takes from its source to the exposed organism.[13]

Preliminary assessment (PA) and site inspection (SI). A PA/SI is a preliminary evaluation of the existence of a release or the potential for a release. The PA is a limited-scope investigation based on existing information. The SI is a limited-scope field investigation. The decision that no further action is needed or that further investigation is needed is based on information gathered from one or both types of investigation. The results of the PA/SI are used by DoD to determine if an area should be designated as a site under the Installation Restoration Program. EPA uses the information generated by a PA/SI to rank sites against Hazard Ranking System criteria and decide if the site should be proposed for listing on the NPL.

Probability. A probability provides a quantitative description of the likely occurrence of a particular event. Probability is expressed on a scale between 0 and 1; a rare event has a probability close to 0, a very common event has a probability close to 1. The probability of an event has been defined as its long-run relative frequency. [15]

Quantity-distance (Q-D). The relationship between the quantity of explosive material and the distance separation between the explosive and people or structures. These relationships are based on levels of risk considered acceptable for protection from defined types of exposures. These are not absolute safe distances, but are relative protective or safe distances.[2]

Range. The term range, when used in a geographic sense, means a designated land or water area that is set aside, managed, and used for range activities of the Department of Defense. Such terms includes the following: (A) Firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, electronic scoring lines, buffer zones with restricted access, and exclusionary areas. (B) Airspace areas designated for military use in accordance with regulations and procedures prescribed by the Administrator of the Federal Aviation Commission.[12]

Receptor. Exposed human or ecological individual relative to the exposure pathway considered.[19]

Real property. Land, buildings, structures, utility systems, improvements, and appurtenances thereto. Includes equipment attached to and made part of buildings and structures (such as heating systems) but not movable equipment (such as plant equipment).

Record of Decision (ROD). A public decision document for a Superfund site that explains the basis of the remedy decision and, if cleanup is required, which cleanup alternative will be used. It provides the legal record of the manner in which the selected remedy complies with the statutory and regulatory requirements of CERCLA and the NCP.[5]

Release. Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant). [9]

Remedial Alternatives – Potential remedies evaluated during the feasibility study that may include the following:

- One or more alternatives that involve little or no treatment, but provide protection of human health and the environment primarily by preventing or controlling exposure to hazardous substances, pollutants, or contaminants, through engineering controls, for example, containment, and, as necessary, institutional controls
- For source control actions, an alternative in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances, pollutants, or contaminants is a principal element.
- For ground-water response action, a limited number of remedial that attain site-specific remediation levels within different restoration time periods [5](300.430(d)(1))

Remedial Investigation – An investigation conducted for the purpose of collecting the data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternative. The RI includes field investigations, treatability studies, and a baseline risk assessment. [5](300.430(d)(1))

Remedy (or Remedial Action) – Those actions consistent with permanent remedy taken instead of, or in addition to, removal action in the event of a release or threatened release of a hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment. [9]

Removal action. Short-term response actions under CERCLA that address immediate threats to public health and the environment.[9]

Removal Investigation. (Also called a Removal Site Evaluation) The amount of investigation conducted to see if removal action is necessary or appropriate [5] (300.410)

Render-safe procedures. The portion of EOD procedures involving the application of special EOD methods and tools to provide for the interruption of functions or separation of essential components of UXO to prevent an unacceptable detonation.[8]

Resource Conservation and Recovery Act (RCRA). The Federal statute that governs the management of all hazardous waste from cradle to grave. RCRA covers requirements regarding identification, management, and cleanup of waste, including (1) identification of when a waste is solid or hazardous; (2) management of waste C transportation, storage, treatment, and disposal; and (3) corrective action, including investigation and cleanup, of old solid waste management units.[6]

Response action. As defined in Section 101 of CERCLA, remove, removal, remedy, or remedial action, including enforcement activities related thereto.[9]

Risk. The possibility of suffering harm or loss; danger. A factor, thing, element, or course involving uncertain danger; a hazard. [17]

Risk Characterization (also called Risk Assessment). Is a process used to identify potential risks posed by chemicals. During risk characterization, chemical-specific toxicity information, combined with quantitative and qualitative information from the exposure assessment, is compared to measured levels of contaminant exposure levels and to levels predicted through environmental fate and transport modeling. These comparisons determine whether concentrations of contaminants at or near the site are affecting, or could potentially affect, human health or the environment. Results of this analysis are presented with all critical assumptions and uncertainties so that significant risks can be identified. [16]

Risk Management. A process by which decision makers reduce or offset risk.[11]

Solid waste. Any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but not including solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under section 402 of the Federal Water Pollution Control Act as amended, or source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954, as amended.[6] When a military munition is identified as a solid waste is defined in 40 CFR 266.202.[10]

Treatment. When used in conjunction with hazardous waste, means any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste or so as to render such waste nonhazardous, safer for transport, amenable for recovery, amenable for storage, or reduced in volume. Such term includes any activity or processing designed to change the physical form or chemical composition of hazardous waste so as to render it nonhazardous.[6]

Uncertainty. Being unsettled or in doubt; the state of being unsure. When used in conjunction with the management of hazardous substances refers to the unknown factors such as quantity of waste, concentration of chemicals, likelihood of human exposure and a variety of other factors whose real value is unsure.

Unexploded ordnance (UXO). Military munitions that have been primed, fuzed, armed, or otherwise prepared for action, and have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material and that remain unexploded either by malfunction, design, or any other cause.[10]

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ACRONYMS

ARAR	applicable or relevant and appropriate requirements
ATSDR	Agency for Toxic Substances and Disease Registry
BRAC	Base Realignment and Closure Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSM	Conceptual site model
DDESB	Department of Defense Explosives Safety Board
DERP	Defense Environmental Restoration Program
DGPS	differential global positioning system
DMM	discarded military munitions
DoD	Department of Defense
DOE	Department of Energy
DQO	data quality objective
EOD	Explosive ordnance disposal
EPA	Environmental Protection Agency
FUDS	Formerly Used Defense Sites
IAG	interagency agreement
IRIS	Integrated Risk Information System
JUXOCO	Joint UXO Coordination Office
MCE	maximum credible event
MEC	munitions and explosives of concern
MRA	munitions response area
MRS	munitions response site
NCP	National Contingency Plan
NEW	Net explosive weight
NPL	National Priorities List
PA/SI	preliminary assessment/site inspection
PRG	preliminary remediation goal
QA/QC	quality assurance/quality control
Q-D	quantity-distance
RCRA	Resource Conservation and Recovery Act
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SERDP	Strategic Environmental Research and Development Program
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
UXO	unexploded ordnance