

**White Paper**  
**Destruction in Place**  
**Blow-in-Place (BIP)**

**Issues:**

The Department of Defense (DoD) seeks to address the acute hazards associated with unexploded ordnance (UXO)<sup>1</sup> in a manner that best minimizes human health and environmental effects,<sup>2</sup> while maximizing the safety of response personnel. Because UXO is extremely dangerous, DoD's general practice is to destroy UXO in place by detonation (commonly referred to as blow-in-place or BIP).<sup>3</sup> However, environmental regulators and safety officials<sup>4</sup> overseeing munitions response<sup>5</sup> actions may have an independent authority, responsibility, and/or the technical expertise to evaluate the public safety and environmental aspects of munitions response actions. In certain site- or situation-specific circumstances, environmental regulators and safety officials may challenge a DoD field expert's disposition decision and seek to elevate the issue to higher levels of authority to achieve a mutually agreeable resolution.

**Background:**

➤ UXO, which will most likely be found in areas that DoD currently uses (i.e., operational ranges) or once used (i.e., inactive and closed) for military munitions<sup>6</sup> training or testing, are considered the most dangerous category of military munitions. However, other military munitions (e.g., discarded military munitions (DMM)<sup>7</sup>) that have experienced abnormal environments (e.g., military munitions involved in

---

<sup>1</sup> Unexploded Ordnance (UXO). See 10 U.S.C. 101(e)(5), which generally provides that UXO means: Military munitions that (A) have been primed, fuzed, armed, or otherwise prepared for action; (B) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and (C) remain unexploded either by malfunction, design, or any other cause.

<sup>2</sup> DoD's position is that potential environmental effects from the application of BIP procedures during munitions responses and other responses involving the disposition of military munition can be mitigated, if necessary, after the immediate hazard is removed without exposing response personnel to increased risk.

<sup>3</sup> The destruction process for UXO and discarded military munitions (DMM) should not be confused with DoD's industrial-level demilitarization program, which is part of DoD's munitions management system, for excess, obsolete, and unserviceable munitions.

<sup>4</sup> Environmental regulators and safety officials include, but may not be limited to environmental regulators, environmental coordinators or hazardous material coordinators, law enforcement officers, and safety personnel of the U.S. Environmental Protection Agency (USEPA), American Indians and Alaska Natives, other Federal Land Managers, and/or the States. When appropriate, public health officials of various agencies may also be involved.

<sup>5</sup> Munitions Response. Response actions, including investigation, removal actions 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).

<sup>6</sup> Military Munitions. See (10 U.S.C. 101(e)(4)(A) through (C)), which generally provides that 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 U.S. Coast Guard, the U.S. Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives, and chemical warfare 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 of the above.

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.

<sup>7</sup> Discarded Military Munitions (DMM). See 10 U.S.C. 2710(e)(2), which generally provides that DMM means: 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

accidents or fires) or are encountered outside DoD's munitions logistics management system<sup>8</sup> should be considered equally dangerous and managed like UXO until technically qualified personnel (see below) assess and determine that the items are not UXO or do not present explosive hazards<sup>9</sup> similar to UXO and that other procedures can be used.

➤ Within DoD, Explosive Ordnance Disposal (EOD) personnel<sup>10</sup> and EOD-qualified Technical Escort Unit (TEU) personnel are considered technically qualified to assess and determine the hazards associated with the disposition of UXO.<sup>11</sup> The Army, as DoD's Executive Agent for Formerly Used Defense Sites, has also authorized certain representatives of the U.S. Army Corps of Engineers (USACE) Military Munitions Center of Expertise (MM CX), located in Huntsville, Alabama, who are also considered technically qualified, to make such assessments and determinations. MM CX's determinations are based on the recommendations of on-site USACE Ordnance and Explosives Safety Specialists or on-site UXO technicians, after it researches EOD technical publications.

➤ Prior to determining a munition's disposition, technically qualified personnel must identify the associated explosive or chemical agent (CA) hazards<sup>12</sup> and evaluate the potential consequences of the disposition action.

- DoD's general practice is to destroy UXO, in place, by BIP.
- Exceptions to this general practice can be made by technically qualified personnel who have determined that the risks associated with alternative actions (e.g., movement) are acceptable.<sup>13</sup>
  - Because of the potential downwind hazard, this general practice does not normally apply to UXO known or suspected to contain CA<sup>14</sup> or for which the liquid fill cannot be determined.
  - DoD will comply with applicable federal, tribal, state, and local laws, regulations, and agreements and with appropriate DoD explosives safety standards and other applicable DoD policies. Should compliance with such laws, regulations, agreements, standards, or policies delay the final

---

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.

<sup>8</sup> Military munitions in DoD's munitions logistics management system are accounted for and managed within DoD's inventory. (Examples of such military munitions are those in the logistics pipeline; in authorized, approved storage; in DoD's demilitarization account; awaiting foreign military sales, etc.)

<sup>9</sup> Explosive Hazard. A condition where danger exists because explosives are present that may react (e.g., detonate, deflagrate) in a mishap with potential unacceptable effects (e.g., death, injury, damage) to personnel, property, operational capability, or the environment.

<sup>10</sup> Explosive Ordnance Disposal (EOD) Personnel. Military personnel who have graduated from the Naval School, Explosive Ordnance Disposal; are assigned to a military unit with a Service-defined EOD mission; and meet Service and assigned unit requirements to perform EOD duties. EOD personnel have received specialized training to address explosive and certain CA hazards during both peacetime and wartime. EOD personnel are trained and equipped to perform Render Safe Procedures (RSP) on nuclear, biological, chemical, and conventional munitions, and on improvised explosive devices.

<sup>11</sup> When conducting an explosives or munitions emergency response, EOD response actions are exempt from RCRA permitting and other substantive requirements (40 CFR 264.1(g)(8), 265.1(c)(11); 270.1(c)(3)). However, if time permits EOD personnel should consult with regulatory agencies regarding the appropriate course of actions (e.g., whether to see a RCRA emergency permit under section 40 CFR 270.61).

<sup>12</sup> Chemical Agent (CA) Hazard. A condition where danger exists because CA is present in a concentration high enough to present potential unacceptable effects (e.g., death, injury, damage) to personnel, operational capability, or the environment.

<sup>13</sup> The determination is only whether the additional risk of moving a UXO is acceptable. It is not a comparison of the risk, as there is always additional risk when a UXO is moved instead of BIP.

<sup>14</sup> Chemical Agent (CA). An agent that, through its chemical properties, produces lethal or other damaging effects on human beings, except that such term does not include riot control agents, chemical herbicides, smoke, and other obscuration materials.

disposition of UXO, protective measures (e.g., explosives safety quantity-distance arcs, use of approved protective barriers) will be maintained to ensure explosives safety for the duration of the delay.

- When required or requested, DoD will collaborate<sup>15</sup> with environmental regulators and safety officials to achieve mutual agreement<sup>16</sup> for managing potential adverse impacts, which are generally site-specific, of the pending BIP operation (e.g., timing, noise, security, environmental impacts) and, if appropriate, on alternatives to BIP. During such collaboration, protective measures must be maintained to ensure explosives safety.

#### Discussion:

➤ There are no safe procedures for moving, rendering safe, or destroying UXO, merely procedures that may be considered less dangerous. For this reason, DoD's general practice is to BIP UXO. Munitions known to contain CA, or that contain or are suspected to contain an unknown liquid fill, are not normally BIP; exceptions are determined on a case-by-case basis by the appropriate-level DoD authority in collaboration with environmental regulators and safety officials.

➤ DoD is responsible for protecting the public and property from potential explosive hazards (e.g., blast and fragmentation) or CA hazards (e.g., downwind hazards) associated with UXO. DoD is equally responsible for protecting personnel who must respond to these potential hazards.

➤ Environmental regulators and safety officials may have an independent authority and/or responsibility to protect public safety and the environment. In addition, applicable state, local, tribal, and federal requirements concerning the disposition of UXO may differ. DoD and regulatory agencies should work collaboratively to resolve such differences.

➤ Munitions found outside DoD's munitions logistics management system should not be disturbed or moved, unless technically qualified personnel determine that the risks associated with movement are acceptable. If technically qualified personnel determine that the military munition's condition precludes:

- A complete assessment of its explosive hazard or that the risk of moving the munition is not acceptable, then it should be BIP unless doing so could pose an imminent and substantial endangerment<sup>17</sup> to public health and/or the environment, or adversely impact critical operations, facilities, and/or equipment.<sup>18</sup> Should environmental regulators and safety officials have concerns regarding this determination, the concerns should be raised to the appropriate-level DoD authority for resolution using the collaborative decision making process.

---

<sup>15</sup> Collaborate, as used in this paper, has the same meaning as in the *Collaborative Decision Making/Mutual Agreement Process* incorporated in the Munitions Response Committee Charter.

<sup>16</sup> Mutual Agreement is defined as "a meeting of the minds on a specific subject, and a manifestation of intent of the parties to do or refrain from doing some specific act or acts." Inherent in any mutual agreement or collaborative process are the acknowledgement of each member's role in the process and their differing views of their authorities. The mutual agreement process will provide a means of resolving differences without denying the parties an opportunity to exercise their respective authorities should mutual agreement fail to be achieved.

<sup>17</sup> If, after assessment, a munition is considered too hazardous to move and its destruction in place could present an imminent and substantial endangerment, then render safe procedures (RSP) may be the only option. Although, depending on the munition, there may be RSP options, RSP generally would involve some movement of the munition and/or the application of mechanical tools to the munition to attempt to disrupt the explosive train (separate the fuze without an unintentional detonation). Because RSP exposes EOD to added risks, the application of alternate procedures should only be attempted in limited circumstances.

<sup>18</sup> DoD believes that potential environmental effects from the application of BIP procedures can be mitigated, if necessary, after the immediate hazard is removed without exposing EOD personnel to increased risk.

- Determination of its fill (e.g., liquid fill), or if the military munition is known to contain CA, then the implementation of protective measures and the disposition of the munition will be determined by the appropriate-level DoD authority in collaboration with environmental regulators and safety officials.
- When the application of BIP procedures poses an imminent and substantial endangerment to the public, critical operations, facilities, equipment and/or the environment, EOD personnel may attempt render-safe procedures (RSP).<sup>19</sup>
  - Only EOD personnel who are specially trained and equipped to conduct RSP are authorized to apply RSP.
  - Prior to attempting RSP, protective measures to mitigate the potential effects (e.g., blast, fragments) of an unintentional, high-order detonation or a CA release will be implemented.
- DoD has conducted numerous tests of protective measures used to mitigate the explosive effects of detonations. The Department of Defense Explosives Safety Board (DDESB) has approved certain measures<sup>20</sup> based on test data. Tests have confirmed that, when properly applied, these protective measures will effectively manage potential explosives safety risks associated with BIP. Environmental regulators and safety officials overseeing munitions responses may request or may have an independent authority to require additional measures be taken to mitigate the effects of a detonation. In such cases, the protective measures to be used will be determined in collaboration with environmental regulators and safety officials.
- Technology can often address potential environmental effects of BIP or help reduce the number of situations (e.g., need for consolidated shots<sup>21</sup>) that would otherwise require BIP or open detonation. However, given the design, configuration, or condition of some recovered munitions, it is unlikely that technological advancements will ever eliminate the need for BIP.
- Current technological disposition alternatives for military munitions, to include chemical munitions and other forms of recovered chemical warfare material (RCWM),<sup>22</sup> include:
  - Contained detonation technology (e.g., the T-10 Contained Detonation Chamber (CDC)). The Army, in concert with private industry, is evaluating contained detonation technology for use with RCWM. Private industry is also working to increase contained detonation capacity to allow larger-caliber military munitions with greater net explosive weights to be destroyed.
  - Mechanized crushing system to reduce the use of explosive charges to break up steel practice bomb bodies recovered during U.S. Air Force range clearance operations to accomplish demilitarization prior to resource recovery and recycling (R3).

<sup>19</sup> Render safe procedures (RSP). EOD procedures that attempt to defeat (i.e., interrupt the function of or separate essential components) a munition's explosive train to preclude an unacceptable detonation.

<sup>20</sup> DDESB Technical Paper 15, contains approved measures.

<sup>21</sup> Under this procedure, military munitions for which a decision has been made that the risk of movement is acceptable are consolidated with either other military munitions that can likewise be moved for detonation or that cannot be moved.

<sup>22</sup> Chemical Warfare Material (CWM). Items generally configured as a munition containing a chemical substance that is intended to kill, seriously injure, or incapacitate a person through its physiological effects. CWM includes V- and G-series nerve agents or H-series (mustard) and L-series (lewisite) blister agents in other-than-munition configurations; and certain industrial chemicals (e.g., hydrogen cyanide (AC), cyanogen chloride (CK), or carbonyl dichloride (called phosgene or CG)) configured as a military munition. Due to their hazards, prevalence, and military-unique application, chemical agent identification sets (CAIS) are also considered CWM. CWM does not include: riot control devices; chemical herbicides; industrial chemicals (e.g., AC, CK, or CG) not configured as a munition; smoke and flame producing items; or soil, water, debris or other media contaminated with low concentrations of chemical agents where no CA hazards exist.

- Explosive Destruction System (EDS), which provides a mobile capability to dispose of immediately dangerous and small quantities of RCWM. The Army is enhancing EDS to increase its capacity.
- Rapid Response System (RRS), which provides a mobile capability to process and dispose of recovered chemical agent identification sets (CAIS), for RCWM.
- Consolidated shots that reduce the amount of donor charge during the BIP.
- Shaped charges, which contain less explosives than traditional donor charges both during BIP and to vent practice bombs to reduce munitions constituents (MC)<sup>23</sup> releases.
- Explosives other than RDX-based explosives, such as PETN, as donor material during a BIP, to reduce MC releases.

#### MRC Recommendations:

- All parties<sup>24</sup> recognize that:
  - Because UXO may pose an immediate hazard DoD's general practice is to destroy them in place.
    - Exceptions to DoD's general practice may be made only after:
      - Technically qualified personnel determine that the risks associated with movement are acceptable.
      - The appropriate-level DoD authority determine, in collaboration with environmental regulators and safety officials, that BIP could pose an imminent and substantial endangerment to public health and/or the environment, or adversely impact critical operations, facilities, and/or equipment.
    - BIP normally does not apply to munitions known or suspected to contain CA or an unknown liquid fill.
  - Environmental regulators and safety officials who oversee munitions response actions may have an independent authority, responsibility and/or the technical expertise to evaluate the public safety and environmental aspects of munitions response actions. Although these officials recognize the expertise of DoD explosives safety personnel involved in UXO disposition decisions, they may in certain circumstances, based on the advice of internal or contracted explosives safety expertise, challenge a DoD field expert's decision and seek to elevate the issue to higher levels of authority to achieve a mutually agreeable resolution.
    - For UXO that (a) can be identified as to their explosive hazard and (b) should be disposed of by BIP: DoD, in collaboration with environmental regulators and safety officials, shall evaluate whether BIP could pose an imminent and substantial endangerment to public health and/or the environment, or adversely impact critical operations, facilities, and/or equipment
    - For UXO that (a) can be identified as to their explosive hazard, (b) should be disposed of by BIP or immediate detonation in the general vicinity of discovery, or at a designated location, and (c) do not pose an imminent and substantial endangerment to the public, critical operations, facilities, equipment and/or the environment: DoD, in collaboration with environmental regulators and safety officials, may evaluate mitigation measures to reduce potential impacts to public safety, the environment and cultural resources.
    - For UXO that (a) can be identified as to their explosive hazard, and (b) are determined acceptable to dispose of by other than BIP or immediate detonation in the general vicinity of discovery, or at a designated location: DoD, in collaboration with environmental regulators and

<sup>23</sup> Munitions Constituents (MC). See 10 U.S.C. 2710(e)(3), which generally provides that MC means: 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.

<sup>24</sup> All parties include those organizations (i.e., the Department of Defense (DoD), the U.S. Environmental Protection Agency (USEPA), American Indians and Alaska Natives, the other Federal Land Managers, and the States) that participate on or support the actions of the Munitions Response Committee.

safety officials, may evaluate a variety of safe disposition alternatives to avoid potentially adverse impacts on public safety, the environment, and cultural resources.

- For UXO that are known or suspected to present a CA hazard: DoD and environmental regulators and safety officials shall evaluate disposition alternatives and determine the necessary protective measures to be taken during the selected disposition.

➤ All parties will collaborate with DoD in its efforts to develop protocols for use, when both practicable and necessary, to address the potential environmental effects of BIP. Varying site conditions may require such protocols be site specific.

#### **Roles and Responsibilities:**

➤ DoD will:

- Continue to pursue and develop technological advancements to address concerns about potential environmental effects of BIP.
- Work with environmental regulators and safety officials to:
  - Develop protocols to address the potential environmental effects of BIP.
  - Educate environmental regulators and safety officials and stakeholders about the continuing need to BIP and the potential hazards associated with encountering UXO.
- Work with environmental regulators and safety officials in applying additional safeguards, when necessary, to ensure the protection of human health and the environment when BIP procedures are used.
- Comply with applicable federal, tribal, state, and local laws, regulations, and agreements and with appropriate DoD explosives safety standards and other applicable DoD policies when managing UXO and other military munitions discovered outside DoD's munitions logistics management system.

➤ Environmental regulators and safety officials will work with DoD to:

- Develop protocols to address the potential environmental effects of employing BIP procedures. Varying site conditions may require such protocols be site-specific.
- Educate the regulatory community and other stakeholders about the potential hazards associated with encountering UXO.
- Educate DoD about location-specific resources and hazards that could impact a BIP decision.