



Cleanup of U.S. Military Munitions: Authorities, Status, and Costs

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Summary

How to address safety, health, and environmental risks from potential exposure to abandoned or discarded military munitions has been a long-standing issue. There has been particular concern among the public about such risks at older decommissioned military properties that have been in civilian use for many years, and at closed military bases still awaiting redevelopment. Many of these properties contain former training ranges and munitions disposal sites where the extent of unexploded ordnance (UXO) and related environmental contamination is not fully understood. The approval of another round of military base closings in 2005 raised additional concerns about munitions risks on certain bases, and whether cleanup challenges may limit their civilian reuse. This report discusses the potential hazards of military munitions and related contamination, the authorities of the Department of Defense (DOD) to address these hazards, the status and costs of cleanup efforts, and issues for Congress.

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Potential Safety, Health, and Environmental Risks

Explosives can remain “live” in munitions and present a safety risk for many years, even decades, after their military use has ceased, especially if munitions are buried and thereby protected from degradation. Munitions used in training exercises do not always detonate upon impact and can burrow beneath the surface where they can remain buried. Munitions that remain on the surface also can be difficult to locate and recover, especially on ranges with dense vegetation that may conceal munitions. The disposal of munitions also can present lingering safety risks if munitions are not properly neutralized and are left intact. Sites where munitions were meant to be destroyed in bulk by open burning or open detonation in earthen pits frequently contain some live munitions. In such cases, certain munitions may not detonate and may be buried by the explosive force of other munitions.

In addition to the more immediate safety risks from explosives, chemical constituents in munitions can leach into the environment and present potential health risks if a “pathway” of exposure is present through the air, soil, groundwater, or surface water. Long-term exposure to contaminants can increase the risks of certain health effects, depending on the nature of a particular contaminant and the duration and concentration of exposure. For example, perchlorate is a common substance used in munitions. There has been increasing attention to the potential health risks of this substance in conjunction with efforts to regulate exposure through drinking water. (See CRS Report RS21961, *Perchlorate Contamination of Drinking Water: Regulatory Issues and Legislative Actions*, by (name redacted).)

Statutory Cleanup Authorities

For many years, DOD addressed potential risks from munitions on former training ranges and disposal sites without a consolidated effort in place to track progress and costs. In response to concerns among states, communities, and environmental organizations about the adequacy of these efforts, Congress included provisions in Sections 311 and 312 of the National Defense Authorization Act for Fiscal Year 2002 (P.L. 107-107),¹ requiring DOD to establish a comprehensive program to identify, investigate, and clean up munitions on former U.S. military training ranges in the United States, including U.S. territories. These provisions also require the cleanup of discarded munitions that were not properly disposed of in the United States, and the cleanup of contaminants leached from munitions into the environment. DOD established a Military Munitions Response Program within its Defense Environmental Restoration Program to fulfill these requirements. Section 312 of the National Defense Authorization Act for Fiscal Year 2003 (P.L. 107-314)² later required DOD to appoint a single official to manage these efforts.

In accordance with the above authorities, the Military Munitions Response Program addresses the cleanup of *former* training ranges and munitions disposal sites on both active and closed military installations in the United States. The cleanup of *operational* training ranges is administered separately as an operation and maintenance activity on an installation-by-installation basis. Relatively little cleanup is performed on operational ranges as long as they *remain* operational. DOD generally clears munitions from its operational ranges to the extent necessary for the safety

¹ 10 U.S.C. 2710 and 10 U.S.C. 2703(b), respectively.

² 10 U.S.C. 2701(k).

of military personnel to gain access to those lands for training. Once munitions are removed from an operational range, they are subject to federal regulations that govern their disposal.³ More extensive cleanup of operational ranges can be required if contaminants leached from munitions migrate off-site and present potential risks to adjacent populations.

The authorities for the Military Munitions Response Program also do not extend to training ranges at U.S. military installations located in other nations. The Status of Forces Agreement between the U.S. government and the government of each nation in which U.S. forces are stationed (i.e., the host nation) generally governs the cleanup of munitions and other hazardous contamination. Under these agreements, the extent to which the U.S. government is held responsible for cleanup at U.S. military installations abroad can vary widely from one nation to another.

Degree of Cleanup Required

Although the above laws authorized the investigation and cleanup of former military training ranges and munitions disposal sites in the United States, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly referred to as Superfund)⁴ generally governs the *degree* of cleanup at individual sites, and *how* cleanup is accomplished. CERCLA also specifies that requirements of the Solid Waste Disposal Act⁵ must be met, which generally applies to disposal facilities operated with permits issued under that latter statute. These laws generally require cleanup decisions to be based on potential risks, and allow multiple types of actions to address those risks, rather than one approach. The Environmental Protection Agency (EPA) and the states are responsible for overseeing DOD's efforts to clean up munitions and related contamination to ensure that applicable requirements of the above statutes are met.

The degree of cleanup required can vary considerably from site to site, depending on the pathways of exposure that would result from the current or anticipated land use, and the means to prevent exposure. For example, munitions may be cleared to a certain depth beneath the surface at some sites, whereas surface clearance only may be performed at others. Regardless of the depth of clearance, removal of a munition often is accomplished not by transporting it from the site, but by detonating it in place, referred to as "Blow in Place" (BIP). Because of the sensitivity of munitions to disturbance, detonation in place often is a safer way to eliminate the explosive risk, rather than unearthing a munition and transporting it elsewhere for disposal. In some cases, restrictions on public access are used to manage potential risks, allowing munitions to be left in place. For example, access restrictions are used at many sites where clearing vegetation to locate munitions would destroy wildlife habitat or plant species protected by federal or state law.

Status of Cleanup

As indicated in **Table 1**, DOD had identified 3,537 sites as of the end of FY2007 on former training ranges and munitions disposal sites in the United States that warranted investigation to

³ 40 C.F.R. Part 266, Subpart M, Military Munitions Rule.

⁴ 42 U.S.C. 9601 et seq.

⁵ 42 U.S.C. 6901 et seq.

determine whether munitions and related contamination were present. Nearly half of these potentially contaminated lands are located on Formerly Used Defense Sites (FUDS), decommissioned before the first consolidated Base Realignment and Closure (BRAC) round in 1988. Many of the FUDS sites are from the World War II era and earlier. Installations closed under the BRAC rounds contained the least number of sites. Most of the other sites are located on active military installations.

In October 2005, DOD promulgated regulations for prioritizing response actions among munitions sites, based primarily on potential risks.⁶ Numerous factors determine the degree of risks at an individual site, such as the type of munitions present, whether munitions are located at or below the surface, the accessibility of a site, the proximity of munitions to populated areas, human health and environmental risks from potential exposure to munitions contaminants, and whether cultural or ecological resources are present. Of the sites identified so far, planned response actions were complete at 920 sites as of the end of FY2007. DOD deemed that response actions likely would not be needed at 470 sites because munitions were not known or suspected to be present, or potential risks were thought to be low enough not to warrant a response. Response actions were under way or planned at 1,113 sites. DOD had not completed or begun its evaluation of potential risks at 1,034 sites. Therefore, much remained uncertain about potential risks at those locations and the actions and funding needed to address those risks.

Table 1. Munitions Site Response Status as of FY2007

Type of Installation	Response Complete	No Response Necessary	Evaluation Pending	Response Planned or Under Way	Total Sites
Active	337	136	700	377	1,550
BRAC	180	11	125	21	337
FUDS	403	323	209	715	1,650
All Installations	920	470	1,034	1,113	3,537

Source: Prepared by CRS using information from the Department of Defense, *Defense Environmental Programs Fiscal Year 2007 Annual Report to Congress*, March 2008, Appendix O, p. O-2-1.

Costs of Cleanup

Funding for the Military Munitions Response Program comes out of multiple defense appropriations accounts. Which account funds a particular site depends on whether the installation is active or closed, and which military branch has jurisdiction over the site. There are five Defense Environmental Restoration Accounts. Three of these accounts are reserved mainly for active installations of the Army, Navy, and Air Force. A fourth account is reserved for defense-wide sites administered primarily by the Defense Logistics Agency. A fifth account is dedicated to FUDS sites, administered by the Army Corps of Engineers. Two BRAC accounts currently fund cleanup at bases closed under each BRAC round. All of these accounts also fund the cleanup of other hazards at non-munitions sites. DOD is responsible for prioritizing and

⁶ 32 C.F.R. Part 179.

allocating monies appropriated to each account to meet competing cleanup needs among contaminated sites.

As indicated in **Table 2**, the amount DOD spent from the above accounts as of the end of FY2007 for the cleanup of munitions was 6% of the total costs that DOD estimated would be needed to complete cleanup at all sites it had identified at that time. The table shows amounts spent on the cleanup of munitions back to FY1997. Prior to that time, the costs to clean up munition sites were not broken out from the costs to clean up other hazards at non-munitions sites. The lack of a breakout of costs for each type of site prior to FY1997 makes it difficult to determine the total funds DOD has expended on munitions cleanup historically.

DOD spent a total of \$1.24 billion from FY1997 through FY2007 on the cleanup of munitions and related contamination at former training ranges and munitions disposal sites it had identified. DOD estimated that another \$19.23 billion would be needed from FY2008 into the future to complete outstanding cleanup actions planned at that time. Cleanup at FUDS sites accounts for 68% of the estimated future costs. Cleanup at active installations accounts for 27% of the estimated future costs. Although BRAC sites account for only 5% of the estimated future costs, communities seeking redevelopment of these properties have emphasized the importance of funding needs at these sites to make them safe for civilian reuse. (See CRS Report RS22065, *Military Base Closures: Cleanup of Contaminated Properties for Civilian Reuse*, by (name red acted).)

Table 2. Munitions Site Response Costs

Type of Installation	Costs Incurred FY1997—FY2007	Estimated Costs FY2008 to Completion	Total Costs
Active	\$209,429,000	\$5,255,062,000	\$5,464,491,000
BRAC	\$326,930,000	\$947,306,000	\$1,274,236,000
FUDS	\$708,549,000	\$13,022,981,000	\$13,731,530,000
All Installations	\$1,244,908,000	\$19,225,349,000	\$20,470,257,000

Source: Prepared by CRS using information from the Department of Defense, *Defense Environmental Programs Fiscal Year 2007 Annual Report to Congress*, March 2008, Appendix O, p. O-2-1.

Note: Dollar amounts reflect cumulative costs of the cleanup process at *individual* munitions sites administered under the Military Munitions Response Program. Although these amounts represent the bulk of the costs, they do not reflect the costs of certain activities at the *program* level, such as management and support costs, and activities that may apply to *multiple* installations. Including these additional activities, the *Department of Defense Fiscal Year 2007 Agency Financial Report* estimated total future costs of \$20.9 billion for the Military Munitions Response Program from FY2008 through site completion. This report did not indicate the total past costs of all related program activities for comparison.

Munitions in Underwater Areas

The above site status and costs focus on the cleanup of former training ranges and munitions disposal sites on land. Munitions also are known or suspected to be present in underwater areas adjacent to some training ranges. In some cases, obsolete or damaged munitions were dumped offshore. Submerged munitions generally have received less attention than munitions on land because of the perceived lower risks of human exposure. Locating and removing munitions underwater also presents greater challenges, making it a more difficult and costlier undertaking

than cleanup on land. Challenges arising from the cleanup of munitions can be multiplied several times when munitions are found underwater. In some cases, removing munitions from underwater areas could present greater risks than leaving the munitions in place and warning individuals to avoid them.

Although the cleanup of munitions in underwater areas has received less attention, there has been rising concern about potential risks, especially in coastal areas where DOD disposed of surplus or damaged munitions. The U.S. Armed Forces disposed of many of these weapons during the World War II era. In response to requirements in Section 314 of the John Warner National Defense Authorization Act for Fiscal Year 2007 (P.L. 109-364), DOD has released more recent information on the past disposal of chemical weapons off U.S. shores.⁷ Congress also has funded a pilot program to identify chemical weapons at known disposal sites off the coast of Hawaii. While concern about potential risks has heightened, locating the weapons at these and other sites would be challenging. The exact coordinates of offshore disposal sites are uncertain, and ocean currents could have moved the weapons over time. If found, removing the weapons could present other obstacles.

Issues for Congress

Members of Congress, states, communities, and environmental organizations have expressed concern about the adequacy and pace of the cleanup of munitions and related contamination at the current inventory of sites, and have questioned whether munitions may be present at other sites not yet identified. The capability of current technologies to locate and neutralize munitions efficiently and effectively also has been an issue. The cleanup of FUDS sites has caused the greatest concern among the public. Many of these properties ceased to be used for military purposes decades ago and have been put to a variety of civilian uses, including residential use in some cases. Potential risks on these lands have motivated desires for greater funding to speed the pace of cleanup. The challenge of cleaning up munitions on closed bases awaiting reuse has motivated interest in greater funding to speed the pace of economic redevelopment to replace lost jobs. There has been less concern among the public about munitions sites on active installations, primarily because these sites pose little, if any, immediate safety risks to the general civilian population. However, some communities adjacent to active installations have expressed concern about health risks from potential exposure to munitions contaminants that may migrate off-site through groundwater.

Some also have questioned whether DOD's estimates of future costs reflect actual funding needs. Uncertainties about the degree of cleanup that will be required at many sites make it challenging to accurately estimate the outstanding costs to complete cleanup. DOD estimates cleanup costs based on its current knowledge of individual site conditions, and its assumptions about the response actions that will be required to close out these sites. DOD revises its cost estimates as more is learned about the type and extent of contamination present at each location, and the actions that federal and state regulators will require to address potential risks. In effect, these estimates are "moving targets" that change as more information becomes available to project the costs of future actions.

⁷ Department of Defense. *Defense Environmental Programs Fiscal Year 2007 Annual Report to Congress*. March 2008. Appendix S, Sea Disposal of Military Munitions, pp. S-1—S-15.

Considering that many sites are not evaluated and that additional sites could be identified in the future, DOD's most recent assumptions of the resources that may be necessary to address cleanup challenges could differ from what may be required. Actual costs could be higher than estimated, if more munitions and contamination are discovered than expected, and more extensive cleanup is needed than anticipated. New or more stringent cleanup standards also could cause costs to rise. Whether more attention is given to munitions in underwater areas is another factor that could contribute to the possible need for greater resources to meet cleanup needs. On the other hand, the development of more cost-effective technologies to locate and neutralize munitions, and clean up related contamination, could help to control costs. The effect of inflation over time also could cause actual costs to differ from current estimates.

In carrying out its statutory authorities, DOD continues to work with federal and state regulators to determine the degree of cleanup that is warranted to protect human safety, health, and the environment. As this process unfolds, more information will become available to assess the resources needed to address potential risks, both in terms of appropriations by Congress and the capabilities of munitions cleanup technologies.

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