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# THE MILITARY MUNITIONS RESPONSE PROGRAM

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DoD is focusing on developing and implementing an effective program for dealing with an environmental, health and safety issue peculiar to the military—unexploded ordnance, military munitions and chemical residue of munitions at both closed, transferring and transferred ranges and at operational ranges, where environmental concerns can have an impact on training activity. This area presents a number of special challenges, which can only be met by a carefully designed program which can define the scope of the problem and address the solution.

*John Paul Woodley, Jr., Assistant Deputy Under Secretary of Defense (Environment)*

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The use of munitions, whether in active military operations or in training to support force readiness, is at the core of the U.S. Military's mission. Munitions use in support of force readiness has three primary components—training military personnel, evaluating new or improved munitions, and munitions production. One result of decades of military training, weapons systems testing, and munitions production is the presence of unexploded ordnance (UXO), discarded munitions, and munitions residue on ranges where training and testing occurred. The disposal of excess, obsolete, or damaged munitions, which occurred from time to time outside the formal demilitarization process, also has resulted in similar conditions at other locations on Department of Defense (DoD) installations.

When troops in the Armed Forces complete training and testing of equipment on defense sites, UXO, discarded military munitions, and munitions constituents are sometimes left behind. This is the situation on many defense sites where DoD no longer plans to test or use military munitions. Over the past several years, environmental issues related to munitions and

ranges have gained increased visibility across DoD. The information in this report fulfills Congress' interim reporting requirements on DoD's activities at munitions response sites as defined in the FY02 National Defense Authorization Act.

Since the inception of the Installation Restoration program (IRP), DoD has addressed the environmental concerns associated with explosive contaminants at munitions manufacturing and processing sites, as well as responses for military munitions incidental to IRP work. DoD will continue to conduct some incidental munitions response activities under the IRP. Sites within the recently established Military Munitions Response program (MMRP), however, are those where the firing or disposal of munitions has occurred during training exercises and were not addressed under the IRP. The primary concern at these sites is safety from explosive hazards.

DoD's challenge in responding to military munitions is to—

- ❑ Protect workers and the public from explosive safety hazards
- ❑ Identify where and how much of this material is still present at these sites

- ❑ Determine the level of risk to human health and the environment present
- ❑ Set priorities for conducting any necessary response actions
- ❑ Develop and implement improved technologies
- ❑ Conduct all required response actions
- ❑ Ensure the timely transfer of excess land to allow for alternative uses.

Among the advances in the Defense Environmental Restoration Program (DERP) is the creation of a new sub-program to address the challenges of conducting munitions responses to address UXO, discarded military munitions, and munitions constituents at sites where the firing or disposal of munitions has occurred and was not addressed under the IRP. DoD established the management structure and initial program requirements for the MMRP in the September 2001 *Management Guidance for the Defense Environmental Restoration Program*. Through making military munitions responses an integral part of the DERP, DoD will apply many of the existing program management elements used in the IRP. For example, the comprehensive Management Action Plan at each installation will be updated to include information on the requirements, plan, schedule, and costs associated with each munitions response site at the installation. In addition to defining the essential requirements for military munitions responses, the Department, through the Management Guidance—

- ❑ Established a requirement to identify through an inventory, to be completed by September 30, 2002, all locations other

than operational ranges that require a military munitions response

- ❑ Defined how the new Program Element was established due to the need for military munitions response
- ❑ Defined the data elements necessary to develop credible cost estimates and support the MMRP
- ❑ Established the requirement to identify, characterize, track and report data on military munitions and military munitions responses in a manner that is compatible with the IRP, and which supports inclusion in the Restoration Management Information System (RMIS) database.

As understanding of the safety and environmental hazards at these sites proceeds, the Department will introduce appropriate requirements for program progress and methods for measuring that progress.

DoD established the MMRP to better reflect the statutory program goals established for the DERP, to enhance the understanding of the nature of munitions response sites, and to manage response activities more effectively. The DERP is intended to address environmental problems remaining from past practices. Consequently, the MMRP will not cover munitions responses for areas that operated after fiscal year 2002. This approach should promote



**RMIS Data Element Dictionary**  
<http://www.dtic.mil/envirodod/re/risk/appendb.html>

improved life-cycle management of munitions and ranges.

Parallel with the creation of this new MMRP, DoD has created new sections in this FY01 DERP Annual Report to Congress. This chapter is included specifically to discuss DoD's plans and satisfy these new congressional requirements in the FY02 National Defense Authorization Act. Appendix C is fashioned after Appendix B, or the 'B-Tables,' which provides remediation status and costs for sites impacted by more "traditional" contaminants. The C-Tables contain a series of 11 tables that provide similar information for MMRP sites. DoD will continue to develop and

enhance the MMRP and its presentation in the DERP Annual Report to Congress in the coming years.

## Congress Understands the Need for Munitions Response

Reinforcing the importance of DoD's initiatives, Congress set similar requirements for DoD in the FY02 National Defense Authorization Act. In Sections 311-313, DoD is directed to—

- Develop and maintain an inventory of defense sites



### FOCUS ON THE FIELD:

## ***Novel Public Involvement Approach Solicits Wide-Spread Interest***

The U.S. Army Corps of Engineers (USACE) used a novel approach for public involvement in FY01 by developing a UXO Safety Awareness video in cooperation with the San Diego, California school system. The video was created in response to recurring reviews at the formerly used defense site, Camp Elliot, in the Tierrasanta community of San Diego.

After evaluating the site, USACE concluded that the technical response efforts protected human health and the environment. However, they recommended reviving several types of public UXO safety awareness initiatives. Many of these initiatives specifically targeted local schools and neighborhood children because officials were concerned that these children could come into contact with military munitions, particularly UXO, in the canyons of Tierrasanta where there are numerous biking, hiking and jogging trails, and children are known to play.

The Tierrasanta Community Council had made a UXO Safety Awareness video many years ago, but it was out of date. USACE and the San Diego Schools decided to produce a new video that would "star" local students. The video tells the story of a student's encounter with potential UXO, and the appropriate response method—"Do not touch, mark the area, and report to local authorities." The video also includes messages from a local official and the Fire Department, which is responsible for ordnance response calls.

The video was a joint production of USACE, its contractor, the city schools, local officials, and emergency response personnel, and has generated interest from several other government agencies, including the U.S. Navy, as a new approach to increasing community involvement.

- ❑ Develop a site prioritization protocol to apply to defense sites
- ❑ Establish a new program element to specifically address munitions
- ❑ Report in the DERP Annual Report to Congress on the remediation plans, costs, and technologies used in conducting munitions responses.

DoD is working to respond to Congress' requests.

First, the Military Components are working to identify all locations that require a munitions response and to gather the specific data needed for site prioritization, program planning, and response execution. DoD has already expanded the RMIS to capture the data elements for the MMRP required in the DERP Management Guidance. Additionally, DoD's RMIS Work Group is evaluating whether or not additional data elements are needed in the RMIS to

sufficiently address the congressional requirements in Section 311 of the FY02 National Defense Authorization Act.

To most effectively manage the MMRP, DoD is developing a site prioritization protocol for assigning relative priorities for addressing munitions response sites. Section 311 of the FY02 National Defense Authorization Act lists specific factors that may be considered in developing the prioritization protocol. DoD is seeking early input from the public, EPA, states, federal land managers, and tribes on these and other factors to consider and how the protocol should incorporate these factors. DoD will also request input from the public on the proposed site prioritization protocol when it is available for review in 2002. After the protocol is finalized,



**Military Munitions Site  
Prioritization Protocol**

<https://www.denix.osd.mil/MMRP>

**DoD may consider these and other factors in its development of the site prioritization protocol—**

- ❑ Known, versus suspected, presence of munitions or constituents
- ❑ Types of munitions or constituents
- ❑ Presence/effectiveness of public access controls
- ❑ Potential for direct human contact and evidence of people entering the site
- ❑ Status of any response actions at the site
- ❑ Planned or mandated dates for transfer of the site from military control
- ❑ Extent of any documented incidents (e.g., explosions, discoveries, injuries, reports, and investigations)
- ❑ Potential for drinking water contamination or the release of munitions constituents into the air
- ❑ Potential for destruction of sensitive ecosystems and damage to natural resources
- ❑ Additional factors as suggested by stakeholders.

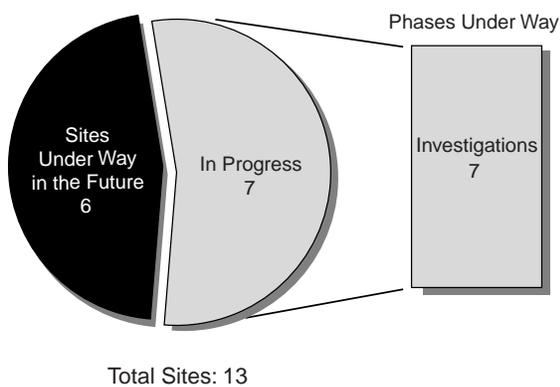
the Department will apply it to the sites in the inventory.

## Munitions Response Site Status

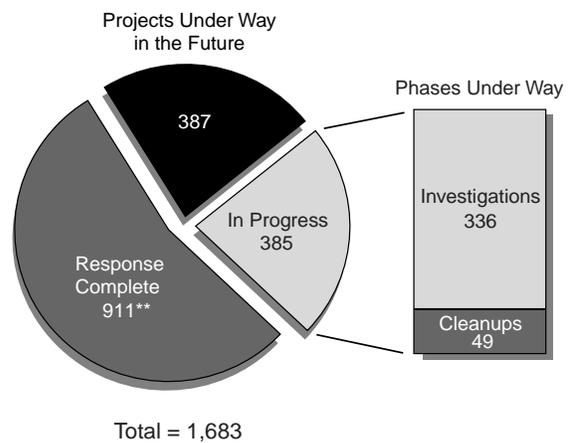
As is the case in the IRP, sites are categorized according to their status in the response process—undergoing investigation or cleanup (in-progress), awaiting future work, or having achieved response complete (RC) status—as of

the end of FY01. Figures 31, 32, and 33 illustrate the status of MMRP sites at active and BRAC installations and FUDS properties, respectively. The number of MMRP sites at active installations is expected to grow as the inventory is completed and specific sites are delineated. Addressing munitions response projects on FUDS properties has been a high priority for the Department, as it no longer owns these properties and cannot ensure the public is protected from the safety hazards that may be

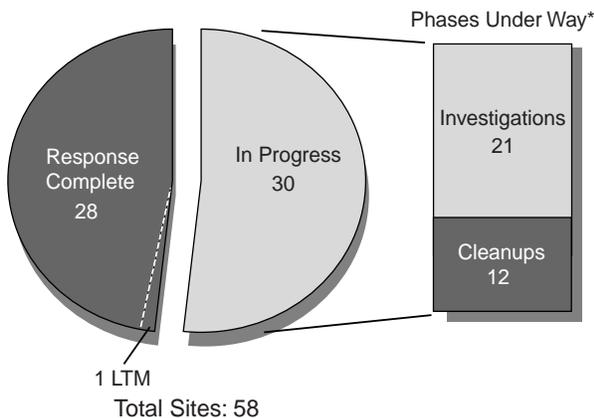
**Figure 31**  
**Active Installations MMRP Site Status**  
(as of September 30, 2001)



**Figure 33**  
**FUDS Properties MMRP Site Status**  
(as of September 30, 2001)



**Figure 32**  
**BRAC Installations MMRP Site Status**  
(as of September 30, 2001)



\*\*Includes 240 sites that have no response complete dates but which were declared No DoD Action Indicated by FUDS.

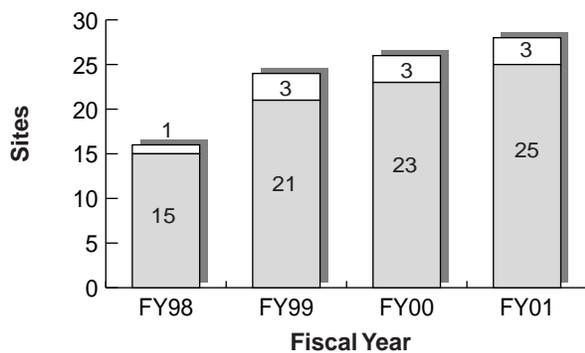
\*Phases Under Way may not add up to Sites in Progress because some sites have multiple phases under way.

present. As reflected in the following figures, DoD has conducted a significant amount of work on FUDS properties to tackle these issues. Since DoD controls access to munitions response sites on its installations, potential for public exposure to explosive safety hazards is much lower than at FUDS properties. DoD will identify and address additional munitions response sites at active and BRAC installations as it increases the focus on these areas in the future.

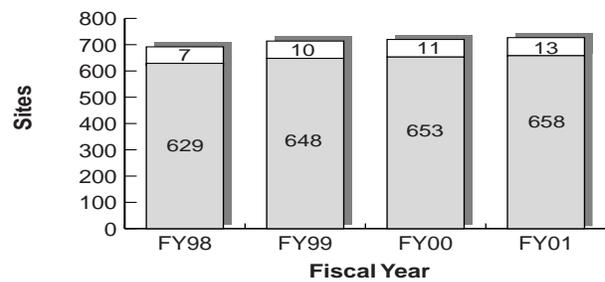
Figures 34 and 35 show the number of BRAC sites and FUDS projects that have achieved RC over the last four fiscal years. Sites that reached RC directly from investigation were found not to pose a risk that required a munitions response. No munitions response sites on active installations have reached the RC milestone.

DoD conducts interim actions to mitigate immediate risks to human health and the

**Figure 34**  
**BRAC Sites With Response Complete**

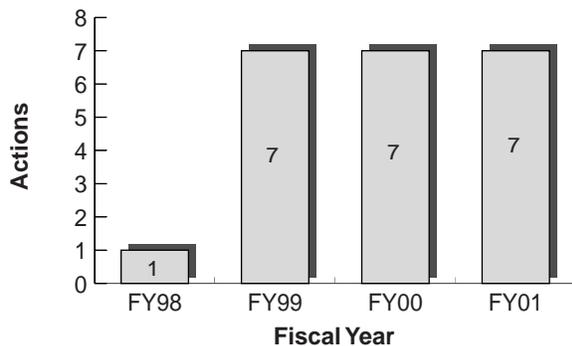


**Figure 35**  
**FUDS Projects With Response Complete**

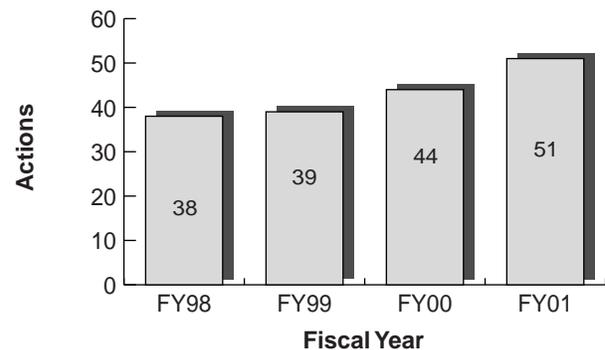


Sites reaching Response Complete from Cleanup  
 Sites reaching Response Complete directly from Investigation

**Figure 36**  
**Cumulative Interim Actions Completed at BRAC Sites**



**Figure 37**  
**Cumulative Interim Actions Completed at FUDS Projects**



environment. Figures 36 and 37 illustrate the number of interim actions completed at munitions response sites on BRAC installations and FUDS properties. DoD has not completed any interim actions at active installations.

Figure 38 shows DoD’s estimated annual funding requirements for response activities by phase. As the MMRP develops and new sites are identified, DoD’s cost-to-complete estimates will expand to provide a more accurate picture of program requirements. DoD plans to increase spending at its munitions response sites as site cleanup requirements are identified.

Figure 39 shows DoD’s estimated cost to complete munitions response site activities by phase category and Component. DoD develops cost estimates by site. Army and the Defense Logistics Agency (DLA) have not yet identified munitions response requirements at a site-level on their active installations. Air Force is still developing its program and revising management tools to capture the total Air Force MMRP. Army is the only Component that has identified response requirements at a site-level on BRAC installations. As additional information and requirements are identified, DoD will have the

**Figure 38**  
**Active Installation and FUDS Property Cost-to-Complete Estimates**  
**by Phase Category, FY02-Complete\***  
 (in \$000)

Phase	FY02	FY03	FY04	FY05	FY06	FY07	FY08- Complete
<b>Investigation</b>	27,257	30,046	19,312	2,910	7,400	21,753	835,427
<b>IRA</b>	2,936	1,447	2,355	6,378	1,560	777	1,826
<b>RD</b>	181	1,331	3,868	6,473	12,617	9,287	44,330
<b>RA-C</b>	18,861	31,658	41,456	56,880	51,520	42,127	12,381,722
<b>RA-O</b>	0	0	0	0	5	5	1,452
<b>LTM</b>	183	1,618	116	128	962	1,815	708,379
<b>Total</b>	<b>49,418</b>	<b>66,100</b>	<b>67,107</b>	<b>72,769</b>	<b>74,064</b>	<b>75,764</b>	<b>13,973,136</b>

\*Does not include program management, DTRA, other miscellaneous costs, and IRP funding. IRP funding is shown in Chapter 3 of this report.

**Figure 39**  
**Active Installation and FUDS Property Cost-to-Complete Estimates**  
**by Phase Category and Component, FY02-Complete\***  
 (in \$000)

Phase	Army	Navy	Air Force	DLA	FUDS	Total
<b>Investigation</b>	0	12,508	5	0	931,592	944,105
<b>IRA</b>	0	14,076	0	0	3,203	17,279
<b>RD</b>	0	603	0	0	77,484	78,087
<b>RA-C</b>	0	45,952	5	0	12,578,267	12,624,224
<b>RA-O</b>	0	1,452	10	0	0	1,462
<b>LTM</b>	0	1,648	349	0	711,204	713,201
<b>Total</b>	<b>0</b>	<b>76,239</b>	<b>369</b>	<b>0</b>	<b>14,301,750</b>	<b>14,378,358</b>

\*Does not include program management, DTRA, other miscellaneous costs, and IRP funding. IRP funding is shown in Chapter 3 of this report.

**Figure 40**  
**BRAC Installation Cost-to-Complete Estimates**  
**by Phase Category, FY02-Complete\*\***  
(in \$000)

Phase	FY02	FY03	FY04	FY05	FY06	FY07	FY08 - Complete
<b>Investigation</b>	6,741	1,732	572	322	322	72	605
<b>IRA</b>	0	0	0	0	0	0	0
<b>RD</b>	210	0	0	0	0	0	524
<b>RA-C</b>	13,202	11,570	6,746	10,129	10,729	9,538	319,364
<b>RA-O</b>	0	0	0	0	0	0	652
<b>LTM</b>	68	120	373	638	368	493	3,467
<b>Total</b>	<b>20,221</b>	<b>13,422</b>	<b>7,691</b>	<b>11,089</b>	<b>11,419</b>	<b>10,103</b>	<b>324,612</b>

\*Does not include program management, DTRA, other miscellaneous costs, and IRP funding. IRP funding is shown in Chapter 3 of this report.  
\*\*Navy is funding military munitions response activities for Adak Naval Air Facility, Mare Island Naval Shipyard, and South Weymouth Naval Air Station with BRAC IRP funding. This funding is reflected in Appendix B of this report.

**Figure 41**  
**BRAC Property Cost-to-Complete Estimates**  
**by Phase Category and Component, FY02-Complete\*\***  
(in \$000)

Phase	Army	Navy	Air Force	DLA	FUDS	Total
<b>Investigation</b>	10,366	0	0	0	0	10,366
<b>IRA</b>	0	0	0	0	0	0
<b>RD</b>	734	0	0	0	0	734
<b>RA-C</b>	381,278	0	0	0	0	381,278
<b>RA-O</b>	652	0	0	0	0	652
<b>LTM</b>	5,527	0	0	0	0	5,527
<b>Total</b>	<b>398,557</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>398,557</b>

\*Does not include program management, DTRA, other miscellaneous costs, and IRP funding. IRP funding is shown in Chapter 3 of this report.  
\*\*Navy is funding military munitions response activities for Adak Naval Air Facility, Mare Island Naval Shipyard, and South Weymouth Naval Air Station with BRAC IRP funding. This funding is reflected in Appendix B of this report.

information necessary to develop more defined cost estimates. Figures 40 and 41 show BRAC cost-to-complete estimates by phase category and by phase category and Component, respectively.

Figures 42 and 43 show each Component's planned ER and BRAC funding for activities at munitions response sites for FY00, FY01, FY02, and FY03.

## Technology for Munitions Responses

At munitions response sites, DoD must address both the explosives risks posed by UXO and

discarded munitions and any toxicological hazards posed by munitions chemical constituents that may have also been released. Because the fundamental basis of the risk is different, different approaches must be taken to address each risk. For this reason, DoD is diligently pursuing advances in technology to detect and remove military munitions and remediate the hazards associated with these munitions and their chemical constituents.

As requested by Congress, the following section details the Department's initiatives to develop new technologies and assess the cost impacts of those technologies.

**Figure 42**  
**Planned Investments for Munitions Response at Active Installations and FUDS Properties, FY00-FY03**  
 (in \$000)

ER	FY00	FY01	FY02	FY03
<b>Army*</b>	10,000	10,042	10,000	10,000
<b>Navy**</b>	3,000	3,000	8,000	8,000
<b>Air Force</b>	25	600	1,153	400
<b>FUDS</b>	54,733	52,939	64,073	70,100
<b>Sub Total</b>	<b>67,758</b>	<b>71,804</b>	<b>83,226</b>	<b>88,500</b>

**Figure 43**  
**Planned Investments for Munitions Response at BRAC Installations, FY00-FY03**  
 (in \$000)

BRAC	FY00	FY01	FY02	FY03
<b>Army</b>	19,241	38,347	20,221	13,422
<b>Navy***</b>	13,096	1,910	7,422	18,649
<b>Air Force</b>	0	0	0	0
<b>Sub Total</b>	<b>32,337</b>	<b>40,257</b>	<b>27,643</b>	<b>32,071</b>

\*In addition to Environmental Restoration (ER) account investments, Army executed \$30.2 million in FY00 and \$12.0 million in FY01 in the Operations & Maintenance (O&M), Army Appropriation at Massachusetts Military Reservation (MMR). Army will execute \$35.9 million and \$76.2 million in FY02 and FY03, respectively, in the O&M, Army Appropriation at MMR.

\*\*In addition to ER investments, Navy executed \$34.8 million in FY00 and \$60.0 million in FY01 in the O&M, Navy Appropriation at Kaho'olawe. Navy will execute \$67.0 million and \$25.0 million in FY02 and FY03, respectively, in the O&M, Navy Appropriation at Kaho'olawe.

\*\*\*Navy is funding military munitions response activities for Adak Naval Air Facility, Mare Island Naval Shipyard, and South Weymouth Naval Air Station with BRAC IRP funding. This funding is reflected in Appendix B of this report.

## The Framework for Understanding Munitions Response Technology

To provide a framework for discussing munitions response technologies, the Department first developed a conceptual framework to describe those technologies that specifically address munitions. This framework reflects input from a number of internal and external organizations. DoD is also working to develop a similar framework for addressing munitions constituents. Because of certain similarities with other remediation efforts, this framework will likely reflect the methodologies to address chemical and radiological releases.

The framework that addresses munitions technology is summarized in Figure 44. It reflects the activities performed by the technology and is organized according to the munitions response process. In summary, a munitions response entails the following phases—

- ❑ Identification phase, in which site access issues, such as vegetation removal and site security, are resolved, or land use controls are implemented to restrict access or future use
- ❑ Characterization or investigation (i.e., study) phase, in which wide area screening, detection, discrimination, and data evaluation occurs
- ❑ Remedial action (including interim action) phase, in which the munitions are recovered, identified, and safely neutralized or destroyed
- ❑ Long-term management phase, in which any residuals of munitions destruction are managed and other long-term management activities occur.

In addition to providing a common frame of reference, classification of the technologies by phase in the response process provides a basis for

**Figure 44**  
**Technology Categories for Munitions**

Phase of Response		Technology categories		
Site Identification	Site Access			
Site characterization	Wide area screening	Detection	Discrimination	Data analysis
Remedial Action	Recovery	Identification	Neutralization	Destruction
Post response	Residuals management	Long-term stewardship		

comparing costs between the current technology and a new or alternative technology.

### Developing a “Baseline” for Munitions Response Technologies

In the coming year, the Department plans to undertake a study of the technology commercially available in ongoing munitions responses. The plan for this study is currently under development. This study provides DoD an opportunity to further expand, refine, and validate the information used in advancing the Department’s strategy for technology development. While the specific details have not been finalized, the study will involve—

- ❑ Using the frameworks for addressing munitions and munitions constituents, the Department will determine the specific information required to adequately describe the uses, operational characteristics, and effectiveness of the current technologies
- ❑ Assessing technology that is commercially available, emerging, and under development

- ❑ Evaluating the data reported in the next Annual Report to Congress.

The presentation of this information in next year’s Annual Report to Congress will include a narrative discussion of the study effort, a summary of information collected, and a discussion of the results of analyses that are performed.

### The Development and Use of Improved Technology in Munitions Responses

The Department’s report titled “Unexploded Ordnance Response: Estimated Costs and Technology Investments” (March 2001) presented information on the complex challenges associated with conducting munitions responses. It also discussed the Department’s plans to continue its significant investment in advancing the state of munitions response technology. As noted in that report, the Department faces many complex scientific and technological challenges in conducting munitions responses. To date,

technology development and investment efforts to address these challenges have focused on technologies related to site characterization. Specifically, the focus was on improving the systems that accurately detect and localize munitions, and the system to discriminate munitions from other materials. With these focused efforts now showing positive results, the Department is preparing to expand its technology development and investment efforts to address the hardware, methods, and scientific understanding necessary to address other aspects of munitions responses.

### Goals and Developmental Objectives for Munitions Response Technologies

In general, the goals and objectives for the Department's continuing investment in munitions response technology are specific to the materials being addressed. For technologies that address the munitions, the goals and objectives are to—

- ❑ Contribute to overall protection of human health and the environment
- ❑ Develop more effective and efficient technologies for conducting site characterization
- ❑ Significantly increase the probability of detecting and accurately geo-referencing munitions, while simultaneously making a major improvement in the ability to discriminate munitions from other non-hazardous metal objects
- ❑ Improve the effectiveness of systems used to recover, identify, and safely destroy munitions
- ❑ Increase the applicability of these systems to a diverse set of geographic applications

- ❑ Improve understanding in the fundamental science of munitions response technologies (e.g., gaining a better understanding of the effect of munitions on geophysical parameters such as magnetic fields).

For technologies to address munitions constituents, the Department's goals and objectives are to—

- ❑ Advance the understanding of the identity, nature, and concentration of the compounds emitted as a result of munitions use or the presence of munitions in the environment
- ❑ Improve understanding of the mechanisms that allow those munitions constituents that are emitted to migrate through the environment
- ❑ Develop effective and highly specific sampling and analytical techniques to identify and quantify munitions constituents
- ❑ Increase the knowledge base on the health and environmental effects of munitions constituents
- ❑ Develop new or modify existing technologies to enhance remediation of munitions constituents.

### Investment Oversight

While each of the Military Components has an environmental quality technology research, development, test, and evaluation (RDT&E) program to meet their specific needs, the Office of the Secretary of Defense (OSD) and various organizations within DoD are the primary organizations managing the Department's munitions response technology investment

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strategy. The two principal OSD investment programs are the Strategic Environmental Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP). These programs work with the Components, various regulatory agencies, industry representatives, leading universities, government and corporate research laboratories, and other stakeholders to determine specific areas for technology investment. In addition to these OSD programs, the Army, as lead Service for UXO technology development, is investing in research to improve signal processing from various detection and discrimination hardware systems.

The organizations involved in overseeing and implementing the munitions response technology investment strategy also work closely with the Joint Unexploded Ordnance Coordination Office (JUXOCO). The JUXOCO mission is to coordinate and leverage investments in munitions response technology with investments occurring in related mission areas, such as countermine, humanitarian demining, active range clearance, and explosives ordnance disposal. Through this interaction, the Department seeks to leverage and optimize our overall investment in these technologies.

### *Identifying Needed Technology Investments*

The Department recognizes the need for new environmental technologies. DoD is challenged with supporting its mission, while remaining in compliance with federal, state, and local regulations, and fulfilling its environmental stewardship responsibilities. When a need cannot be fulfilled using existing technology, DoD begins an extensive and thorough process of identifying

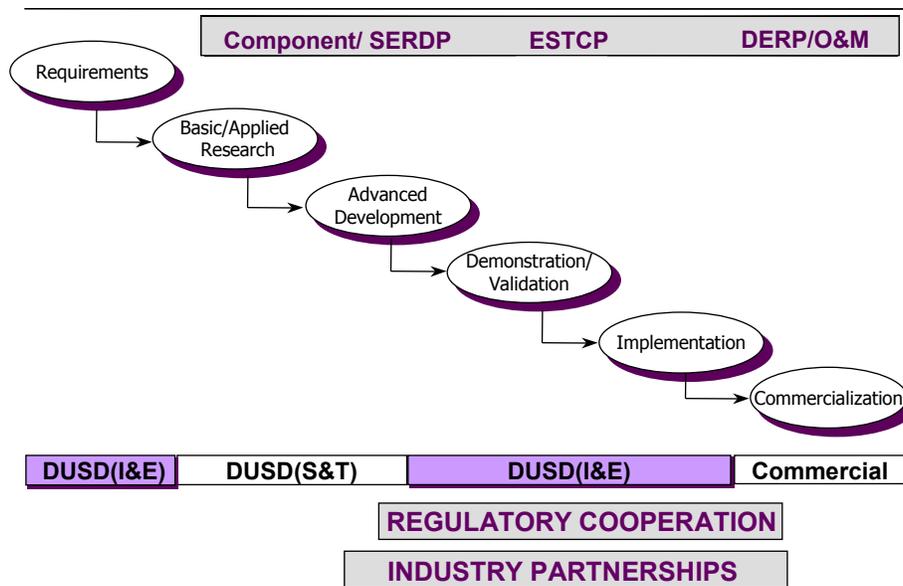
needs and setting requirements for the technology; evaluating, selecting, and funding projects; and undertaking the developmental effort. Figure 45 illustrates the technology development process, including stages of development, oversight organizations, and sponsorship for each stage.

### *Transitioning Technology to the End User*

One of the problems associated with advancing the use of new technologies is moving the technologies from the RDT&E arena to the field (i.e., private industry and munitions response project managers). For these new technologies to be deployed, the contractors who perform the majority of the munitions response must sometimes make significant capital investments to acquire and deploy these systems. For this to occur, these firms need information to allow them to make reasoned business investments. Such information includes the applicability of particular technologies in upcoming projects, the effectiveness of the technology at meeting specific needs, and some assurance that the broad community of stakeholders understands and accepts these newly developed technologies.

DoD is examining various means to address the challenges related to effectively transitioning munitions response technologies to the end users. One such means is the Department's partnership with the Interstate Technology Regulatory Cooperation (ITRC), a state-led coalition working with government, industry, and other stakeholders to achieve regulatory acceptance of new technologies. Within ITRC, a working group is focused on issues related to munitions responses and advancing the

**Figure 45**  
**Technology Development Process**  
**Technology Development Process**



state of the technology used in conducting those responses.

*Assessing the Cost Impact of New Technology in the Munitions Response Program*

DoD is assessing the cost impact of new technologies. Such an assessment will require several steps—

- ❑ Determining the specific variable(s) in the cost estimating methodology affected by a technology
- ❑ Determining, based on performance data, the degree to which a given technology changes the values assigned to its associated variable

- ❑ Comparing the costs with the baseline technology and again with the new technology and comparing the results.

The Department is currently collecting the data needed for developing new technologies. Once the data is collected, the Department can undertake the cost impact analysis.

In addition to the information provided in this report, a comprehensive discussion of the Department’s efforts in the area of environmental technology is provided in the Defense Environmental Technology Program Annual Report. That report is prepared by the Department and provides more detail on the structure and execution of the Department’s environmental technology program, as well as

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information on specific investments in pollution prevention, compliance, natural resource management, and environmental restoration technologies.



The ability to improve the lifecycle management of munitions and ranges is complicated by the need to rectify problems resulting from past practices, changes in the military's mission, and changes in the overall societal views that shape the environment in which the military operates.

The Department's experience over the past few decades has shown there are many significant scientific, policy, and technical challenges in

responding to military munitions, specifically unexploded ordnance and waste military munitions. Further understanding of these challenges will grow as more is learned about this area. Throughout the response process, as the investigations proceed, technical challenges are resolved, and response requirements are identified, the Department will work with all stakeholders to find solutions to ensure that appropriate actions are taken to protect the public and the environment from the hazards associated with these sites.