United States
Environmental Protection
Agency

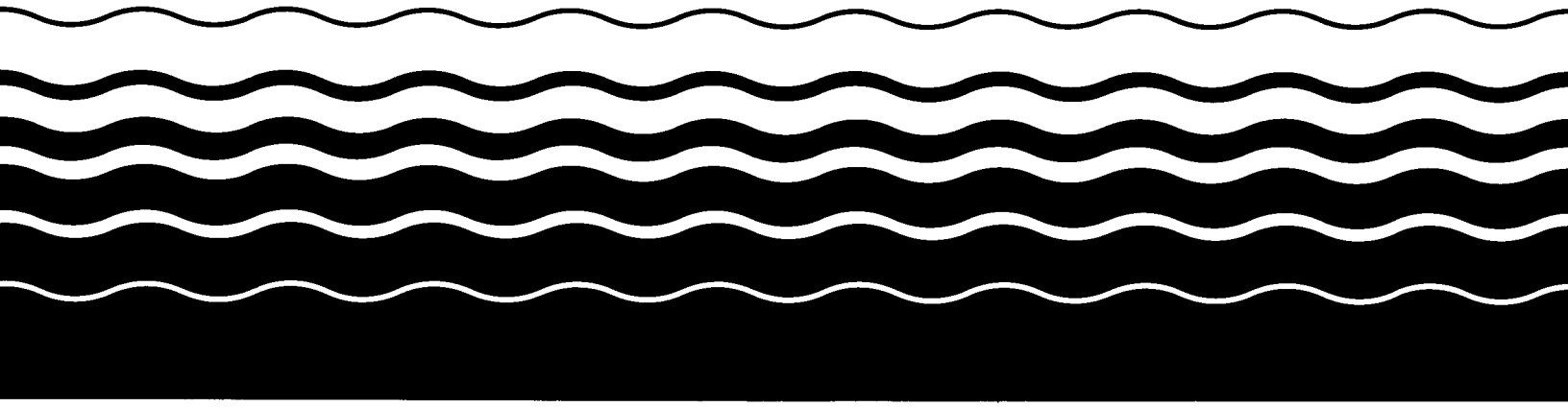
Office of Solid Waste and
Emergency Response
Washington, DC 20460

EPA-505-R-00-01
September 2000

EPA

Used or Fired Munitions and Unexploded Ordnance at Closed, Transferred, and Transferring Military Ranges

Report and Analysis of EPA Survey Results



Disclaimer

The information in this report is based on narrative responses to a survey of EPA Regional Offices conducted in the fall and winter of 1998-99. The survey instrument consisted of open-ended questions and made no attempt to statistically survey the Remedial Project Managers with range responsibilities. As such, the results of the survey represent a snapshot of information available from those who participated in the survey. Finally, the reader should be aware that the report and its contents do not represent official EPA policy.

Acknowledgments

The Federal Facilities and Reuse Office (FFRRO) wishes to acknowledge the support the EPA Regions and the Regional Project Managers for their participation in this survey effort. The information provided by EPA Regional staff has provided previously unavailable insight into the management of unexploded ordnance (UXO) at closed, transferred, and transferring ranges. In addition, FFRRO acknowledges the contributions of Douglas Bell in the development and application of the survey. EPA FFRRO is grateful for this support.

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Overview

In the fall of 1998, the Federal Facilities Restoration and Reuse Office of the Environmental Protection Agency (EPA) surveyed Regional Remedial Project Managers (RPMs) to assess the number and types of closed military munitions ranges that may have the potential to create an imminent and substantial endangerment to the public health and welfare or to the environment. The survey was prepared in response to the increasing number of requests by States, tribes, and other stakeholders that EPA assist with a wide array of issues associated with unexploded ordnance (UXO) at closed, transferred, and transferring (CTT) military ranges.

The completed surveys referenced in this report represent 61 facilities, with at least 203 CTT and inactive ranges. Although this is a small portion of the actual number of CTT and inactive ranges nationwide, the information pertaining to the ranges in this survey is important since these ranges represent the beginning of what will be a very large environmental assessment and cleanup effort.

The survey on which this report is based consisted of 20 multiple-part questions (Appendix A-1), which were designed to capture the wide variety of situations in which the EPA Regions are now involved and to present opportunities for respondents to provide site-specific information. The wide array of responses reflects the complex regulatory framework within which UXO is managed at CTT ranges, as well as a wide variety of environmental settings and contamination scenarios. As a result, these responses are subject to interpretation and must be viewed as a starting point for developing a better understanding of activities at CTT ranges.

The survey results were utilized (in part) to identify issues of concern to EPA at CTT ranges as described in a letter dated April 22, 1999, from Tim Fields, EPA Assistant Administrator at the Office of Solid Waste and Emergency Response, to Sherri W. Goodman, Deputy Under Secretary of Defense (Environmental Security). (See Appendix G.) In addition, survey results were used in part as input to DoD and EPA Management Principles for Implementing Response Actions at Closed, Transferring, and Transferred Ranges (see Appendix H).[1]

Report Organization

This report is divided into seven chapters and an Appendix. The seven chapters provide background and analysis of each substantive area covered by the survey. The Appendix provides the survey methodology, data tables that support the major findings in the report, and background documentation about the CTT range issues of concern to the regulatory community.

[1]DoD and EPA, Interim Final Management Principles for Implementing Response Actions at Closed, Transferring, and Transferred Ranges, March 7, 2000.

1.0 INTRODUCTION

1.1 Purpose

In the fall of 1998, the Federal Facilities Restoration and Reuse Office of the Environmental Protection Agency (EPA) surveyed Regional Remedial Project Managers (RPMs) to assess the number and types of closed military munitions ranges that may have the potential to create an imminent and substantial endangerment to the public health and welfare or to the environment. This report summarizes the results of the survey and identifies questions and issues.

1.2 Background

1.2.1 The Challenge

As DoD's downsizing and base closure activities have increased in recent years, large numbers of military properties are being turned over to non-DoD ownership and control. Former military ranges may pose unique risks as many of these areas are converted to new uses. When necessary, investigation and remediation of used or fired munitions, UXO, and other contamination will be initiated to provide adequate protection of human health and the environment at these facilities. Current estimates of potentially affected acreage are incomplete. In 1997, the Joint Unexploded Ordnance Steering Group estimated that 1,900 formerly used defense sites were known or suspected to contain UXO and that 130 Base Realignment and Closure Commission (BRAC) sites require review for potential UXO.[2, 3] In April 1998, the Defense Science Board estimated that over 15 million acres of land in the United States are potentially contaminated

Types of military munitions discussed in this report:

Used or Fired Military Munitions are those military munitions that (1) have been primed, fused, armed, or otherwise prepared for action, *and* have been fired, dropped, launched, projected, placed, or otherwise used; (2) are munitions fragments (e.g., shrapnel, casings, fins, and other components, to include arming wires and pins) that result from the use of military munitions; or (3) are malfunctions or misfires.

The term **Unexploded Ordnance, or UXO**, means military munitions that have been primed, fused, 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 remain unexploded either by malfunction, design, or any other cause.

Source: Military Munitions Rule (40 CFR Part 266.201)

[2]Formerly used defense sites (FUDS) are areas that have been transferred to other Federal agencies, State, or local governments, or private citizens and are no longer in DoD ownership.

[3]Report to Congress. Unexploded Ordnance Clearance: A Coordinated Approach to Requirements and Technology Development. March 25, 1997. Page 10.

with UXO.[4] Contradictory estimates from a number of sources exist. These preliminary estimates will likely be revised as more data are gathered. However, all estimates are consistently large.

Military munitions are defined by DoD as all ammunition products and components produced or used by or for DoD or the U.S. Armed Services for national defense and security. Environmental and safety concerns at CTT ranges are derived from two sources: metal fragments (remnants of

Key definitions that will help you understand this report

Range - any land mass or water body that is or was used for conducting training, research, development, testing, or evaluation of military munitions or explosives.
Active Range - a range that is currently in operation, construction, maintenance, renovation, or reconfiguration to meet current DoD component training requirements and is being regularly used for range activities.
Inactive Range - a range that is not currently used but is still under military control, is considered by the military to be a potential range area, and has not been put to a new use incompatible with range activities.
Closed Range - a range that has been taken out of service and either has been put to new uses that are incompatible with range activities or is not considered by the military to be a potential range area. Closed ranges remain under the control of the military.
Transferring Range - a military range that is proposed to be leased or transferred from DoD to another entity. An active or inactive range will not be considered a "transferring range" until the transfer is imminent.
Transferred Range - a range that has been released from military control. Transferred ranges are those in the FUDS (Formerly Used Defense Sites) program, as well as those that have been transferred to other Federal, State, and local agencies, and private parties under the Base Realignment and Closure Act.

Source: Military Munitions Rule (40 CFR Part 266.201) and Proposed DoD Range Rule (62 FR 50834, Section 178.4, September 26, 1997)

bullets, mortar shells, rockets, bombs, etc.) and chemical residuals from used or fired munitions, and UXO from both used or fired munitions that failed to explode and munitions that were never used but were discarded or otherwise abandoned.

1.2.2 The Legal Framework for Range Cleanup

The statutory history and regulatory debate over the management of used or fired military munitions and UXO are long and beyond the scope of this report. However, some regulatory and statutory context is essential to understanding the framework, the terms, and the significance of the information presented in this report.

Although the Department of Defense has been implementing its Installation Restoration Program since the mid-1970s, it was not until the passage of the Superfund Amendments and Reauthorization Act of 1986 (SARA), amending the Comprehensive Environmental Response,

[4]Report of the Defense Science Board Task Force on Unexploded Ordnance (UXO), Clearance, Active Range UXO Clearance, and Explosive Ordnance Disposal Programs. April 1998. Page 2.

Compensation, and Liability Act of 1980 (CERCLA), that the program was formalized by statute. Section 211 of SARA established the Defense Environmental Restoration Program, to be carried out in consultation with the Administrator of EPA. The program has three explicit goals:

- Cleanup of contamination from hazardous substances, pollutants, and contaminants, consistent with CERCLA cleanup requirements as embodied in SARA and the National Contingency Plan (NCP).

- Correction of environmental damage, such as the detection and disposal of used or fired military munitions, that creates an imminent and substantial endangerment to public health and the environment.

- Demolition and removal of unsafe buildings and structures, including those at formerly used defense sites.

In response to a 1992 mandate in the Federal Facilities Compliance Act, EPA's Military Munitions Rule (62 FR 6621, February 12, 1997; hereafter, the Munitions Rule) identified when conventional and chemical military munitions become hazardous wastes that are subject to the Resource Conservation and Recovery Act (RCRA), Subtitle C, hazardous waste management requirements. The EPA Munitions Rule defined used munitions as solid waste and potentially hazardous waste. However, EPA has postponed final action on the regulatory status of used or fired munitions at CTT ranges until DoD promulgates a Range Rule specifying requirements for the investigation and cleanup of closed and transferred ranges (62 FR 6632, Preamble IV.H). At that point, EPA will make a final determination as to whether and under what circumstances used munitions will be considered a hazardous waste, and what regulatory requirements will be applicable to management of this waste (62 FR 6632 Preamble IV.H). A draft Range Rule was proposed in the *Federal Register* on September 26, 1997. The Final Range Rule is under development.

When is used or fired munitions a solid waste or a potentially hazardous waste?

- When it is transported off range or from the site of use for storing, reclaiming, treating, and disposing or treating prior to disposal; or
- When it is recovered, collected, and then disposed of by burial or landfilling either on or off range; or
- When the munition lands off range and is not promptly rendered safe and/or retrieved.

What was postponed at the time of the Military Munitions Rule?

- Applicability of solid and hazardous waste regulations to used or fired munitions that are recovered and then treated on closed or transferred ranges.

Source: Preamble, Final Military Munitions Rule (62 FR 6632, February 12, 1997.) EPA fact sheet entitled "Military Munitions Final Rule."

1.3 Overview and Design of Survey

During this period of regulatory development, the Federal Facilities Restoration and Reuse Office (FFRRO) and the Office of Solid Waste (OSW) in EPA's Office of Solid Waste and Emergency Response (OSWER) received several communications relating to the investigation and cleanup of ranges from EPA field staff, State environmental officials, tribal officials, and the general public. Most of the questions raised were critical of DoD range investigation and cleanup activities. In order to obtain a more comprehensive and systematic picture from EPA field personnel, the FFRRO developed a survey to obtain a better understanding of the following:

- Current management, ownership, and regulation of CTT ranges.
- Potential munitions hazards and contamination on CTT ranges and potential risks to receptors.
- The nature and extent of characterization activities that have taken place on the range, including the use of statistical sampling methods for UXO.
- The past, current, and future activities taking place on these ranges.

The survey tool was distributed to all EPA Regions and directed specifically toward RPMs who have been involved in range activities. Since the survey questions were open ended, this report is based on interpretations and assumptions, which are identified where appropriate. This report contains the findings of 75 surveys representing 61 DoD facilities submitted by all 10 EPA Regions in early 1999.[5] Table 1-1 identifies the number of ranges and facilities covered by this report, and Figure 1 identifies the Regional distribution of the completed surveys. Appendix B, Table B-1, contains the list of facilities covered by this report.

[5]Of the 75 surveys received for DoD facilities containing CTT or inactive ranges, 6 of these contained 13 separate entries, each addressing one or more ranges. In order to preserve the information provided about every range contained in each of these 6 surveys, separate data were recorded for each range or groups of ranges, and the ranges were treated as if they had each been covered in a separate survey, bringing the total number of fields in the database to 88. Data tables found in the appendix therefore list 88 "separate" survey entries.

Table 1-1. Survey Responses: Number of Facilities and Ranges Reported in Survey (Appendix B, Tables B-2 and B-5)

	Information in Report
Total Number of Facilities:	**61**
Total Number of Ranges:	**203***

Range Status	No. of Facilities	No. of Ranges
In Report:		
Inactive	10	100
Closed	16	45
Transferring	3	4
Transferred	11	11
Status Uncertain	8	15
Not Reported	13	28
Total in Report	**61**	**203***

*This number represents the minimum number of ranges included in the report.

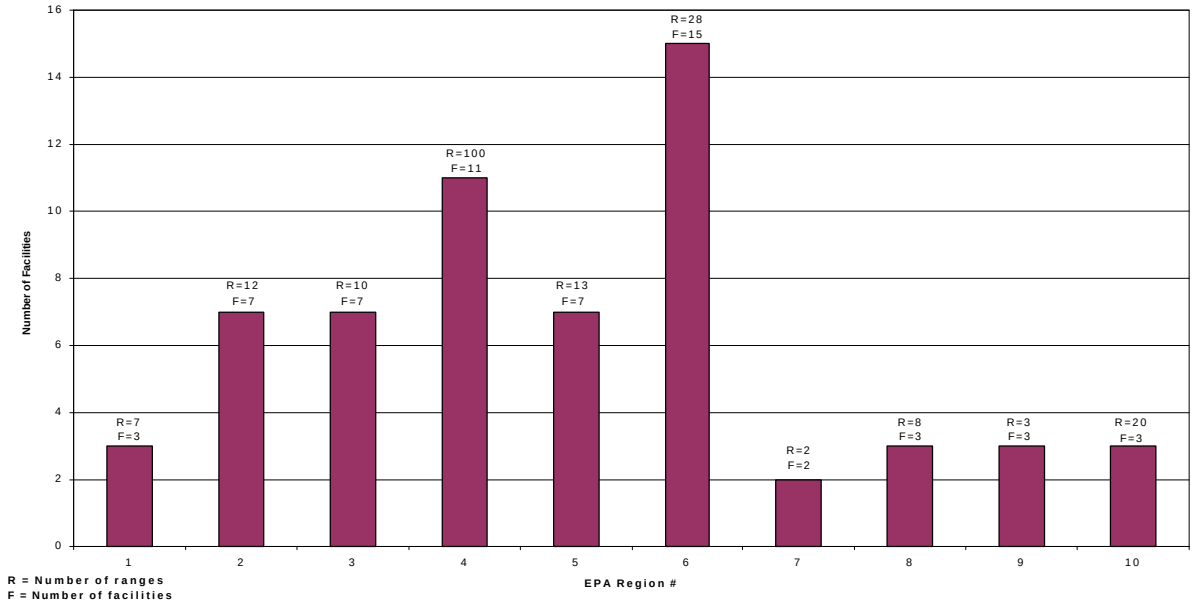

Figure 1. Distribution of Facilities Among EPA Regions (by facility) (Appendix B, Table B-1)

The 75 survey responses referenced in this report represent 61 facilities, with at least 203 ranges. Most of the completed surveys provided information about a number of ranges at a single facility. On some surveys, the respondent differentiated between each range, and in a few cases the respondent filled out separate surveys for each range at the facility. In yet other cases the survey respondent provided no range-specific information, but indicated that the information applied to a number of ranges. Given the complexity and number of ranges at large facilities, this latter approach clearly did not capture the full range of information and issues associated with those ranges.

Survey responses from three facilities, Ft. McClellan, Redstone Arsenal, and NAF Adak, included data for 61, 22, and 18 individual ranges, respectively; therefore, data about ranges at these facilities may disproportionately skew the findings in this report in some cases. However, the information presented provides a first glimpse into the relationship between the numbers and types of ranges where EPA Regions have become involved. When the information from these ranges clearly skews the overall data, the effect will be identified in the report. In addition, the number of facilities, as well as the number of ranges, is provided in every figure to give the reader a sense of both the number of ranges and facilities addressed in every analysis.

Although the focus of the survey (and this report) is closed, transferred, and transferring ranges, inactive ranges are also included in the report. This inclusion is due to the somewhat subjective nature of the definition of a closed versus an inactive range and the fact that DoD has not yet completed its inventory of closed ranges. In some cases, a range may be labeled inactive but may not have been used for decades. A *closed range* is defined as a range that has been taken out of service and either has been put to new uses that are incompatible with range activities or is not considered by the military to be a potential range area.[6] Inactive ranges were therefore retained in this report, as the DoD inventory of closed ranges may determine some of these to be considered closed. Some of the inactive ranges, however, may become active in the future. Two such inactive ranges are included in the survey data — Massachusetts Military Reservation and the Pelham Range at Ft. McClellan — in order to be consistent with the inclusion of inactive ranges in the survey data. Finally, where they could be identified, every effort was made to remove active ranges from

Examples of reasons for inactive ranges to be declared closed:

Land use is incompatible.

- **#** A hotel or other structure has been built on top of or in close proximity to the range.
- **#** The surrounding area has become populated and developed, thereby making use of property as a range dangerous.

New munitions technology renders use of a formerly active range impracticable for future range use.

- **#** Training with present-day M-16 rifles could not be conducted on a range that was created for training soldiers on old M-16 rifles that required a smaller range area.

[6]DoD Proposed Range Rule, 60 FR 50834, Section 187.4, September 26, 1997.

the survey data. However, because of incomplete information provided in survey responses, it is possible that some of the data provided by the Regions may address active ranges.

Finally, and not surprisingly, since this is a survey of EPA Regions, most of the ranges identified are located on facilities for which EPA has a direct statutory or regulatory oversight responsibility: facilities on the National Priorities List (NPL) and facilities that are affected by the Base Realignment and Closure (BRAC) Act. As shown in Figure 2, 40 percent of the facilities in the survey are NPL facilities and 48 percent are BRAC facilities.[7]

1.4 Report Organization

This report is divided into seven chapters and an Appendix. The seven chapters provide background and analysis of each substantive area covered by the survey, including the conclusions. The Appendix provides the survey methodology, data tables that support the major findings in the report, and background documentation about the CTT range issues of concern to the regulatory community.

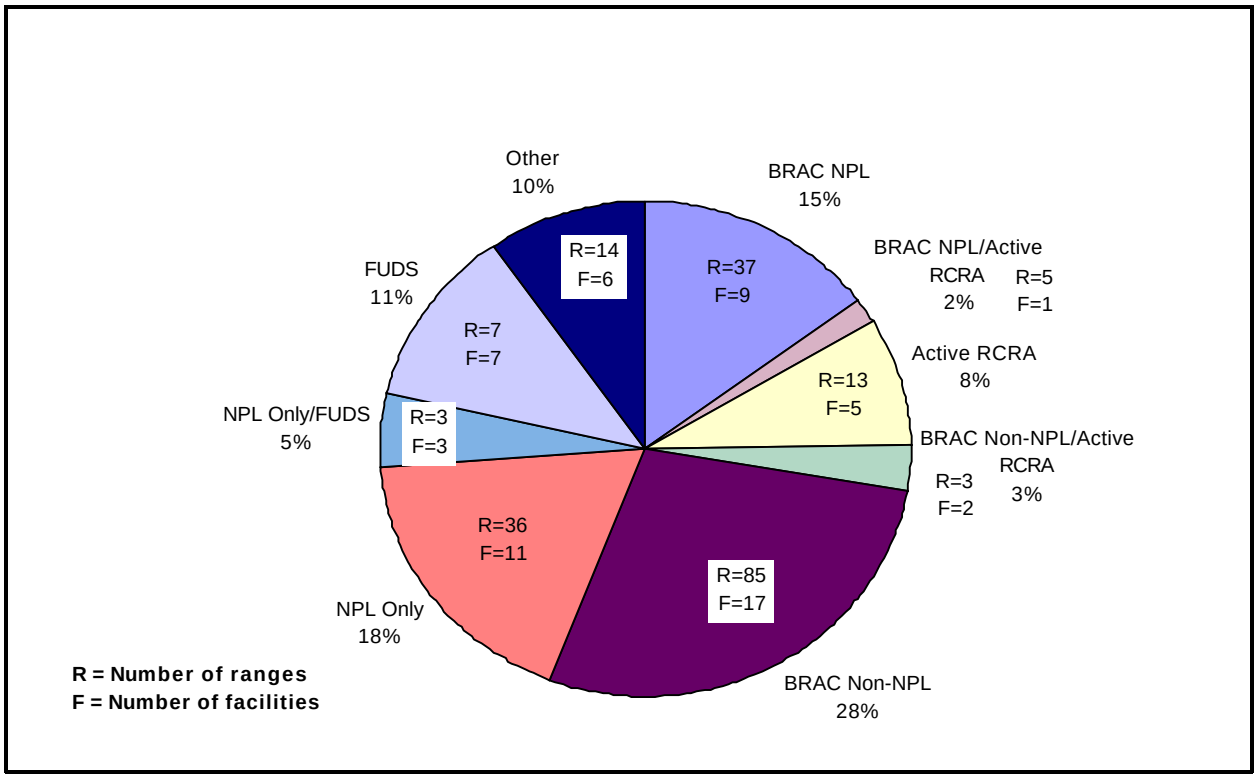

Figure 2. Programmatic Category of Facility (by facility) (Appendix B, Table B-3)

[7]Of total facilities, 18 percent are both BRAC and NPL.

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2.0 GENERAL FACILITY AND RANGE INFORMATION

2.1 Introduction

Every military facility has a unique mission that determines the activities that occur within it. Therefore, the nature of the used or fired military munitions likely to be found on its ranges, and the potential for exposure of human receptors and the environment to the associated hazards, will vary across facilities. The variety of range-related activities that may go on at a military facility include training, research, munitions development, and testing and evaluation of military munitions and explosives. Over their history, ranges may have been used for several different types of activities. Range size varies from 10 or 15 acres, up to hundreds of square miles. Factors such as size and activities add to the challenges of investigating and cleaning up the ranges. The majority of facilities that are included in this study are located in rural areas or near small towns. Due to the changing nature of the DoD mission, several of these former ranges are likely to be put to a different use in the future.

Description of Ft. McClellan

Ft. McClellan, located in northeastern Alabama, is home to both the U.S. Army Chemical and Military Police Corps and the U.S. Army Chemical Corps. Ft. McClellan is a large facility of 45,679 acres with 44 and 17 inactive ranges, respectively, at each of two areas on the base — the Main Post and Pelham Range. As Ft. McClellan is being closed under BRAC, all of the 44 ranges on the Main Post will be transferred. Future uses will include a divided limited-access highway, as well as commercial, residential, and wildlife areas. Pelham Range will be retained by DoD as a location for National Guard training.

Observations on facility size

Large facilities host many different types of ordnance-related activities such as storage, testing, training, and disposal. The Savanna Army Depot in Savanna, Illinois, is a good example of a facility that employed a wide variety of munitions and currently poses potentially significant risks to human health and the environment.

The Savanna Army Depot was used for many different types of munitions-related activities, including training, testing, disposal, storage, and impact ranges. Sites on the depot included a stokes mortar impact range, 75-155 mm impact ranges, function test ranges, open-burning/open-detonation areas, grenade burial area, antitank mines, mustard burial area, landfills, multiple small arms burial, and pistol/rifle ranges. Munitions activities affected an area estimated at 8,700 acres.

2.2 Surrounding Area Characteristics

As shown in Figure 3, almost 60 percent of the facilities covered in this report are located near rural/remote areas or small or medium towns. Only a small number of facilities are located near urban areas.

Definitions of surrounding area characteristics

Rural **-** areas with sparse populations or population centers between 250 and 3,000 near the facility. Area residents rely on larger population centers and must travel for most goods and services.
Small or medium towns **-** areas that are self-supporting and independent of large municipalities and towns. Populations are between 3,000 and 10,000.
Suburban **-** areas with populations between 10,000 and 20,000 that are located in proximity to larger population centers.
Urban **-** areas that are large municipalities with concentrated populations of over 20,000.

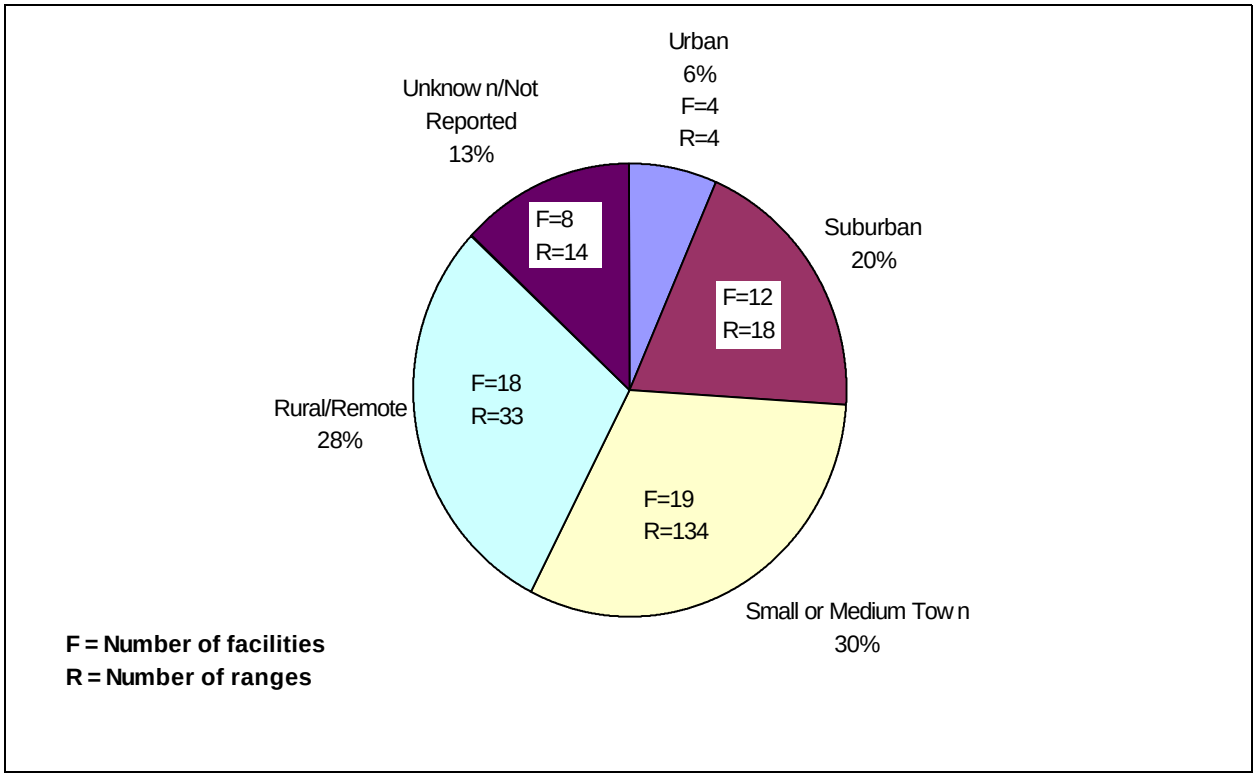

Figure 3. Characteristics of Surrounding Area (by facility) (Appendix B, Table B-4)

2.3 Range Status

Almost 50 percent of the ranges in the survey are categorized as inactive (Figure 4). This may be because these ranges have not yet been assessed by DoD to determine whether they should actually be considered closed. The reader should also be aware that a disproportionately large number of inactive ranges are located on only two facilities, Ft. McClellan and Redstone Arsenal. Together, these facilities represent 83 out of the 100 inactive ranges. Many of these ranges have not

been used in decades, such as the range at Redstone Arsenal described in the text box below. The second largest category is closed ranges, at 22 percent, followed by "unknown" at 14 percent.[8]

Inactive ranges

The Redstone Arsenal in Huntsville, Alabama, is a facility that contains 23 ranges, 22 of which are inactive. This facility provides several good examples of ranges that have been inactive for years, but which have not been officially closed by DoD. For example, the Inactive Mustard Gas Demilitarization Site/Range at the Redstone Arsenal was last used in the mid- to late-1940s and is currently forested and partially underwater. Given current environmental conditions, nearby populations, and today's more stringent regulatory framework, it is highly unlikely the facility will be used for mustard gas demilitarization again.

About the report figures

In order to clarify the effect of the three facilities with a disproportionaltely large number of ranges on the figures throughout this report, the number of associated facilities is included in the charts that are organized by range. Conversely, charts that depict the number or percentage of facilities also include the number of ranges associated with each category. One result of providing the number of facilities associated with every range is that the sum of facilities is often greater than the 61 facilities covered in this report. There are also some instances where the number of ranges totals more than 203 because of multiple answers.

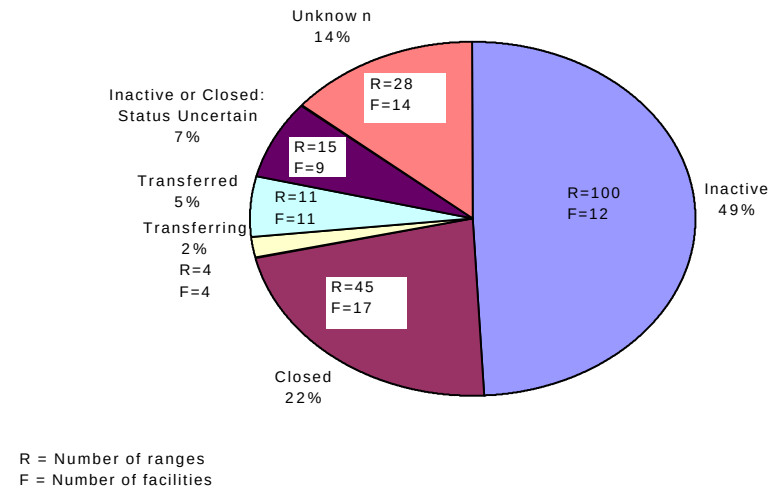

Figure 4. Range Status (Appendix B, Table B-5)

[8] The large percentage of ranges with unknown status can be attributed to the fact that the survey did not explicitly ask for information about range status, and thus, not all surveys contained this information.

2.4 Munitions Potentially Found on Ranges

Munitions found on ranges generally come from two sources: munitions used for their intended purpose in training activities, and munitions that were abandoned or discarded without being used (also including UXO).

The types and quantities of munitions used on a given range change over its life cycle as a result of changes in the military mission and advances in munition technologies. As technology evolves and weapons systems are replaced, new types of military munitions are developed and employed. Further, changes in training needs also may contribute to the variety of used or fired munitions found on ranges. Determining the density of UXO is best accomplished through focused investigative efforts that utilize previously existing information and acquired data (when necessary) to identify all troop training and weapons testing activities, and all types, quantities, and condition of UXO or explosive materials at CTT ranges.

The types of munitions reported by survey respondents to have been used on the ranges are displayed in Figure 5. It is important to keep in mind that the quality of data and recordkeeping for ranges is generally poorer for older ranges. For older ranges, delineating the munitions, their locations, and the volume is more challenging than with ranges of more recent vintage.

In addition to munitions that landed on or beneath the ground surface, munitions were also buried beneath the ground as a routine activity during troop training exercises on ranges. The age of burial areas is largely dependent upon the age of the range and activities that have been performed to date. While many older ranges have burial pits, a number of ranges that were active, but were later closed and then transferred, have also been noted to have this problem In addition, burial pits may contain a mix of used, exploded, unexploded, and unused munitions, as well as other types of wastes. Burial pits pose a variety of remediation challenges. Also, the contents of the burial pits may not be known, so they create many uncertainties in terms of potential exposure and environmental risks.

Environmental and safety hazards

Used or fired munitions and UXO can be found intact or in fragments, both of which may present potential hazards. The **human health hazards** associated with UXO left intact are threats of injury, dismemberment, or even death; however, from an **ecological** perspective, used or fired munitions that are damaged or corroded may be more hazardous because of the increased possibility that explosives or chemicals have leached into the surrounding media.

The risks to human health and safety and the environment that are posed by different types of used or fired munitions vary greatly. For example, projected grenades present a high explosive hazard when encountered as UXO, in addition to potential ecological risks from the explosive and/or toxic fillers employed, particularly when the munition is damaged in some way. Grenades may contain explosives, white phosphorus (which is known to spontaneously combust when disturbed and

exposed to air), chemical agents, or illumination flares, depending on their intended use. Small arms and grenades generally are found within 1 foot of the ground surface.

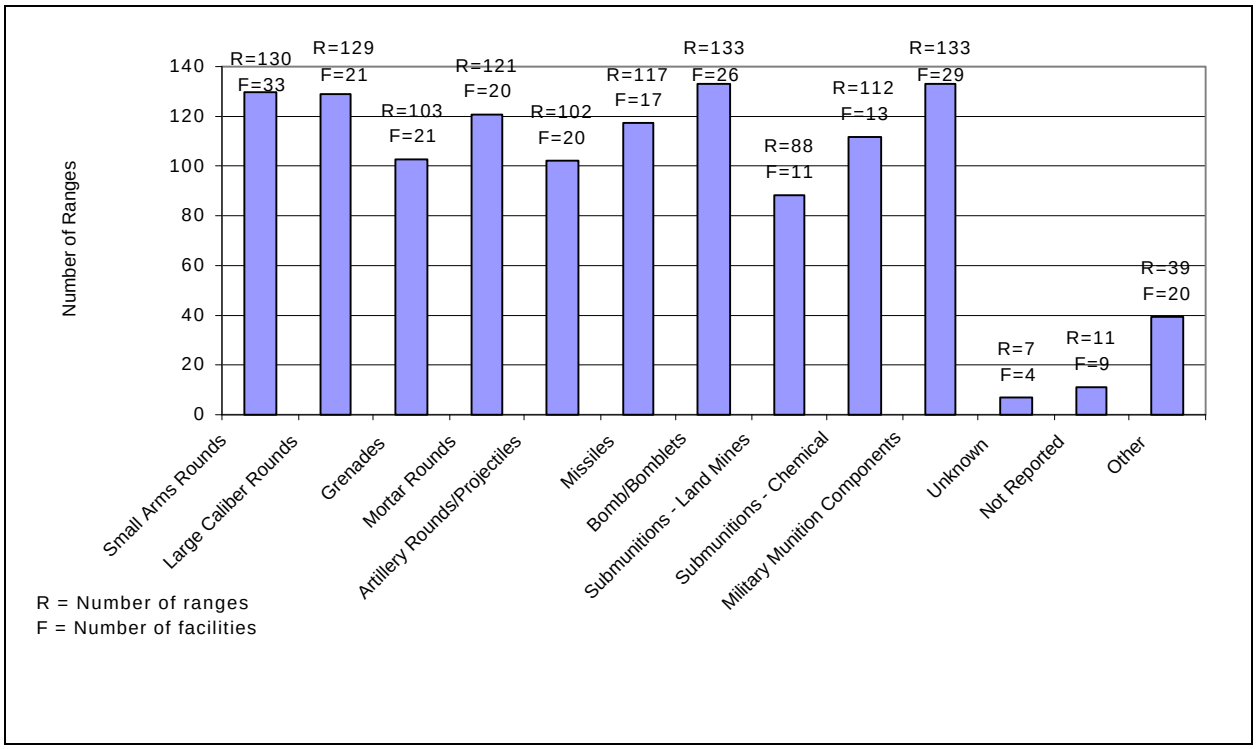

Figure 5. Munitions Employed at Ranges (by range) (Appendix B, Table B-6)

Mortar rounds can be filled with explosives, white phosphorus, or illumination flares, and they pose serious human health risks when encountered as UXO, as they may explode when disturbed. In addition, explosives or toxic fillers can leach into soils or groundwater if the mortar round is degraded. Artillery rounds/projectiles are very similar to mortar rounds in their construction, types of use, and fillers. Projectiles and mortars are usually located within 4 feet of the ground surface.

Submunitions (e.g., bomblets, grenades, and mines filled with explosives or chemical agents), particularly those that are activated by movement or disturbance, pose serious safety threats. Submunitions come in many varieties, including antipersonnel, antimateriel, antitank, dual-purpose, incendiary, and chemical. They are normally spread over a large area by missiles, rockets, projectiles, or other dispensers and typically land on the ground surface, making them easily accessible and therefore a potentially serious threat to humans.

Missiles use gas pressure from rapidly burning material (propellant) to transport a payload to a desired location. Missiles may present significant explosive hazards because of the possibility of residual propellant remaining after they have landed, thus creating potential for ignition and violent burning once they are disturbed. Further, missiles use proximity fuzes, which function when the missile reaches a predetermined distance from the target and can be activated when disturbed, causing

the missile warhead to explode. The warhead may consist of explosives, toxic chemicals, white phosphorus, submunitions, riot-control agent, or illumination flares. Bombs are also a serious threat, as their fillers consist of either explosives or other chemicals. Bomb fuzes may be impact, proximity, or delay fuzes, meaning they may explode on impact when they reach a predetermined distance from the target, or after a set amount of time. Bombs and missiles can be buried as deep as 30 feet beneath the ground surface, thus making detection and removal potentially difficult and costly.[9]

Types of military munitions

- **Small Arms Munitions** - Small arms munitions contain projectiles that are 0.5 inch or less in caliber and no longer than approximately 4 inches. They are fired from various sizes of weapons, such as pistols, carbines, rifles, automatic rifles, shotguns, and machine guns.

- **Hand Grenades** - Hand grenades are small explosive- or chemical-type munitions that are designed to be thrown at short range. Various classes of grenades may be encountered as UXO, including fragmentation, smoke, and illumination grenades. All grenades have three main parts: a body, a fuze with a pull ring and safety clip assembly, and a filler. Grenades are made of metal, plastic, cardboard, or rubber bodies and may contain explosives, white phosphorus, chemical agents, or illumination flares, depending on their intended use. Fragmentation grenades are the most frequently used type of grenade.

- **Mortars** - Mortar shells range from approximately 1 to 11 inches in diameter and can be filled with explosives, white phosphorus, or illumination flares. The mortar fuze is located in either the nose or the base.

- **Projectiles/Artillery Rounds** - Projectiles range from approximately 1 to 16 inches in diameter and from 2 inches to 4 feet in length. Like mortars, projectile fuzes are located in either the nose or the base.

- **Submunitions** - Submunitions include bomblets and mines that are filled with either explosives or chemical agents. Submunitions are used for a variety of purposes, including antipersonnel, antimateriel, antitank, dual-purpose, incendiary, and other. They are scattered over large areas by dispensers, missiles, rockets, or projectiles. Submunitions are activated in a number of ways, including pressure, impact, movement, or disturbance, while in flight or when near metallic objects.

- **Missiles** - Missiles consist of a warhead, a motor section, and a fuze, and they are guided to their target by any number of systems, including radar and video. Missiles rely exclusively on proximity fuzes.

- **Bombs** - Bombs range from 1 to 3,000 pounds in weight and from 3 to 10 feet in length. Bombs consist of a metal container (the bomb body), a fuze, and a stabilizing device. The bomb body holds the explosive or chemical filler.

Source: Unexploded Ordnance (UXO): An Overview. October 1996. Naval Explosive Ordnance Disposal Technology Division, UXO Countermeasures Department.

[9]Unexploded Ordnance (UXO): An Overview. October 1996. Naval Explosive Ordnance Disposal Technology Division, UXO Countermeasures Department.

2.5 Range Ownership

For facilities addressed by the survey respondents, DoD is the largest past, present, and future range owner. Not surprisingly, because DoD is in the process of transferring range lands, DoD ownership is expected to drop by almost 50 percent in the future (Figure 6) as ownership of former ranges shifts to other Federal agencies, State or local governments, and private owners. In fact, after DoD, State and local governments are predicted to be the second largest owner of former ranges in the future.

Within the category of DoD range ownership, the Army is the largest landlord, with ownership of 67 percent of all DoD ranges in the past, and current ownership of 63 percent of DoD ranges. The Army is the Service responsible for the procurement, testing, and training of military munitions for the entire military; therefore, it is not surprising that within DoD, the Army owns the majority of ranges. In the future, as the total DoD ownership of ranges decreases, it is anticipated that the Army's ownership of ranges will decrease to 49 percent of all DoD ranges.

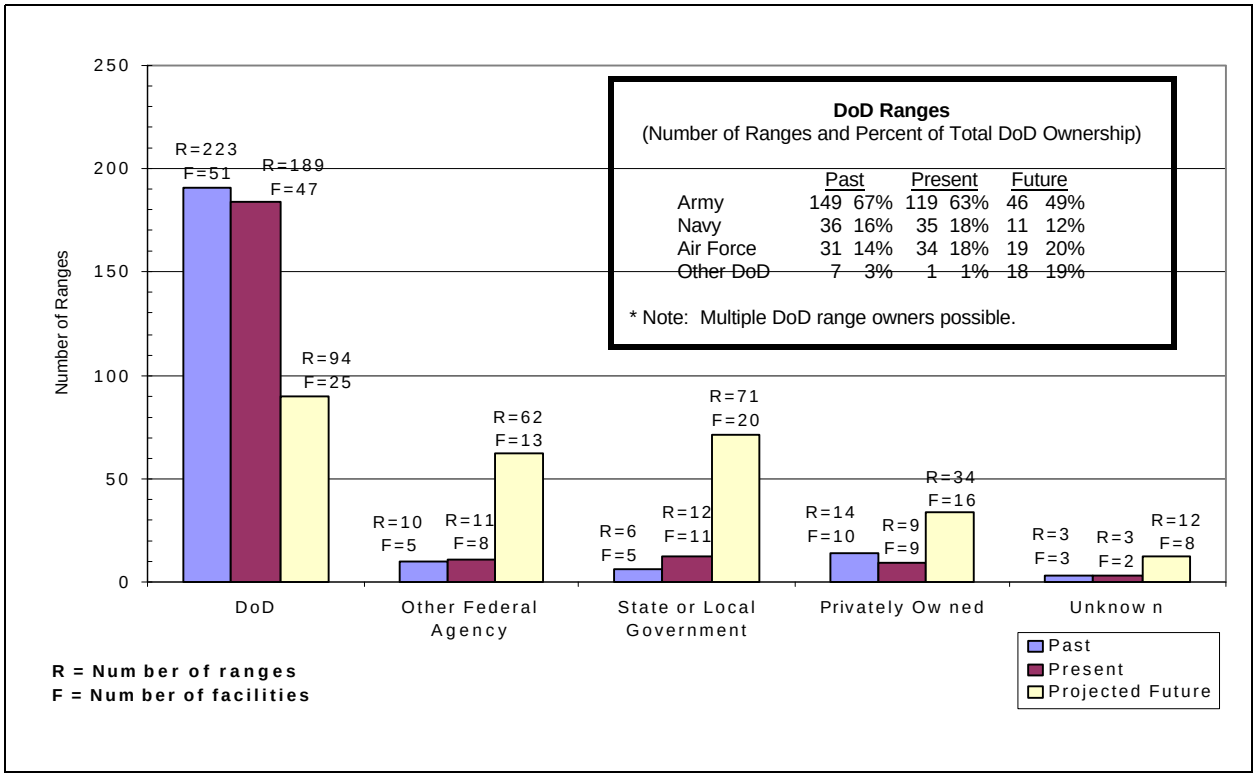

Figure 6. Range Ownership Over Time (by range) (Appendix B, Table B-7)

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3.0 THREATS TO HUMAN HEALTH AND THE ENVIRONMENT

3.1 Introduction

The potential threats to human health and the environment posed by munitions on the ranges included in this report are significant. The location of ranges in and near surface water suggests potential impacts to ecological receptors. Finally, data provided in the survey suggest known presence of UXO at most ranges, and a number of encounters with UXO by the public. (See Appendix C for data relating to this section.)

3.2 Range Setting

The ecological characteristics of a range and its surrounding area can determine the potential risks to environmental receptors, as well as the likely complexity of cleanups. In addition, the topography of a range can serve as an indication of potential future land uses.

3.2.1 Range Topography/Landforms

Respondents were asked to provide information about the environmental setting of their ranges. This information is necessary to understand the potential environmental and safety hazards associated with the range, as well as the potential exposure to human and ecological receptors.

As shown in Figure 7, 42 percent of the ranges covered by this survey are located on rolling hills, and another 21 percent are located on prairie or flat terrain. In addition, many of the ranges are located on or near surface water, wetlands, or floodplains, thus making cleanup more difficult and increasing the likelihood of exposure to sensitive ecological receptors.

3.2.2 Identification of Explosives in Soils or Groundwater

The media most likely to be contaminated by used or fired military munitions are soil and groundwater. As shown in Figure 8, 70 percent of the ranges have potential soil contamination and 59 percent have potential groundwater contamination. These results are not surprising as used or fired military munitions are most frequently found in soils. Where groundwater is present beneath a range, there is a risk of groundwater contamination resulting from the leaching of explosives and their breakdown products into the soils and groundwater. For example, one respondent stated that HMX and RDX have been found in groundwater.

The following narrative regarding the environmental characteristics and sensitivity of the Savanna Army Depot was taken from the completed installation survey:

"The facility is approximately 13,062 acres located roughly 7 miles north of Savanna, Illinois, and adjacent to the Mississippi River. Approximately 6,183 acres are considered bottomlands of the Mississippi and Apple Rivers and are heavily wooded with roughly 5,800 acres associated with the backwaters of the Mississippi River. These bottomlands routinely flood seasonally, with substantial flooding recently occurring about once every three years....The geology of the bottomlands is fairly typical of areas of river sedimentation....Groundwater in the bottomlands is extremely shallow with some wells becoming artesian with the change of seasons....The bottomlands have been impacted by the 75 mm and 155 mm ranges, open burning and open detonation disposal areas, bomb disassembly area, and old landfills."

Although environmental monitoring has not yet been conducted, the presence of UXO or explosive residues in the bottomlands are potentially dangerous to human health and the environment. The shallow groundwater may potentially be contaminated by buried UXO or other substances in the landfill. In addition, the routine flooding of the bottomlands may cause buried UXO and explosive residues to migrate, potentially exposing human or ecological receptors.

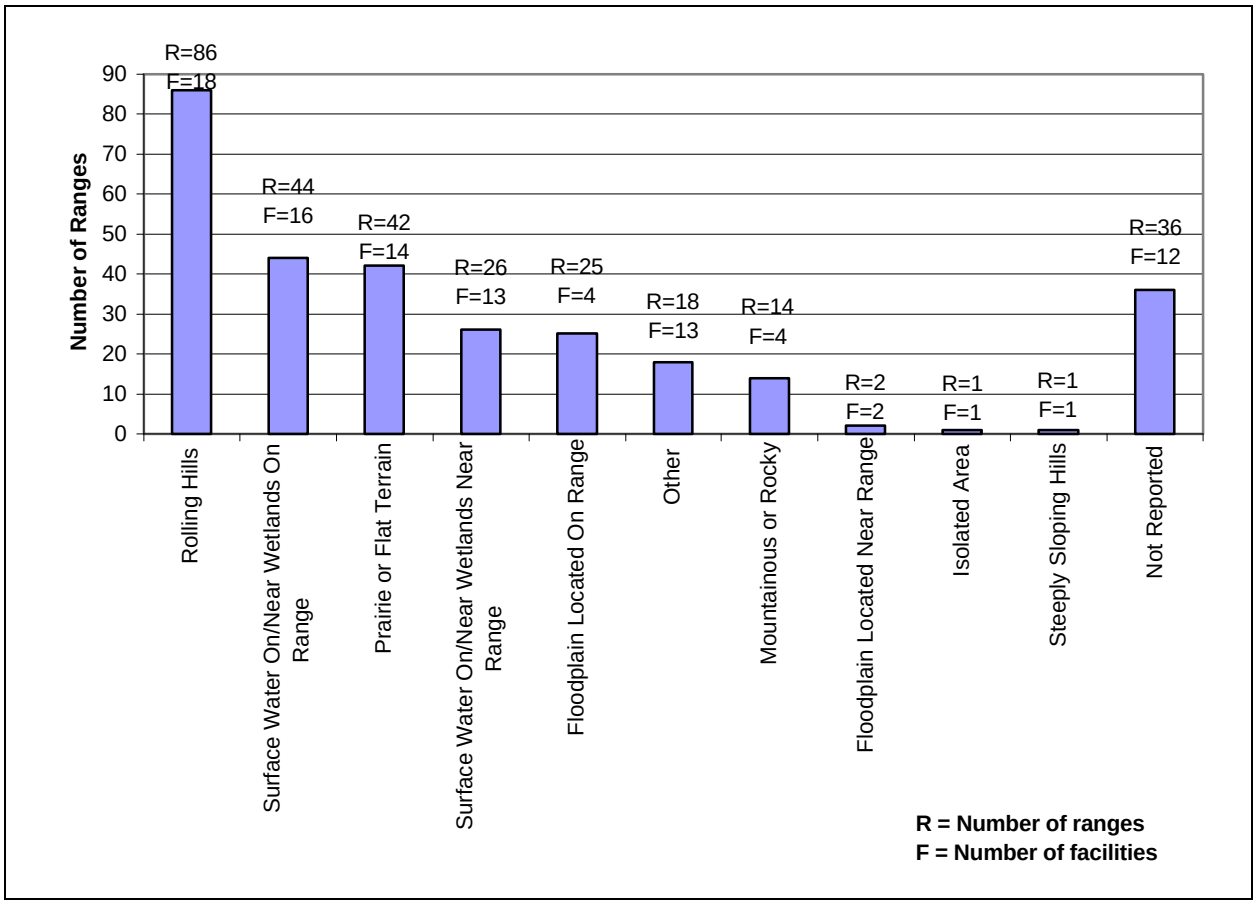

Figure 7. Range Topography/Landforms (by range) (Appendix C, Table C-1)

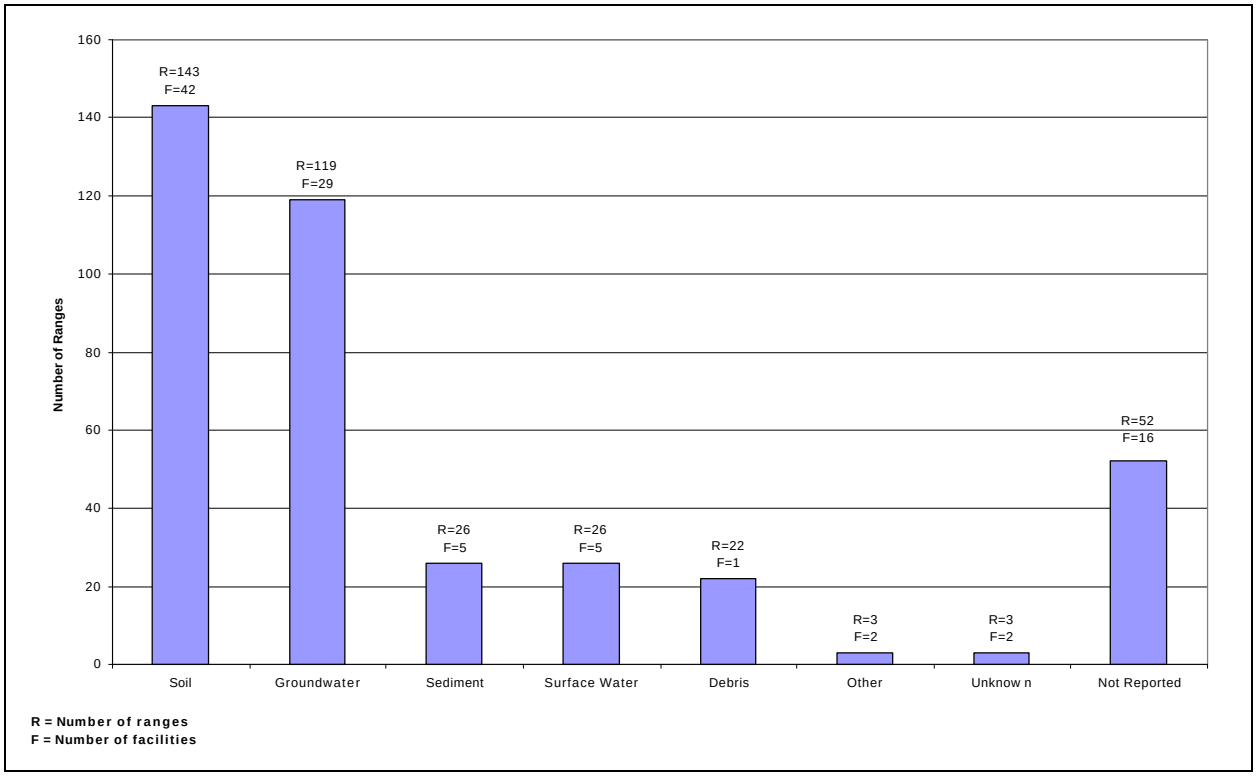

Figure 8. Media Possibly Contaminated with Used or Fired Military Munitions (by range) (Appendix C, Table C-2)

3.3 Community Setting

The risks of used or fired munitions and UXO to human health and safety are affected by factors such as type of land uses on and around the range and the proximity of the range to nearby populations. These factors make human access more likely, increasing the likelihood of exposure to hazards from used or fired munitions and UXO.

3.3.1 Land Use

As might be expected, the past land use of over 90 percent of the ranges was ordnance-related (Figure 9). EPA Regions reported that ordnance-related land use has dropped by 86 percent between the past and present (Figures 9 and 10). However, land uses that have increased over time — residential and industrial/commercial — may result in greater potential for human exposure. Respondents reported that within ordnance-related land uses, training is the largest category for past land use, while the present and future time periods reflect primarily munitions disposal and storage uses (Figure 11). The exception to this are 17 ranges at Ft. McClellan, which are currently planned to be used for National Guard training.

As ordnance-related land uses have been decreasing, residential development of ranges has increased and is expected to increase significantly in the future, as is industrial and commercial land use. Growth in residential land use is already occurring on or near former ranges, including Ft. Ord and the Lowry Bombing Range. In many cases, redevelopment for industrial or commercial uses is logical because buildings and infrastructure are already in place at installations. In addition, the use of former ordnance lands as wildlife refuges is also growing dramatically (Figure 12). According to DDESB regulations, limited land-use range transfers of contaminated property may be arranged with other Federal agencies, such as to the U.S. Fish and Wildlife Service (FWS) to develop wildlife refuges.[10] Restrictions are often included in these limited land-use transfers, which limit access to authorized refuge personnel. Some transfers of ranges where cleanup is most difficult (i.e., former impact areas) are handled in this manner.

Range use and size

The purpose and use of military ranges can be determining factors in the range size. As the uses of ranges can vary dramatically, so can their sizes.

- The Rocket Test Range on Shumaker Naval Ammunition Depot in East Camden, Arkansas, was used to flight-test rockets until the late 1950s. This rocket test range was 1 mile wide by 8 miles long, with a portion of the area used to dispose of rockets by burning. The total area of the former Naval Ammunition Depot was 68,418 acres and was used for the manufacture, testing, storage, distribution, disassembly, reworking, and destruction of ammunition, bombs, and explosives.

- The Small Arms Range (SAR) at Griffis Air Force Base in Rome, New York, is a 350- by 200-foot area that was used for small and heavy arms training by the 416th Combat Support Group under the Air Combat Command. Types of weapons employed on the range include M-16 and M-50 machine guns. The range has been taken out of use and the Oneida Indian Nation hopes to use this range to train its police force in the future.

- The former Lowry Bombing and Gunnery Range in Arapahoe County, Colorado, is located on 59,000 acres of short-grass prairie on the western edge of the Great Plains near the city of Denver. A variety of ranges were located at Lowry, including a 758-acre air/ground gunnery range and a 209-acre bombing target range.

[10]DoD Ammunition and Explosives Safety Standards, August 1997, Chapter 12.3.2.5, DoD Directive 6055.9 STD.

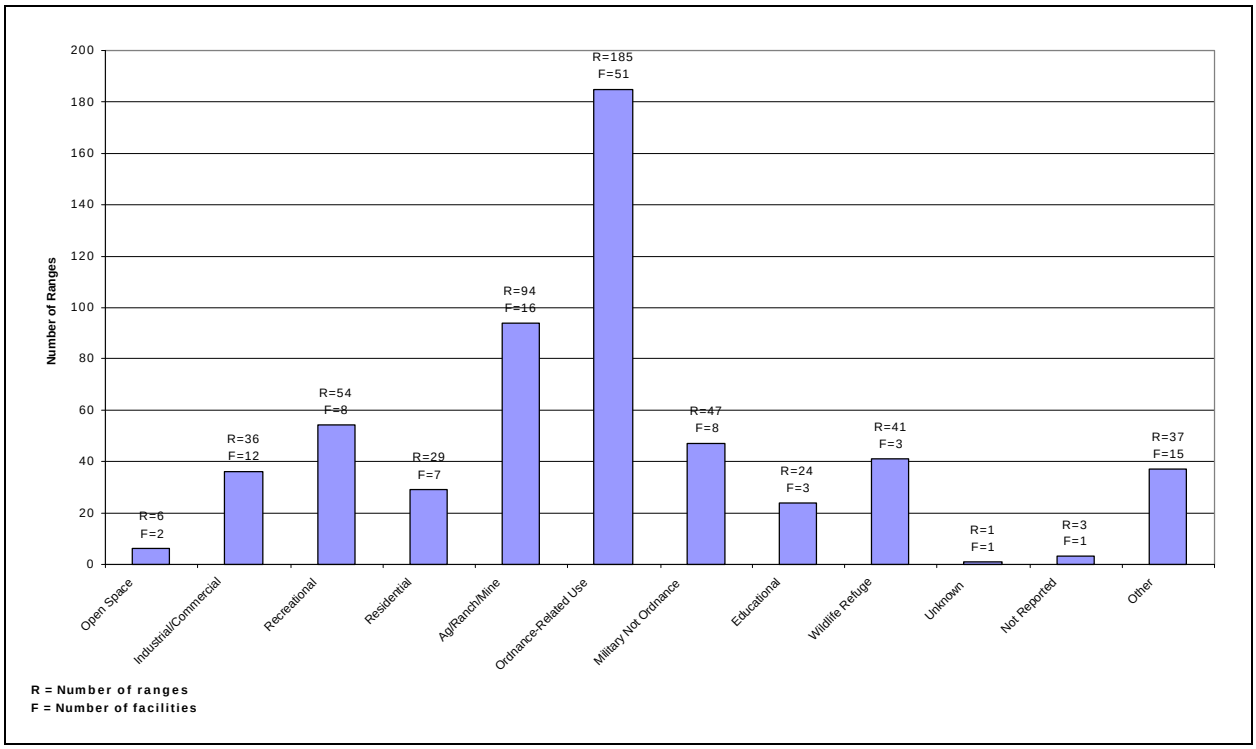

Figure 9. Past Land Uses (by range) (Appendix C, Table C-3)

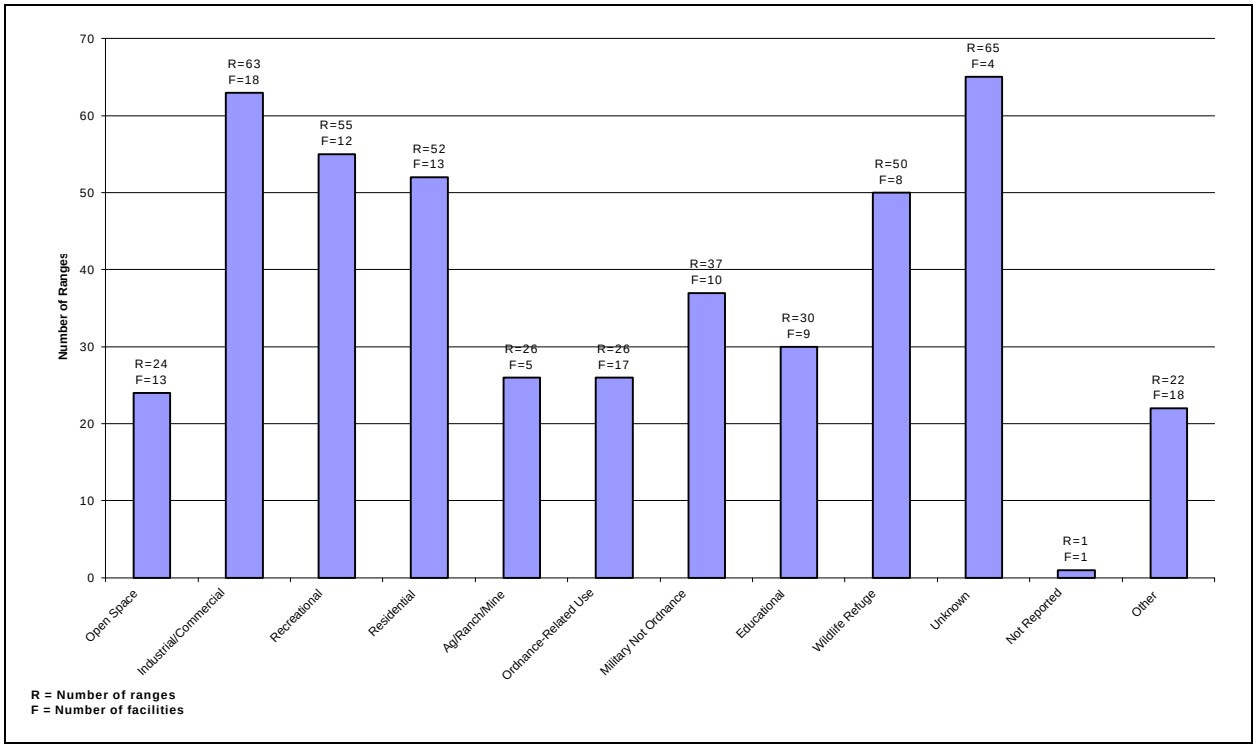

Figure 10. Present Land Uses (by range) (Appendix C, Table C-3)

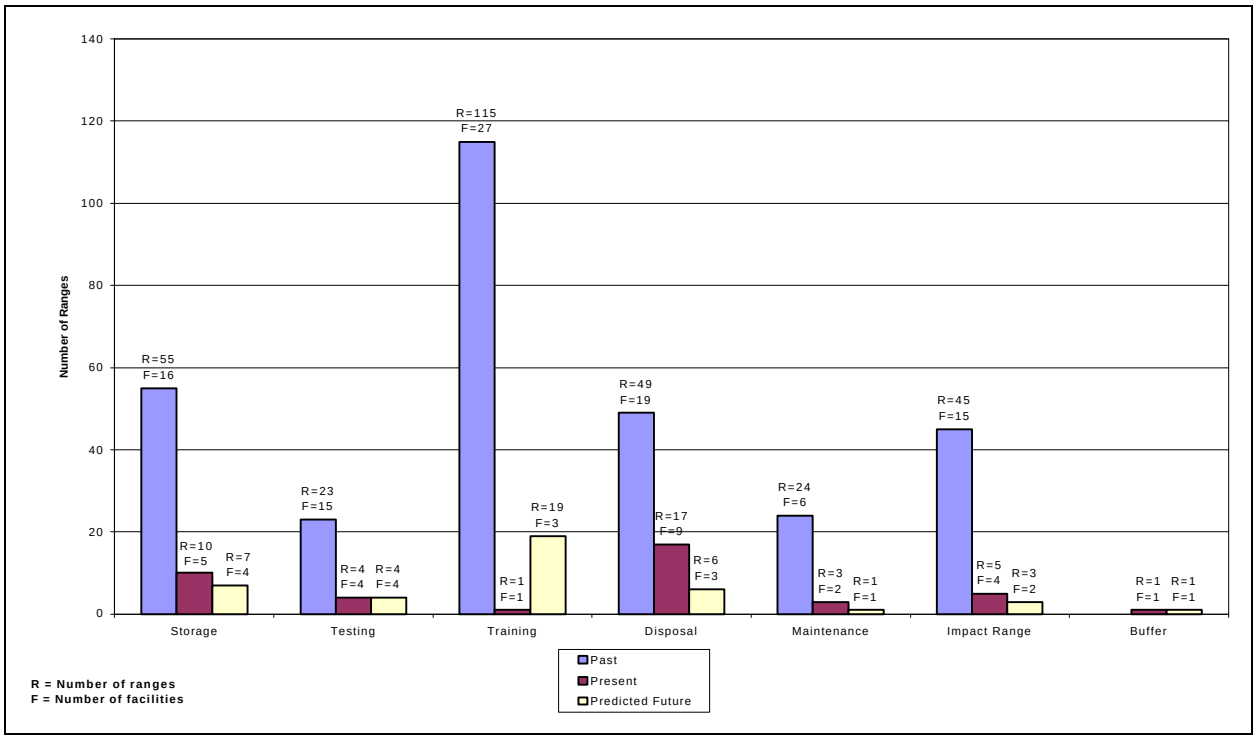

Figure 11. Ordnance-Related Land Use Over Time (by range) (Appendix C, Table C-4)

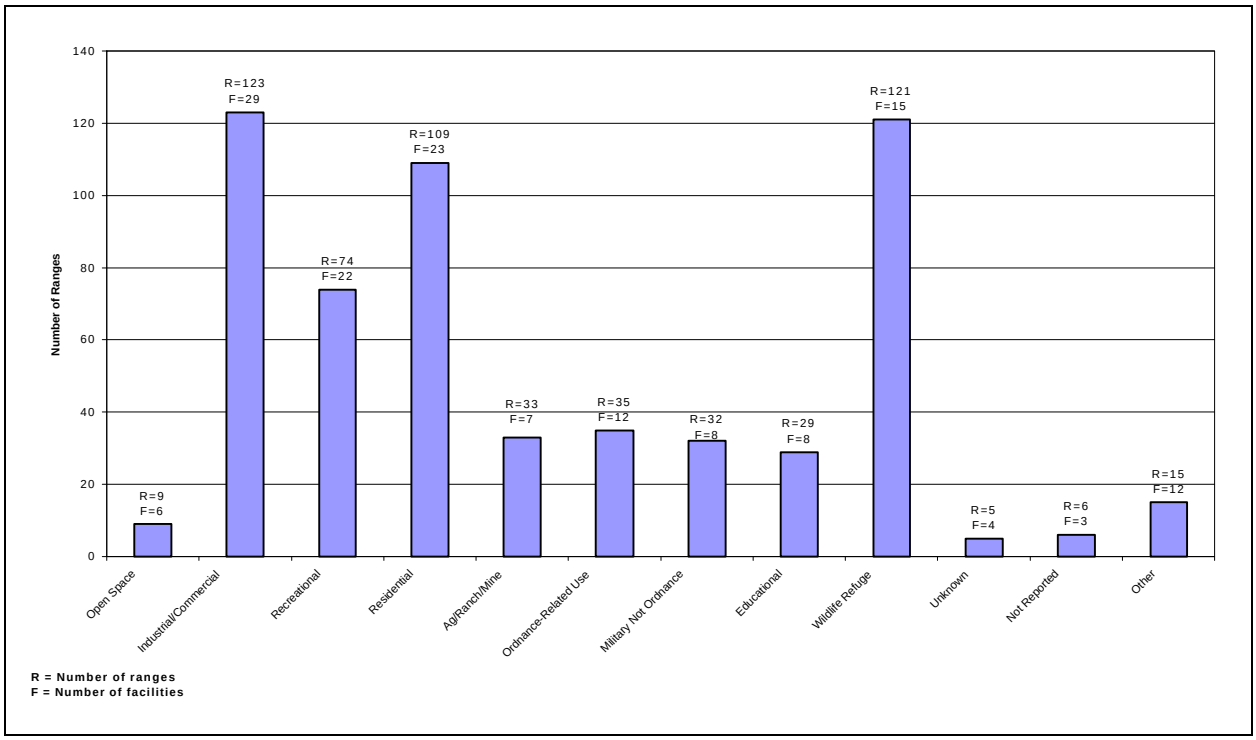

Figure 12. Expected Future Land Uses (by range) (Appendix C, Table C-3)

3.3.2 Surrounding Area Land Use

Most ranges are surrounded by residential areas either on or near the facility. As shown in Figure 13, the surrounding land use at over 70 percent of the ranges includes residential uses. Agricultural, ranching, and mining activities, as well as industrial and commercial development, are also common land uses around the facilities. Given that pressure to reuse CTT ranges will continue to increase, the general trend is of concern, particularly from the standpoint that used/fired munitions and significant amounts of UXO can be found on the majority of these properties.

3.3.3 Proximity to Nearest Populations

The majority of ranges (89 percent) are located within 5 miles of the nearest population center (Figure 14). Even in rural areas, population centers have developed near military facilities to provide goods and services to the community living on the base. In some cases, a population adjacent to or near the range may be on-base residents. It should be noted that the facilities with the largest numbers of ranges, Ft. McClellan, Redstone Arsenal, and NAF Adak, all fall within the categories Adjacent, <1 Mile, and 1-5 Miles.

The increase in residential, industrial, commercial, and recreational development of ranges, coupled with the close proximity to surrounding populations, indicates that potentially significant risks to human health and safety exist at these ranges.

3.4 The Presence of Used or Fired Munitions and UXO

Used or fired munitions include the fragmented remains of exploded ordnance, as well as UXO. In addition to potential for environmental and human health hazards, UXO and chemical or biological weapons or fragments are of serious concern because of their potential to cause imminent and substantial endangerment to public health or the environment. The EPA Regional survey asked a number of questions regarding the scope of the UXO problem.

3.4.1 Has UXO Been Found on Range?

UXO has been found on 86 percent of the ranges in the survey (Figure 15). This large number indicates the widespread UXO contamination on current and former ranges. In addition, the extent of UXO highlights the importance of obtaining as much information as possible about these sites. On only 11 percent of ranges has no UXO been found, while respondents for the remaining 3 percent either did not know or did not report the presence of UXO. The disproportionately large number of ranges at Ft. McClellan, Redstone Arsenal, and NAF Adak are included in the category UXO Found on Range.

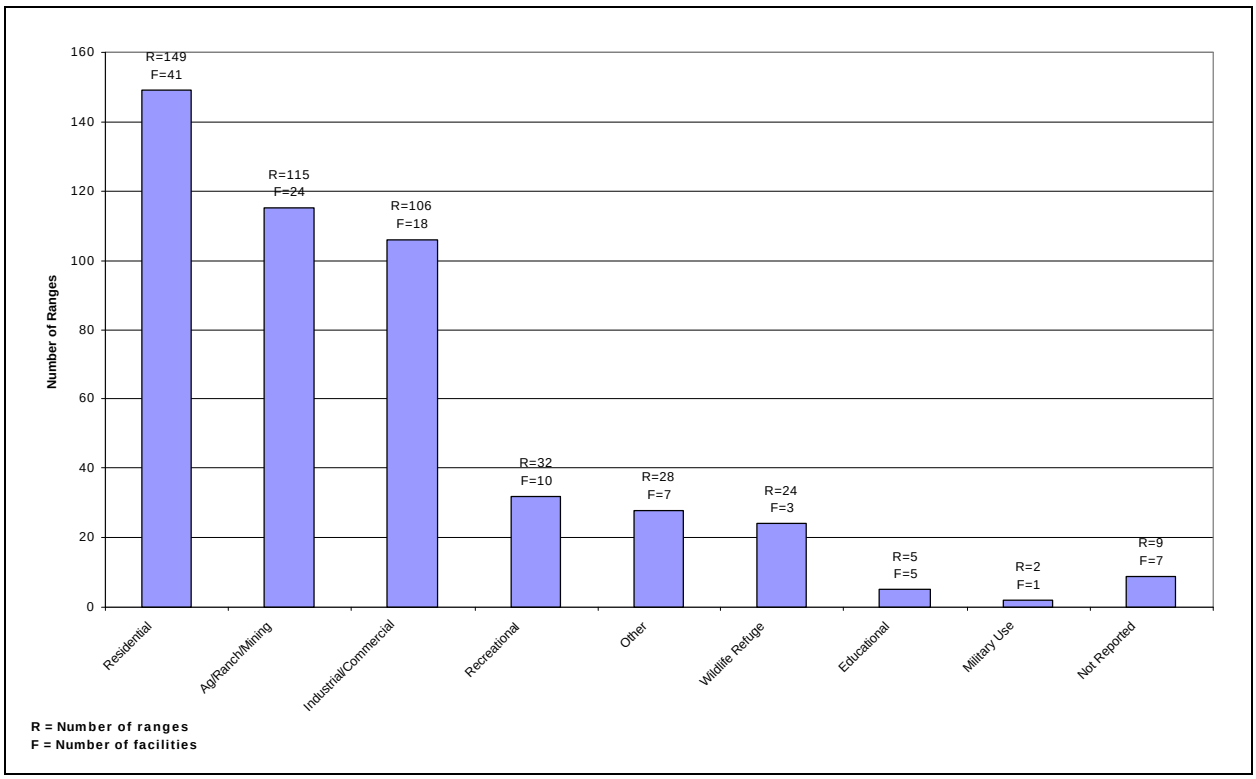

Figure 13. Land Use of Surrounding Area (by range) (Appendix C, Table C-5)

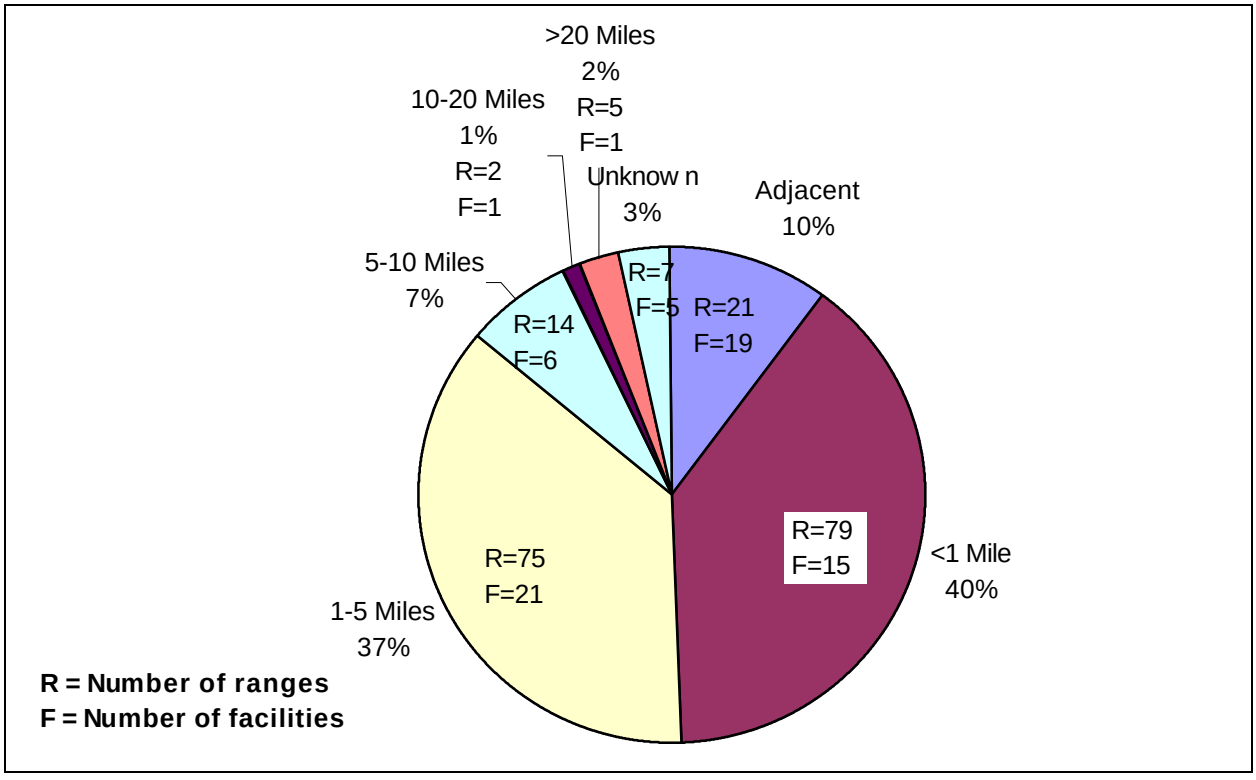

Figure 14. Proximity to Nearest Populated Area (by range) (Appendix C, Table C-6)

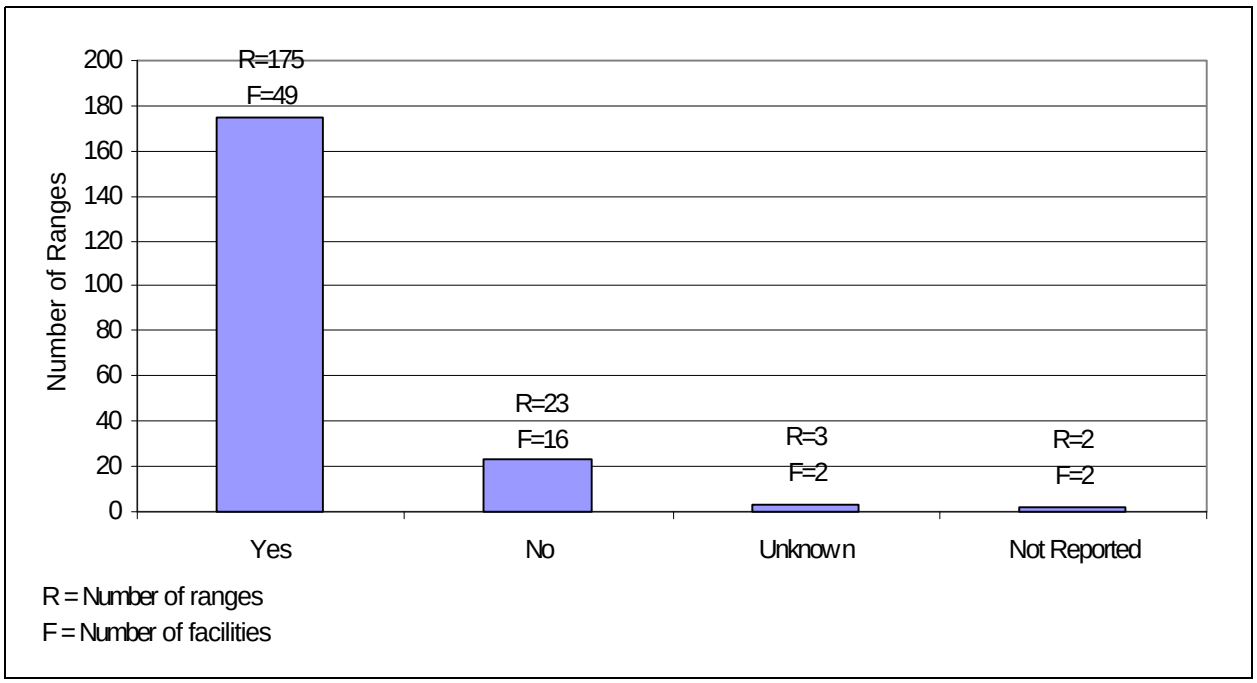

Figure 15. Has UXO Been Found on Range? (by range) (Appendix C, Table C-7)

3.4.2 Have Chemical or Biological Weapons Been Found or Suspected on Range?

Fifty-five percent of respondents indicated that chemical or biological weapons were found or suspected on their ranges, as shown in Figure 16.

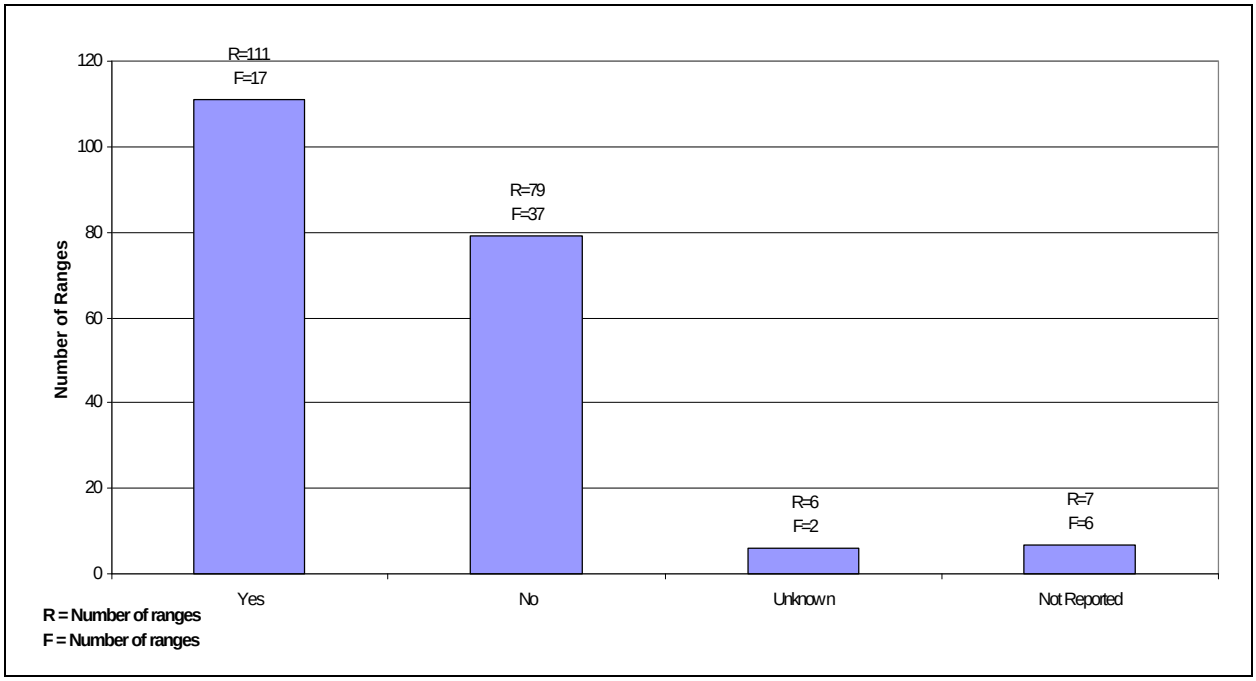

Figure 16. Have Chemical or Biological Weapons Been Found or Suspected? (by range) (Appendix C, Table C-7)

3.4.3 Known or Suspected Potential Off-Range or Off-Site Problems

The vast majority of RPMs reported no off-range impacts. On only 20 percent of reported ranges did the respondents believe that there was a possibility that munitions affected off-range areas. Munitions may be found on off-range areas generally because munitions land off range or because of environmental factors that can cause movement of UXO (Figure 17). Munitions testing, training, and storage can cause munitions to land off range or outside the planned impact area. In addition, certain soils, erosion, and frost heaving can transport buried, used, or fired munitions across distances and vertically to the ground surface, making surface and off-range areas potential destinations for transported used or fired munitions. Ft. McClellan and Redstone Arsenal, both with a very large number of ranges, reportedly had no known or suspected off-range or off-site problems.

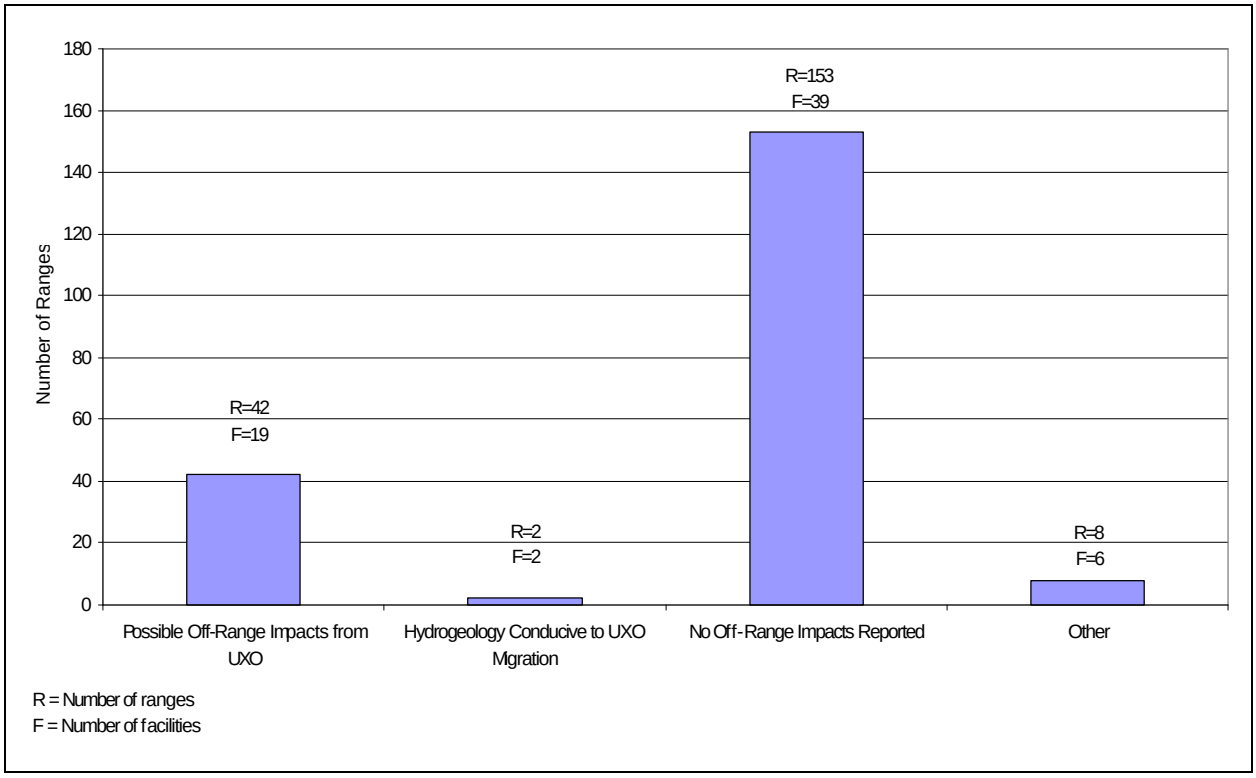

Figure 17. Potential Off-Range Problems (by range) (Appendix C, Table C-8)

3.5 Incidents Involving UXO

In response to a question regarding UXO-related problems and incidents involving UXO, the Regions reported a variety of problems, including accidental explosions, public encounters with UXO, and the unexpected discovery of UXO during the investigation or cleanup of hazardous wastes.

Descriptions of UXO "incidents" provided by survey respondents fall into three categories:

- The accidental explosion of UXO
- UXO encounters by the public
- UXO uncovered during investigations

EPA Regions report that UXO "incidents" have occurred at 24 facilities. As illustrated in Figure 18, two accidental explosions of UXO occurred in which injuries were sustained, and three incidents causing fatalities occurred, with a total of five accidental UXO explosions at two different ranges.[11] In addition, a total of 38 individual encounters with UXO were documented by the survey, none of which resulted in injuries or fatalities. Of those, 25 occurred at the Lowry Bombing Range (see text box that follows).

Examples of UXO on former DoD property

In May 1997, 37 mm shells were discovered in the Tobyhanna State Park, adjacent to Tobyhanna Army Depot. Portions of the old artillery range are located in the 150-acre state park campground. The subsequent removal action identified and recovered 210 additional live UXO items over a 500 acre area.

The Arapahoe County Sheriff's Office bomb squad has responded on at least 25 occasions to reports of potentially live UXO on the surface of the Lowry Bombing Range, located near the City of Aurora, Colorado. During those responses, the Sheriff's Office detonated approximately 37 pieces of potentially live ordnance. In addition, in January 1996, a ranger drove over and ignited a white phosphorus burster with his pickup truck, which started a small range fire. The USACE is currently engaged in a large-scale evaluation and cleanup of this FUDS property as part of a settlement with the State of Colorado.

[11]Two of the fatal explosions and both of the explosions causing injuries occurred at Picatinny Arsenal.

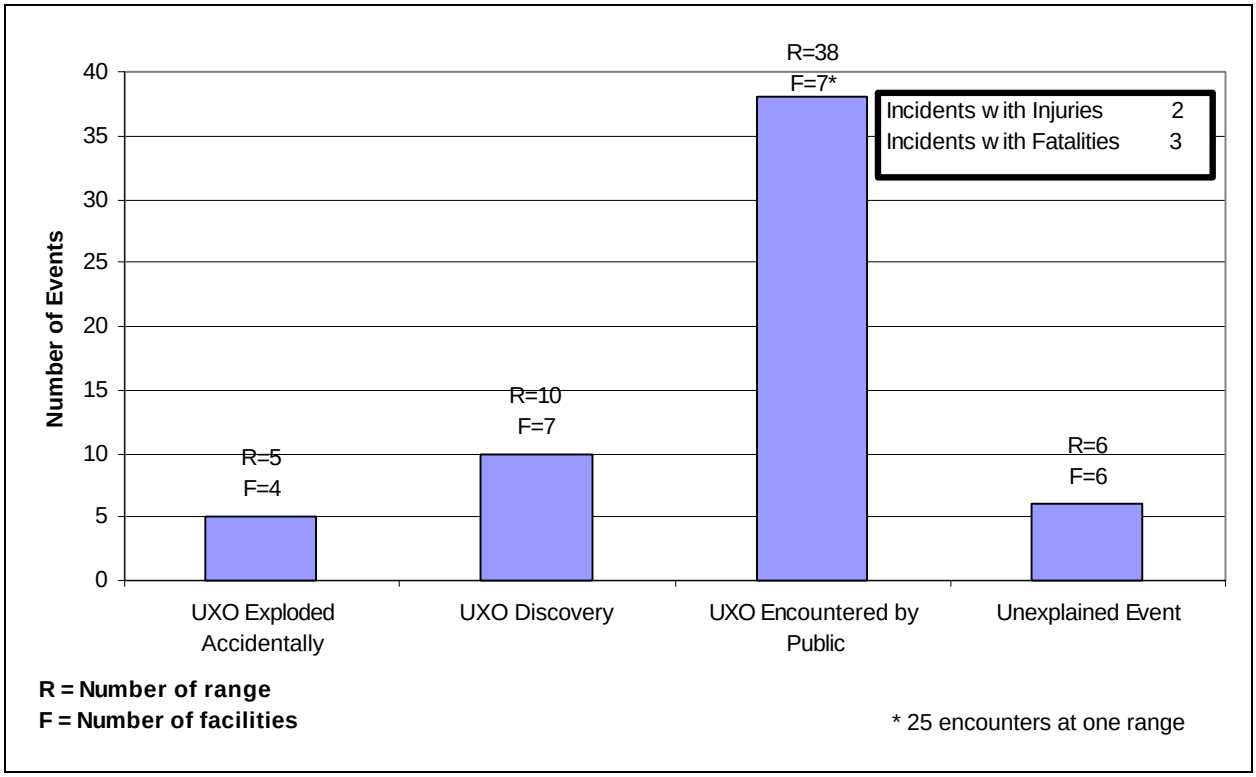

Figure 18. Incidents Involving UXO (by range) (Appendix C, Table C-9)

4.0 RANGE MANAGEMENT

4.1 Introduction

Range management involves a wide variety of activities, including control of access to a range, property management, and potentially range investigation and cleanup. The involvement of governmental regulators in the management and cleanup of a CTT or inactive range is a function of range ownership, as well as of the regulatory status of the installation on which the range is located. In cases where the Army owns the range and the facility on which it is located, the Army will probably also manage the range. At CTT ranges that are BRAC or FUDS, the Army (through USACE) is often involved in overseeing range investigations and cleanup. (See Appendix D for data relating to this chapter.)

4.2 Survey Responses on Who Manages the Range?

Survey respondents identified DoD as the current manager of 91 percent of the ranges. Within DoD, the Army **manages** the majority of ranges in the survey, with the Navy and Air Force managing equal and significantly lower percentages, as illustrated in Figure 19. This is not surprising, as the Army is also the largest **owner** of ranges, currently owning 63 percent of the DoD-owned ranges in the survey. (See Figure 6.) The large number of respondents who identified the Army as the range manager (123 ranges) reflects the large number of ranges at Ft. McClellan and Redstone Arsenal, which are included in this category. Twenty-six facilities are represented by the ranges managed by the Army.

The category Other Federal Agencies includes the U.S. Fish and Wildlife Service (FWS). For example, Nomans Land Island, off the shore of Massachusetts, is being converted to park land under the management of the FWS. The category Other includes respondents who indicated that the range is managed by a contractor, such as in the case of a Government-Owned, Contractor-Operated (GOCO) facility, or by State or local authorities.

Who manages the range?

The Washington, D.C., Army Munitions Site in Spring Valley was used for the development, testing, and disposal of chemical weapons during World War I and immediately thereafter. At that time, the area was rural with the exception of the small university. The site, which is adjacent to and includes portions of American University, was closed in the 1920s, and transferred to private ownership. The property was later developed for residential use. Chemical and other weapons have been found during a series of investigations over the past 10 years. The cleanup of this FUDS site is being managed by the Army through USACE and the cleanup is being overseen by EPA Region III and the D.C. Government. The property today is owned by individual homeowners and by American University.

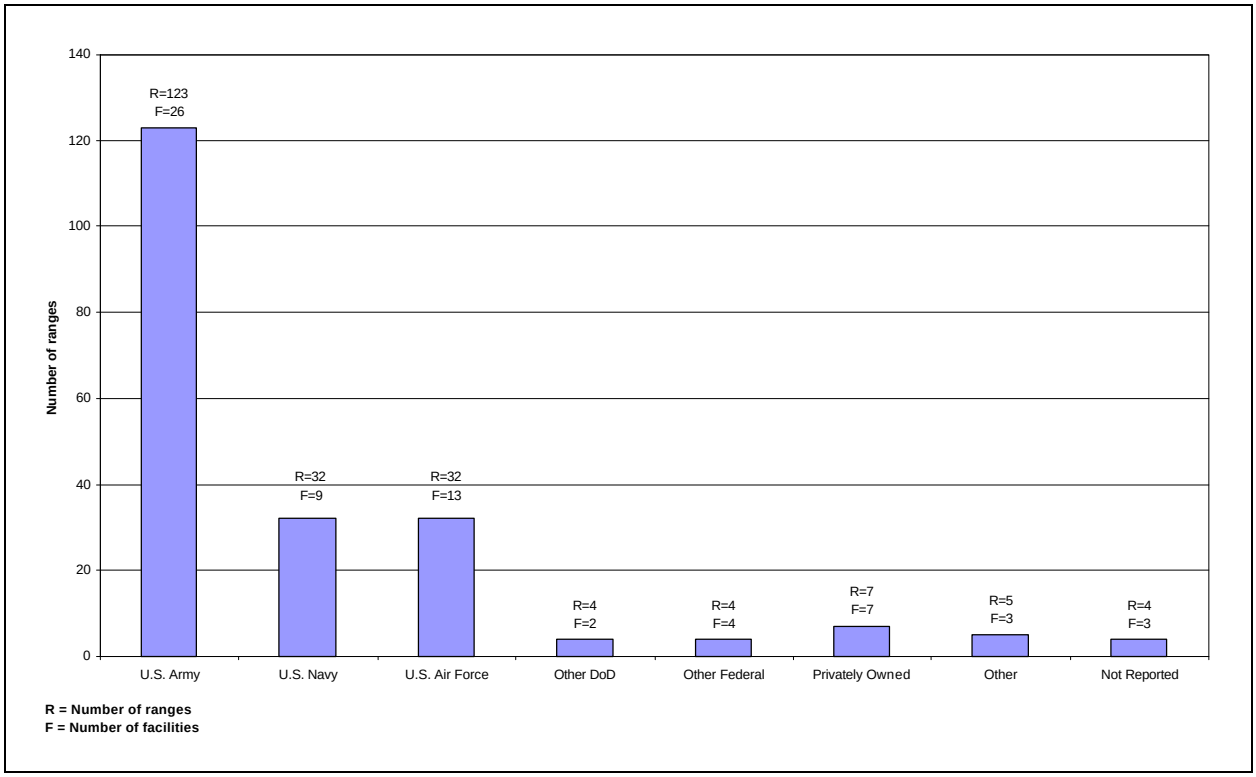

Figure 19. Who Manages the Range? (by range) (Appendix D, Table D-1)

4.3 Utilization of the U.S. Army Corps of Engineers

USACE is reported to have the most significant role in the management of ranges and range investigation and cleanup. According to the survey responses, they have been involved in the investigation and cleanup operations on almost all of the ranges that are currently undergoing or have undergone investigation and cleanup in the past (Figure 20). In fact, USACE has been used on 65 percent of the total number of ranges reported in this survey. As the technical center of expertise for DoD in matters relating to UXO, the U.S. Army Engineering and Support Center, in Huntsville, Alabama, is involved in many of the UXO investigations and clearance activities throughout the country. The mission of the center, also known as the Ordnance and Explosives Mandatory Center of Expertise (MCX) and Design, is "To safely eliminate or reduce risks from ordnance, explosives and recovered chemical warfare materiel at current or formerly used defense sites." The role of USACE varies from range to range and includes the full spectrum of cleanup-related activities. On the majority of ranges, USACE performs technical assessments (Figure 21). USACE is also involved in remediation, contract oversight and management, as well as other activities such as design and implementation of land use controls, including engineering, site access, and institutional controls. It should be noted that the number of responses indicating USACE involvement in technical assessment, contractual oversight and management, and other activities reflect responses from Ft. McClellan, Redstone Arsenal, and NAF Adak, all of which have large numbers of ranges and all of which have used USACE.

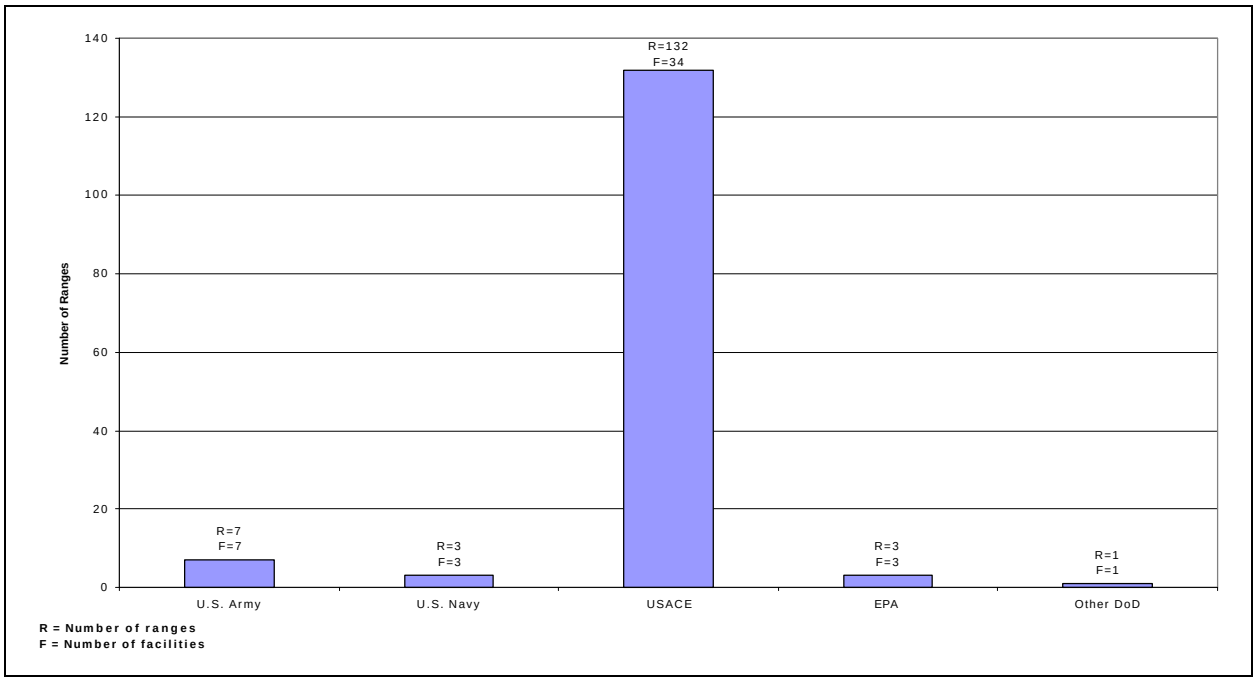

Figure 20. Organizations That Conducted Range Investigation and Cleanup Activities (by range) (Appendix D, Table D-2)

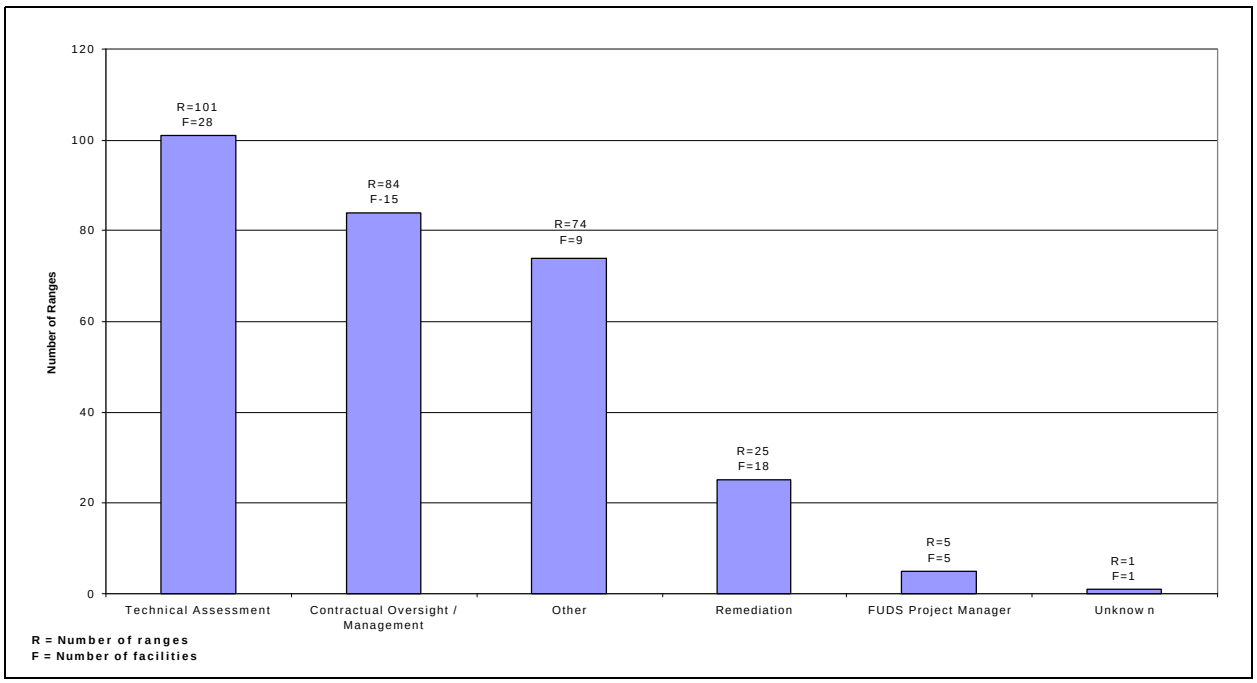

Figure 21. USACE Role in Investigation and Cleanup (by range) (Appendix D, Table D-3)

4.4 Activities on Range

The types of environmental activities conducted at ranges vary from preliminary assessment to post-remedial and post-removal activities. The majority of ranges reported in this survey are in the time-consuming, detailed characterization phase (Figure 22). A significant number of ranges are further along in the cleanup process, at the cleanup/response phase. One facility, Ft. McClellan, represents 60 of the 126 ranges at which characterization has been performed. For the purpose of this report, five categories of response activities are described in Table 4-1.

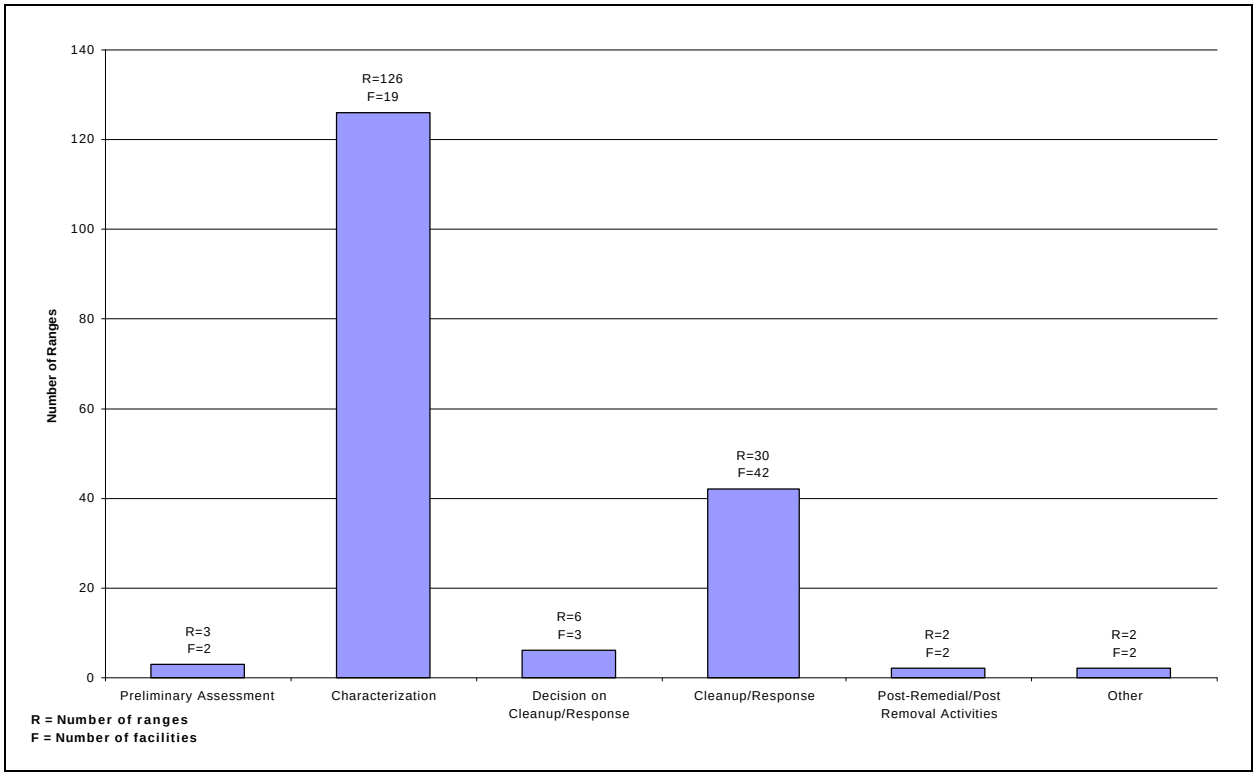

Figure 22. Latest Phase of Cleanup Activities Conducted (by range) (Appendix D, Table D-2)

Table 4-1. Stages of Response

Stage of Cleanup	Definition	CERCLA Term	RCRA Term
Preliminary Assessment	Preliminary review of area or site prior to deciding if more detailed investigation or cleanup is necessary.	Preliminary Assessment/ Site Investigation (PA/SI)	RCRA Facilities Assessment (RFA)
Investigation	Detailed investigation of area or site to determine risk (or no risk) and to decide which remedy is appropriate.	Remedial Investigation/ Feasibility Study (RI/FS) — for remedial program Removal Investigation or Engineering Evaluation/ Cost Analysis (EE/CA) — for the removal program	RCRA Facilities Investigation (RFI) Corrective Measures Study (CMS)
Decision on Cleanup/Response	Formal decision as to what the cleanup activity should be (or the formal decision not to clean up). Usually involves some kind of public review.	Record of Decision (ROD) Action Memorandum (the decision record for a removal action)	Statement of Basis RCRA Permit
Cleanup/Response	Construction of a remedy to clean up the problem or physical removal of the waste from a site. This should also include design phase. Design occurs between decision and cleanup and involves the engineering design of the remedy.	Remedial Action Removal Action	Corrective Measures Implementation
Post-Remedial/Post-Removal Activities	Completion of construction, completion of cleanup, long-term operation of groundwater cleanup systems.	Construction Completion Remedy in Place Response Complete Remedial Action Operations Long-Term Remedial Actions Operation and Maintenance	Corrective Measures Implementation Corrective Measures Completion

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5.0 UXO TECHNICAL ISSUES

5.1 Introduction

Investigating a range to determine the nature and extent of contamination from UXO is technically challenging. Used munitions, both exploded and unexploded, are often buried beneath the surface of the land. If the munitions are on the surface, vegetative cover (e.g., brush, trees, etc.) often obscures visual inspection and makes assessment both difficult and dangerous.

This chapter summarizes the scope of the UXO technical issues pertaining to ranges discussed in this survey report. (See Appendix E for the data for this chapter.)

5.2 UXO Assessment Problems

The Regions reported that 84 of the 203 ranges (41 percent) have had at least one type of assessment problem (Figure 23). However, they also reported that range assessment problems had not been encountered at 34 ranges (17 percent). In addition, 69 ranges reportedly were not assessed (34 percent). The problem most frequently reported was incomplete historical records of range activities. Incomplete historical records may be an obstacle to an investigation, as they can help define how an area was used as a range and identify the types of munitions that were employed there. Inadequate historical information may make risk management decisions more challenging. Another obstacle to assessment is difficult terrain, because thick vegetation and groundcover or rugged landscapes can conceal UXO from detection and make access difficult to those conducting the assessment. The category Other includes problems such as false alarms or the misidentification of anomalies resulting from limitations in detection technologies. These false alarms often result in incorrect estimations of UXO density and often lead to an increase in excavation and cleanup costs. Because of the difficulty, danger, and time required to excavate UXO, the high investigation and remediation costs per acre are exacerbated by a high false alarm rate.

The apparent inconsistency between the large number of ranges at which no assessment has yet been performed and Figure 22, which shows that most ranges have reached the characterization stage, is the result of contradictory information regarding activities at the 61 ranges at Ft. McClellan. The survey respondent at Ft. McClellan expressed frustration with the investigative activities and suggested that assessment has not “really” begun. However, fact sheets published by EPA and DoD state that investigations have started on the ranges at the facility.

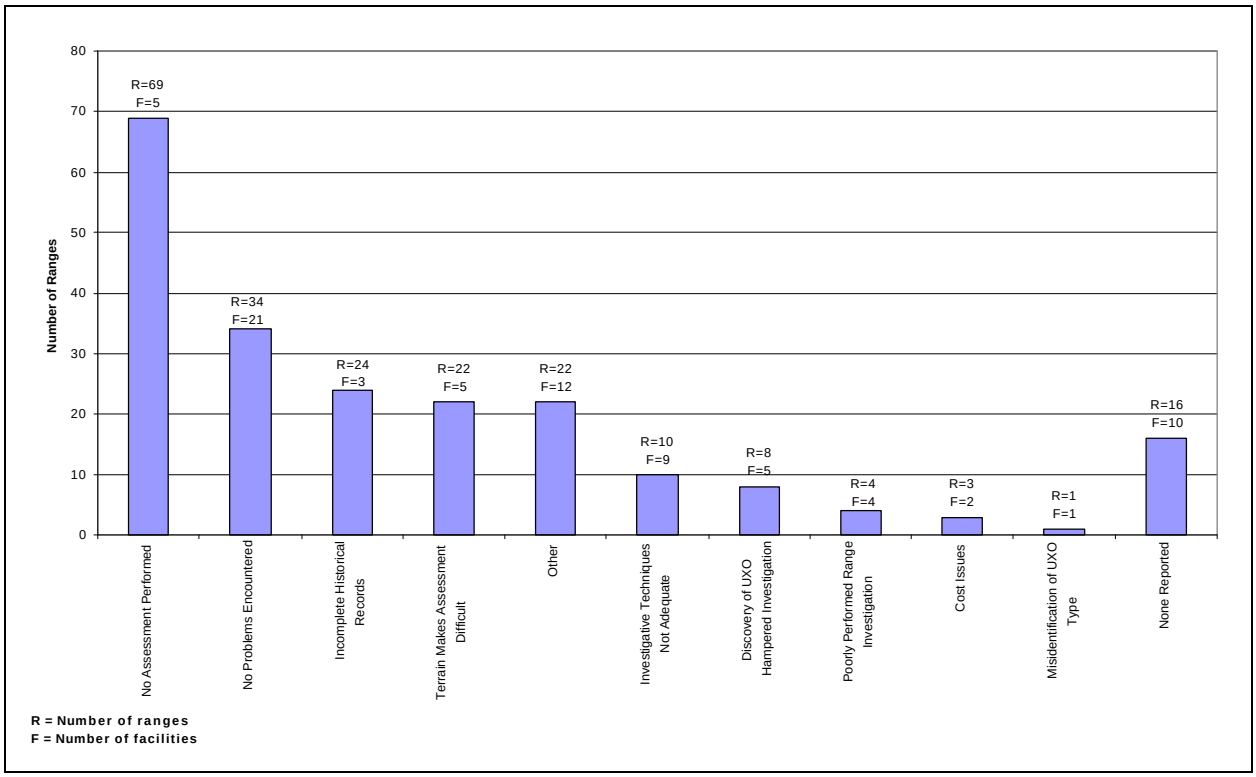


Figure 23. Assessment Problems (by range) (Appendix E, Table E-1)

5.3 Remediation Problems

According to survey respondents, almost 40 percent of the ranges have not yet initiated remediation activities. (See Figure 24.) However, caution is advised with regard to this figure as previous removal actions may have occurred without RPM knowledge. Many ranges (29 percent) reported that no remediation problems were encountered. Among the 42 ranges reporting problems, issues relating to cost were the most commonly cited remediation concerns (Figure 24). Respondents also identified technical issues, such as the need for special equipment that is well suited to range-specific conditions or uncertainty about which detection technologies to employ, as causes of remediation problems. In addition, poorly performed assessments that may fail to define potential range hazards were cited as a cause of remediation problems. The category Other describes a variety of problems, including liability issues, noise complaints, unclear lines of authority relating to the monitoring of removal and remediation activities, and the unavailability of technology for closed detonation.

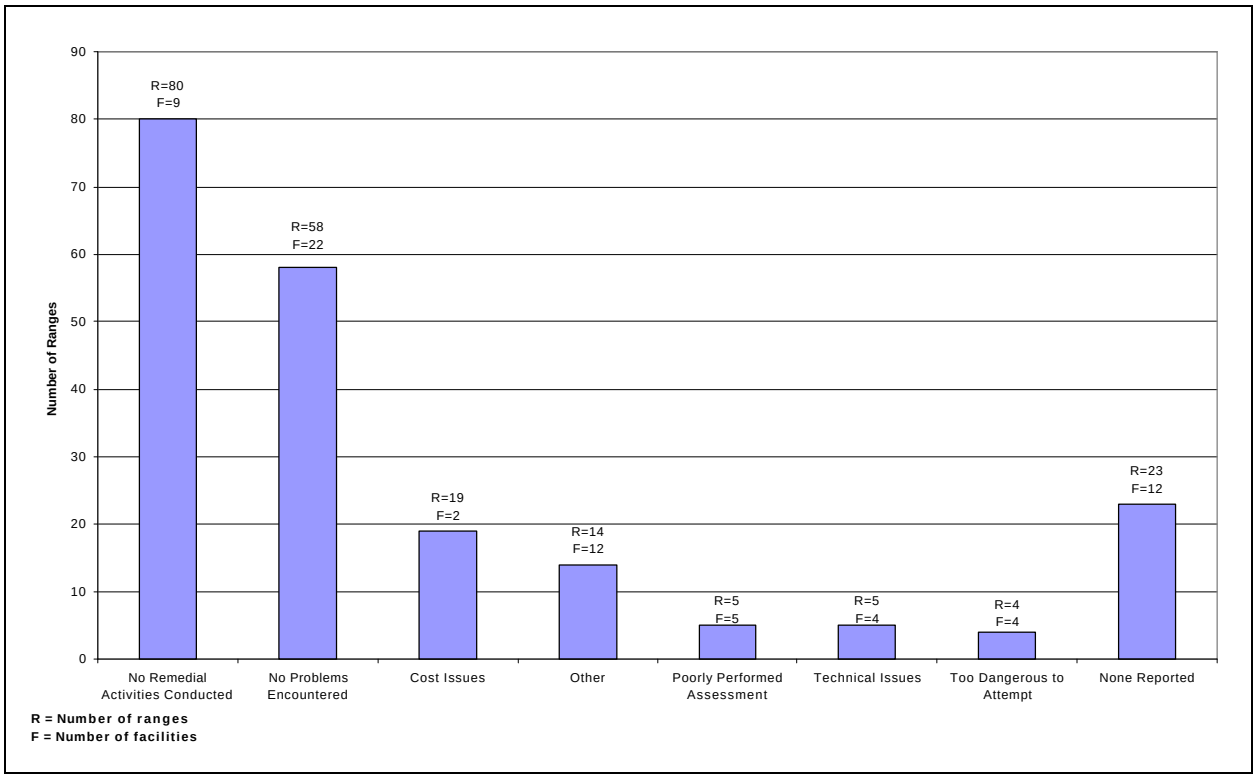


Figure 24. Remediation Problems (by range) (Appendix E, Table E-2)

5.4 Use of Statistical Methods To Define the Extent of UXO

5.4.1 Use of Statistical Methods on Ranges

USACE has developed statistical sampling techniques that are used in combination with risk estimation procedures in order to determine the extent of cleanup. Statistical grid sampling methods are frequently used in an attempt to determine the location and density of UXO on ranges. Statistical grid sampling on ranges employs assumptions that some may question. For example, one technique relies on an assumption of uniform distribution of UXO over a given area, which may not be the case. Much concern has been expressed to EPA Headquarters about range characterization and sampling techniques.

As illustrated in Figure 25, statistical methods were employed at almost 40 percent of ranges in an attempt to define the extent of UXO contamination.

5.4.2 Recommendations Based on Statistical Methods

Of the 78 ranges (at 17 facilities) that report using statistical techniques, recommendations based on statistical sampling that the Regions could not support were made at 71 ranges (at 11 facilities) (Figure 26).

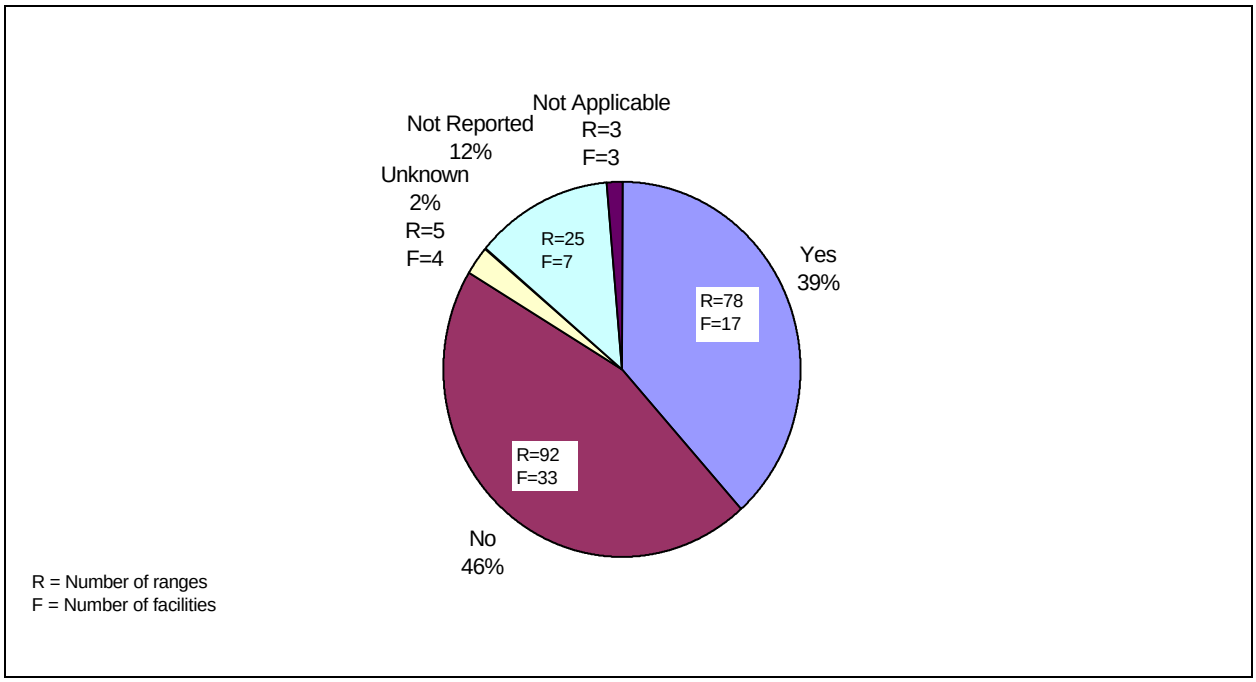


Figure 25. Have Statistical Methods Been Used on Range? (by range) (Appendix E, Table E-3)

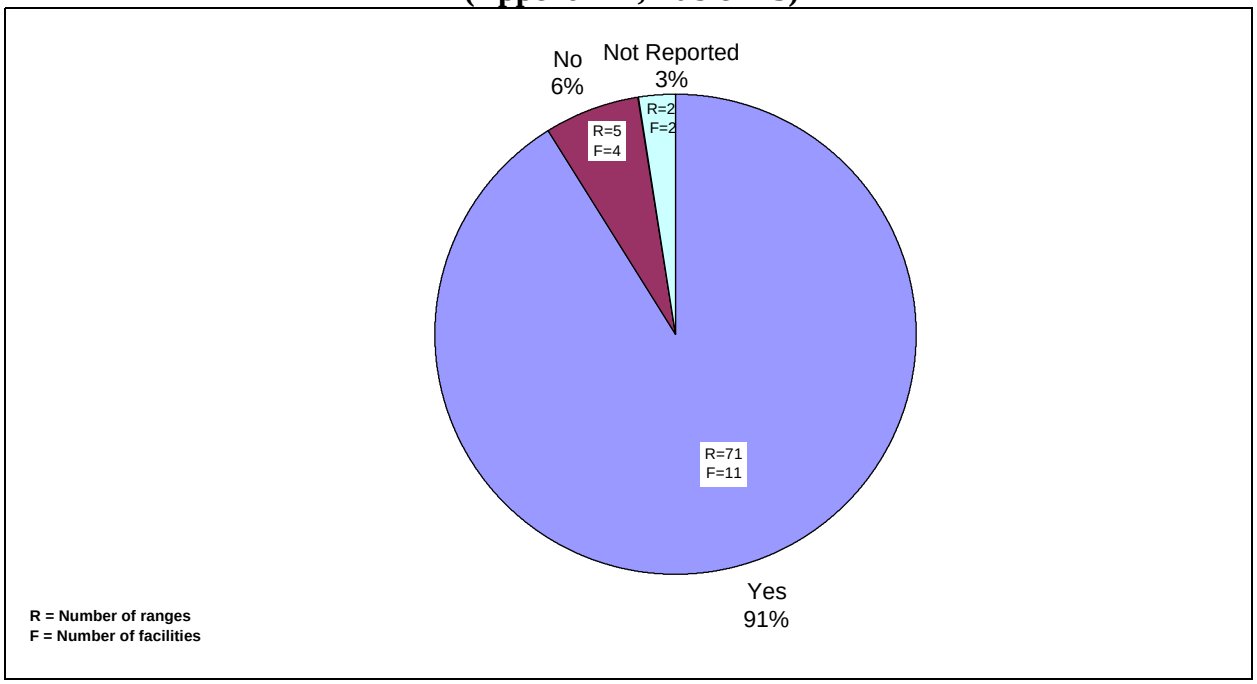


Figure 26. Were Recommendations Generated That EPA Could Not Support? (by range) (Appendix E, Table E-3)

5.5 Addressing UXO

5.5.1 Indications by DoD Organization or Contractors That UXO Will Not or Cannot Be Addressed

EPA Regions reported that at almost half of the 203 ranges surveyed (at 16 facilities), the Army or Navy said that UXO will not or cannot be addressed (Figure 27). Survey narratives identified several rationales for why UXO may not be addressed. First, the costs of remediation on a large range can be enormous. In some cases, cost becomes a consideration that has far-reaching consequences for the environmental investigation and cleanup program at the range (see text box that follows). In addition, because it is possible that DoD plans to maintain ownership and control of an inactive range for its potential future use, treating the UXO on range may not be a priority. Alternatively, DoD may plan to transfer the land to a use not inconsistent with range use. For example, the Oneida Indian Nation in New York State plans to train its police force at a range on Griffis Air Force Base, thus allowing future use that is consistent with the current use of the range. The large number of ranges on which a statement was reported that UXO will or cannot be addressed also reflects the large number of ranges at Ft. McClellan (61) and NAF Adak (18) that fall into this category.

UXO costs and assessments.

An example of a situation in which UXO may not be addressed is the case of NAF Adak, a facility on the remote Adak Island in Alaska, at which over 30,000 acres have been affected by range activities and where more than 77,000 munitions or pieces of munitions have been discovered since 1945. In addition to its sprawling size, NAF Adak has thick vegetation, variable topography, soft ground, and high water tables, which make UXO assessment difficult and expensive. The Navy has maintained that it is technically infeasible and may be too costly to clear UXO from NAF Adak. The remedial investigation was originally estimated to cost between $30 and $50 million. EPA Region 10, the State of Alaska, and the Navy are engaged in a collaborative effort to find an alternative means to assess the site.

5.5.2 Situations Out of Regulator's Control That Needed Immediate Attention

Eighty percent of the respondents stated that they did not face any situations regarding UXO that they felt were out of their control. The large number of responses indicating that there have not been situations regarding UXO that are out of the regulator's control reflects the large number of ranges at NAF Adak, Ft. McClellan, and Redstone Arsenal that fall into this category. Fourteen percent, however, indicated that they had faced situations regarding UXO that they felt were out of their control but needed immediate attention (Figure 28). The situations described by respondents included a variety of concerns. One EPA respondent felt "out of the loop" and was therefore not entirely comfortable with the manner in which issues were addressed. Another EPA respondent highlighted a more specific concern that OB/OD was occurring without review of whether render safe procedures would be applied to safely store ordnance until the arrival of a detonation chamber.

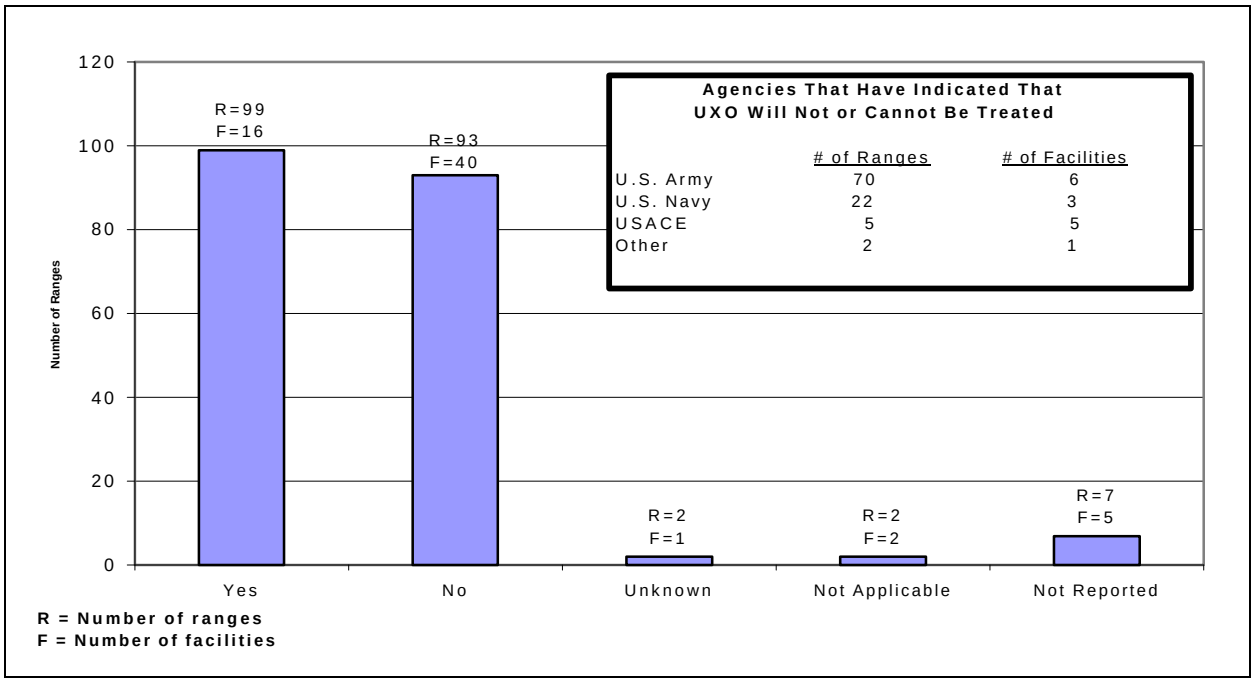


Figure 27. Has Any DoD Organization Indicated That UXO Will Not or Cannot Be Addressed? (Appendix E, Table E-4)

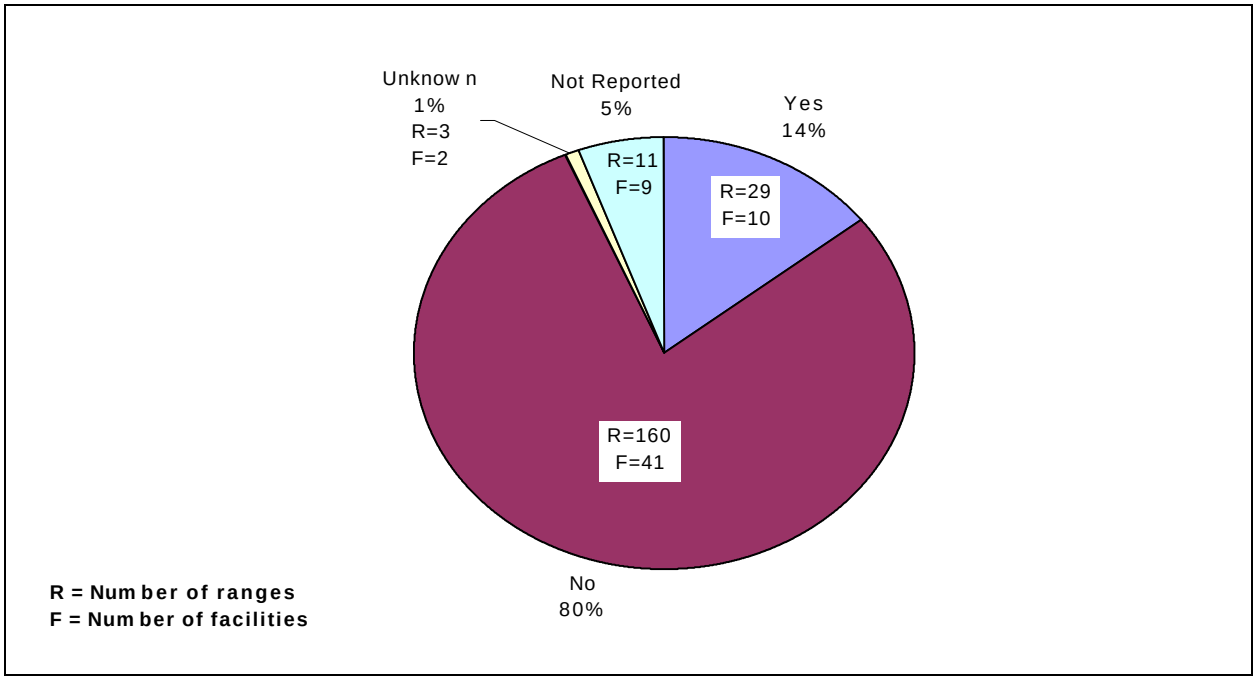


Figure 28. Did You Face Any Situations Regarding UXO That You Felt Were Out of Your Control but Needed Immediate Attention? (by range) (Appendix E, Table E-5)

6.0 REGULATORY STATUS AND ISSUES

6.1 Introduction

As described in Chapter 1.0, the framework for regulating the investigation and cleanup of CTT and inactive ranges is complex and evolving. CERCLA, with its framework regulation provided by the NCP, may provide the regulatory setting. RCRA also provides applicable statutory authority and numerous regulatory requirements for the management of solid waste (Subtitle D) and hazardous waste (Subtitle C). Safety and cleanup standards are effectively provided within the DDESB regulations known as DOD 6055.9-STD. This report does not attempt to clarify regulatory requirements, but confirms existing uncertainties at the field level over which organization can best manage UXO and which regulatory authority best addresses UXO situations.

6.2 Range Regulatory Authorities

With potentially overlapping regulatory requirements, the regulatory landscape is complicated. EPA plays an active oversight role at NPL and BRAC facilities, but the States usually take the lead for oversight at non-NPL facilities. Under RCRA, State or Federal regulatory authorities may make the State agency the lead regulator.

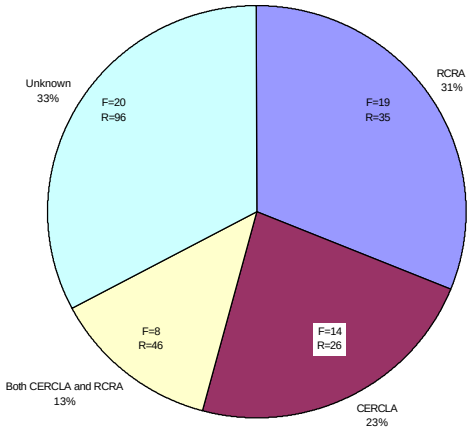
6.2.1 Under What Program Is Range Regulated?

There was no specific survey question asking respondents which programs regulate the ranges; therefore, this information was derived or interpreted from other survey questions that provided clues to the regulatory program governing the range. However, the survey instrument asked the Regions to identify whether the range or site is under a Federal Facilities Agreement (FFA). Responses to this and other questions were used to derive or interpret the regulatory program governing ranges. For the purpose of this report, a range that is on an NPL facility and that is specifically identified in an FFA as regulated by EPA was considered a CERCLA-regulated range. A range that is regulated by the State and EPA and has a RCRA Subpart X permit was categorized as a RCRA-regulated range.

Using the approach described above, survey reviewers were able to determine the regulatory program governing 67 percent of the facilities. Twenty-three percent of the facilities are actively regulated under CERCLA, 31 percent under RCRA and 13 percent under both CERCLA and RCRA, as shown in Figure 29.

6.2.2 Who Regulates the Range?

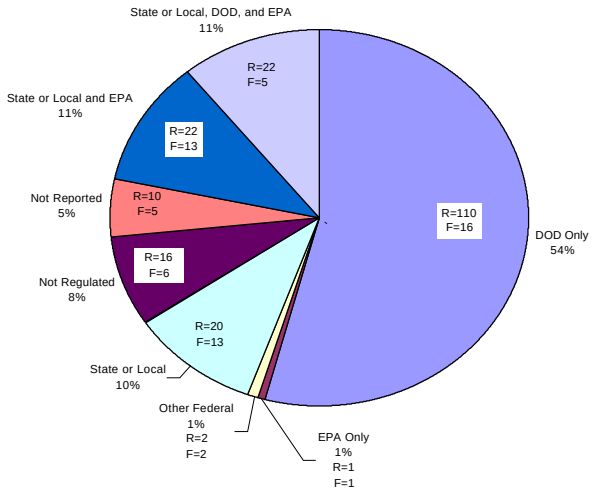
According to survey responses, 54 percent of ranges are regulated solely by DoD (Figure 30), with 83 percent of those ranges under Army regulation. Most ranges identified as regulated solely by DoD are located within facilities that are still operated by DoD. State or local authorities and EPA regulate most of the remainder of the ranges. It should be noted that over half of the 110 ranges regulated by DoD are located at one facility – Ft. McClellan.



Note: The categories CERCLA, RCRA, and Both CERCLA and RCRA represent facilities for which the program that governs at least one range is known. A facility for which it is not possible to discern from the surveys whether the ranges are regulated or under what program they are regulated are categorized as Unknown.

R = Number of ranges
F = Number of facilities

Figure 29. Under What Program Is the Range Regulated? (by facility) (Appendix F, Table F-1)



R = Number of ranges
F = Number of facilities

Figure 30. Who Regulates the Range? (by range) (Appendix F, Table F-2)

6.3 Compliance with CERCLA and the NCP at Sites Where USACE Has Been Utilized

As discussed in Chapter 4.0, USACE was involved in the range assessment and cleanups at 65 percent (132) of ranges. In a different question, respondents were asked whether the activities in which USACE was involved were conducted in compliance with CERCLA and the NCP. In response to this question, the Regions reported that at only 31 ranges were CERCLA and NCP requirements being met. Respondents felt that cleanup or other activities conducted by USACE were not conducted in compliance with CERCLA and the NCP at 70 ranges. It should be noted that 61 of the 70 ranges at which CERCLA and NCP requirements were not being met are located at one facility, Ft. McClellan. However, it is unclear as to how many ranges are represented by the eight other facilities, each of which are counted as one range based on a single survey response. An example that was given of nonconformance with CERCLA includes the inappropriate use of time-critical/emergency responses as the default response action in situations that encompass long-term cleanup and are not emergencies. The use of time-critical/emergency actions may eliminate some of the regulatory oversight, reporting, and public involvement requirements by CERCLA in remedial actions. Descriptions of deviations from CERCLA, as provided in two of the survey responses, are described in the text box that follows.

Ft. Wingate Depot activity, Gallup, New Mexico

The New Mexico Environment Department regulates Ft. Wingate under RCRA permitting. In response to the question regarding whether USACE actions have been consistent with CERCLA and the NCP, the respondent replied, "Not in the clearance operations. It seems that EPA has deferred to DoD's protocols for UXO and range clearance operations, and the Corps has continued to 'do what it does' in this work. There has been no public notice or public participation in the process. The regulators were not given notice either. We have been given brief summaries during BRAC RAB (Restoration Advisory Board) meetings of the work done, but little written documentation has been produced/offered. Without this documentation, we cannot evaluate what has been done."

Ft. McClellan, Anniston, Alabama

The Army regulates Ft. McClellan, which is a BRAC non-NPL facility. In response to the question regarding whether USACE actions have been consistent with CERCLA and the NCP, the respondent replied, "...Deed restrictions are not a concern with the DoD component. They will put the county on notice that a restriction is to be put in place. However, there is no DoD requirement for follow-up. Nothing is done to ensure that any secondary purchaser observes the controls. [The Army] has stated that once the property is transferred, their responsibility is over. There is no incentive for DoD to attempt any type of institutional control enforcement. The NCP does not envision this type of absolution."

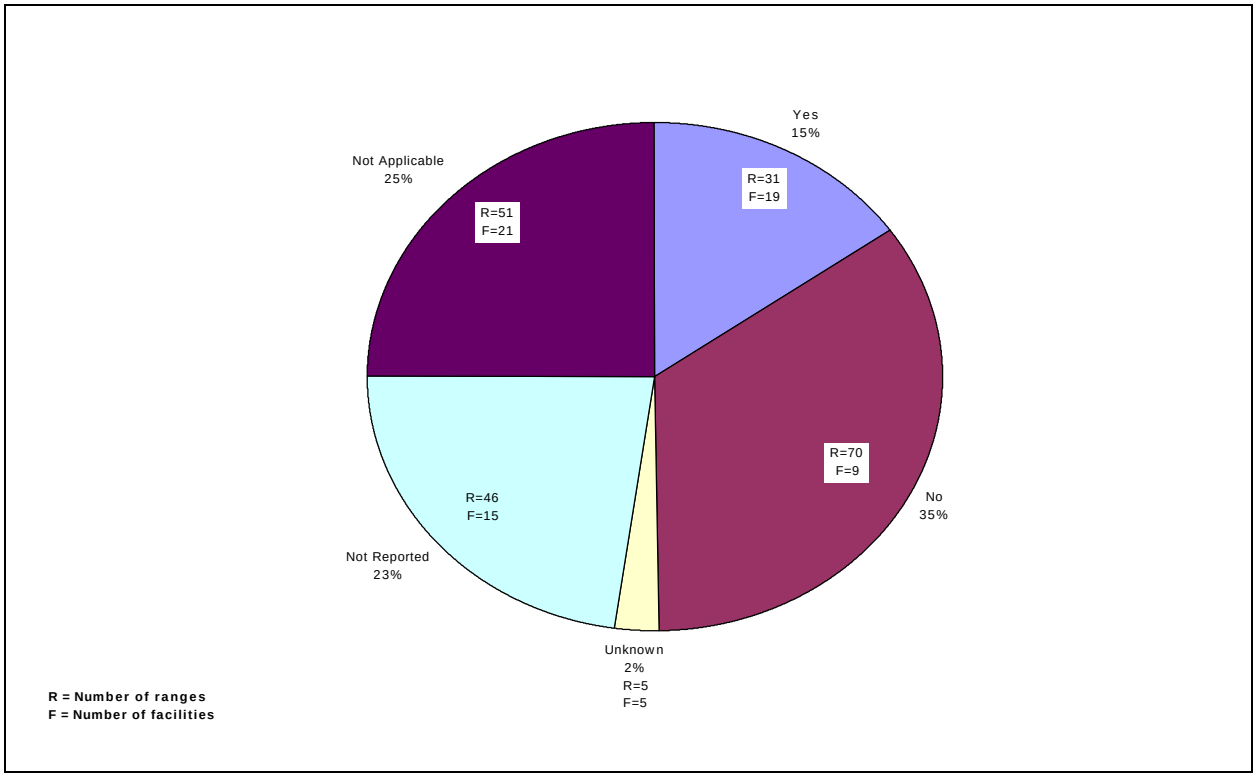


Figure 31. Were Activities Conducted by USACE Consistent with CERCLA and the NCP? (by range) (Appendix F, Table F-3)

6.4 Submission of Draft Work Plans to the Department of Defense Explosives Safety Board for Review and Approval

The DDESB makes policy for all activities relating to munitions on DoD facilities to protect human health and property from explosives hazards, including clearance. As part of its responsibilities for ensuring explosives safety standards, the DDESB must review and approve all plans for leasing, transferring, excessing, disposing of, or remediating DoD real property when ammunition, explosives, or chemical contamination exists or is suspected to exist.[12] According to survey responses from the EPA Regions, draft work plans were submitted to the DDESB for review and approval for just under 60 percent of ranges (Figure 32). The circumstances under which work plans were and were not submitted are not known; therefore, it is not possible to know whether any additional work plans should have been submitted to the DDESB for review and approval.

[12]DoD Ammunition and Explosives Safety Standards, August 1997, Chapter 12, DoD Directive 6055.9 STD.

The role of the Department of Defense Explosives Safety Board

The DDESB was established by Congress in 1928 as a result of a major disaster at the Naval Ammunition Depot in Lake Denmark, New Jersey, in 1926. The accident caused heavy damage to the depot and surrounding areas and communities, killed 21 people, and seriously injured 51 others.

The mission of the DDESB is to provide objective advice to the Secretary of Defense and Service Secretaries on matters concerning explosives safety and to prevent hazardous conditions to life and property, both on and off DoD installations, from the explosives and environmental effects of DoD munitions.

DDESB provides oversight of the development, manufacture, testing, maintenance, demilitarization, handling, transportation, and storage of explosives, including chemical agents on DoD facilities worldwide.

6.5 Open Burning, Open Detonation

Open burning, open detonation (OB/OD) is a commonly used treatment to rid ranges of both used and unused munitions for routine range maintenance; for destruction of excess, obsolete, or unserviceable munitions; and for range cleanup purposes. OB/OD is performed on active, inactive, and closed ranges. The conduct of OB/OD is regulated under RCRA, Subpart X. A RCRA Subpart X permit may be required when used or fired munitions are moved off range for OB/OD or when unused munitions are excessed and destroyed by OB/OD. A permit for OB/OD is required when this approach is used in routine range clearance of an active range. In addition, the Military Munitions Rule postponed applicability of Subpart X to "used or fired munitions that are recovered and then treated at a closed or transferred range."[13]

Eighty-one percent of ranges in the survey have employed OB/OD. The specific circumstances under which DoD conducted OB/OD at these ranges are not known, but respondents indicated that of the ranges on which OB/OD was used, 31 percent obtained a RCRA Subpart X permit (Figure 33).

As shown in Figure 34, the Army performed more OB/OD activities than any other organization. OB/OD was also conducted by other DoD organizations, such as Navy and explosives ordnance disposal (EOD) personnel, and by qualified non-DoD (contractor) personnel hired by the Services or the USACE. The OB/OD activities performed by the Army represent 61 ranges located at Ft. McClellan.

[13]Preamble, Final Military Munitions Rule (62 FR 6632, February 12, 1997).

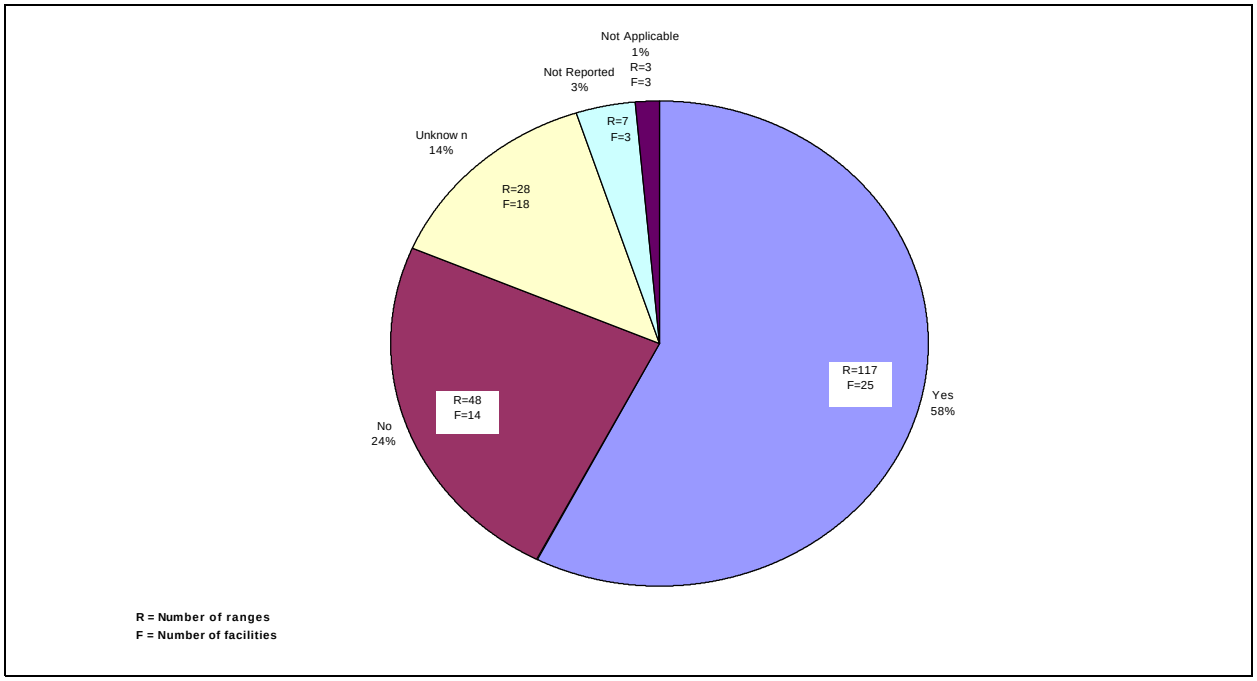


Figure 32. Were Draft Work Plans Submitted to the DDESB? (by range) (Appendix F, Table F-4)

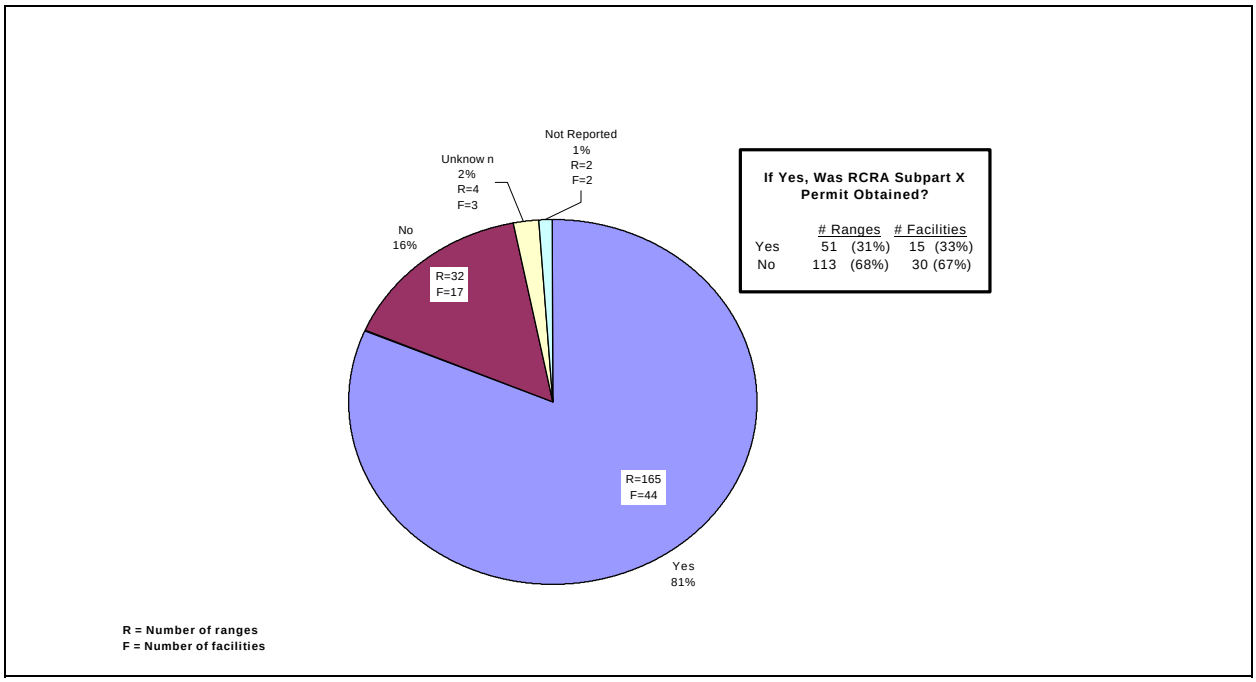


Figure 33. Have Any OB/OD Activities Been Performed at Range? (by range) (Appendix F, Table F-5)

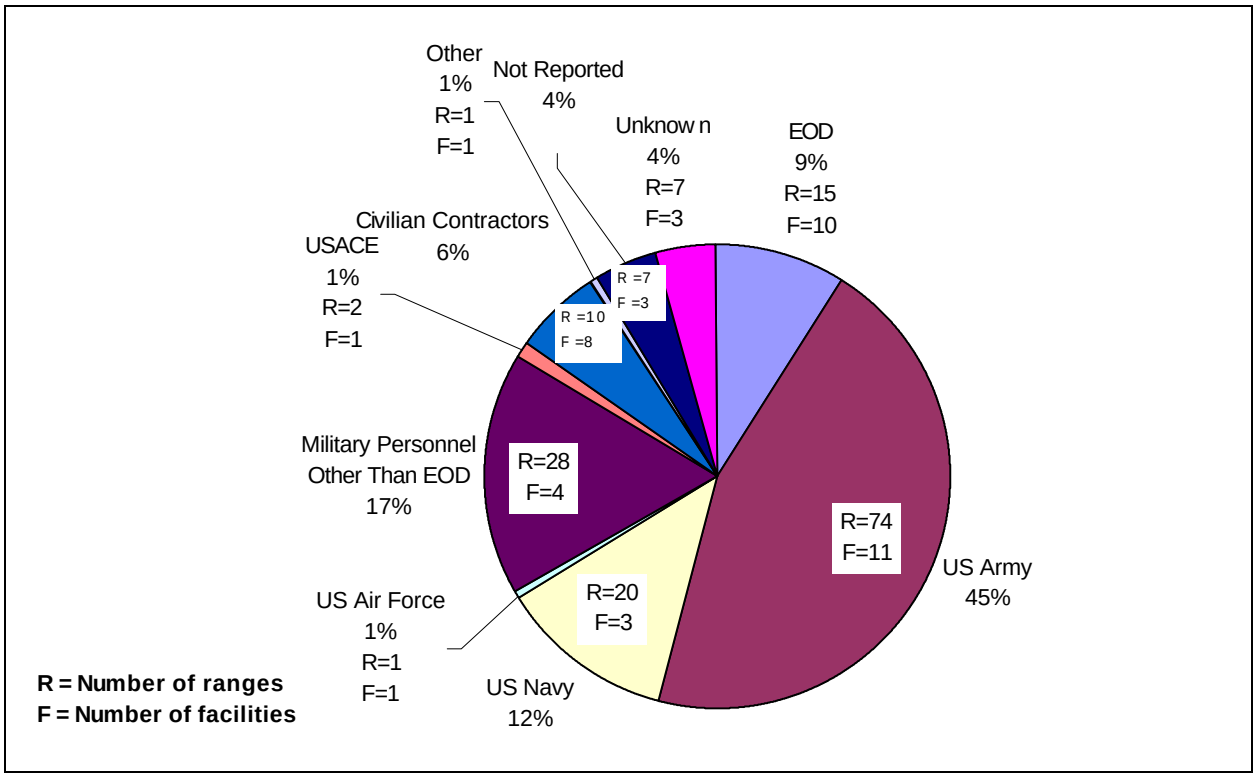


Figure 34. Who Performed OB/OD Activities? (by range) (Appendix F, Table F-5)

6.6 Is the Range or Site Covered by a Federal Facilities Agreement (FFA), State Cleanup Agreement, Permit, or Order?

According to CERCLA Section 120(e)(2), DoD must enter into an interagency agreement with the EPA Administrator "for the expeditious completion of all necessary remedial action" at a DoD facility on the NPL. Those agreements are usually referred to as FFAs but may also be called interagency agreements (IAGs). States may be a party to FFAs as well. In addition, other regulatory agreements document the requirements that govern site cleanup. These may include State cleanup agreements (between DoD and the State), State cleanup permits, and administrative orders.

When an FFA is in place, it governs the relationship between the regulators and the regulated party (DoD), and usually specifies (either directly or by reference to another document) the sites on the facility that are covered by the FFA. If the FFA lists the ranges either directly or by reference, the cleanup is unambiguously covered by CERCLA and the FFA.

In order to obtain additional clarification of the regulatory status of the ranges in the survey, the survey asked respondents whether the range is covered by any regulatory agreements. Only 78 ranges are specifically covered under some type of agreement (Figure 35). The distribution of agreement types is shown in Figure 36, with the majority of agreements being FFAs. For 26 percent of the ranges covered by written agreements, respondents did not identify the type of agreement that applies to the range. Of the 120 ranges reportedly not covered by an agreement, 83 are located at

two facilities, Redstone Arsenal and Ft. McClellan. However, it should be noted that an additional 24 facilities representing an unknown number of ranges report that they are not covered by an agreement.

Of ranges covered by a regulatory agreement, 61 percent were described as covered by an FFA (Figure 36). Given the number of facilities where the party regulating the range was not reported, and given the level of uncertainty in all the numbers, this percentage is not inconsistent with previously reported data, which showed that 23 percent of the ranges are regulated by EPA (Figure 30).

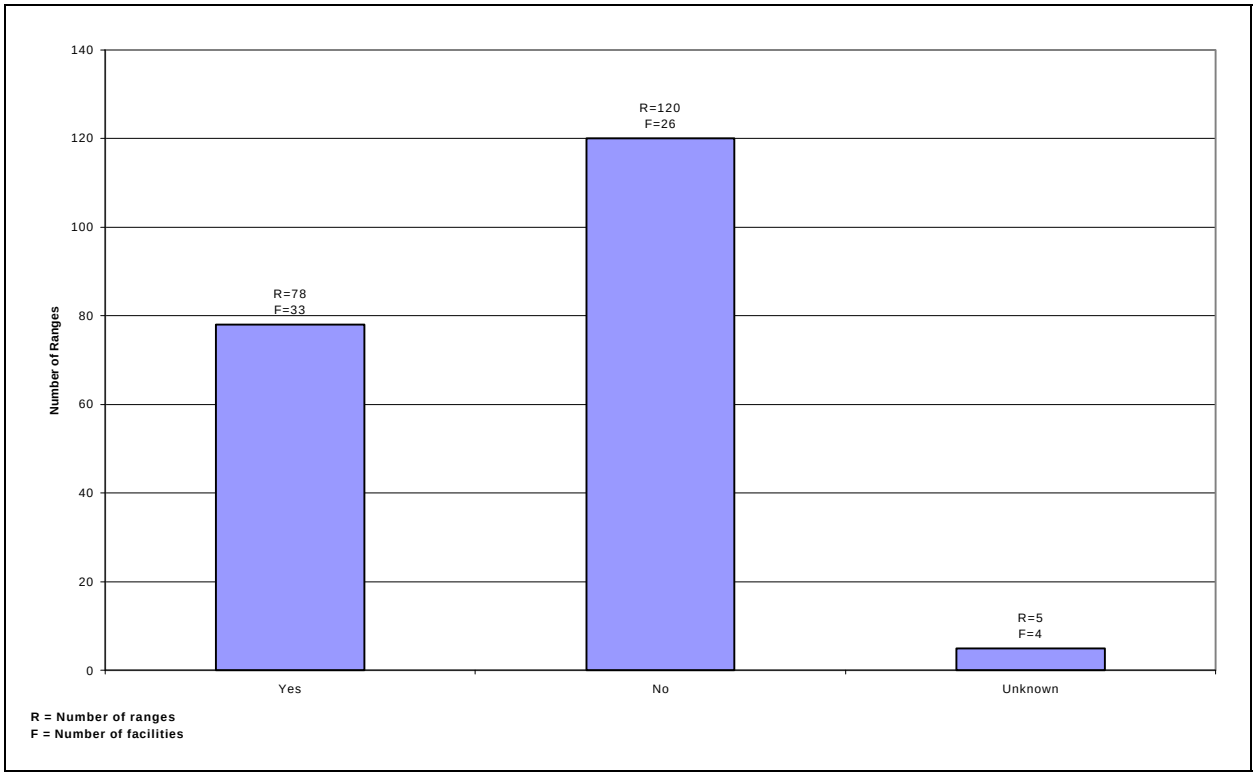


Figure 35. Is the Range Covered Under an FFA, a State Cleanup Agreement or Permit, or an Administrative Order? (by range) (Appendix F, Table F-6)

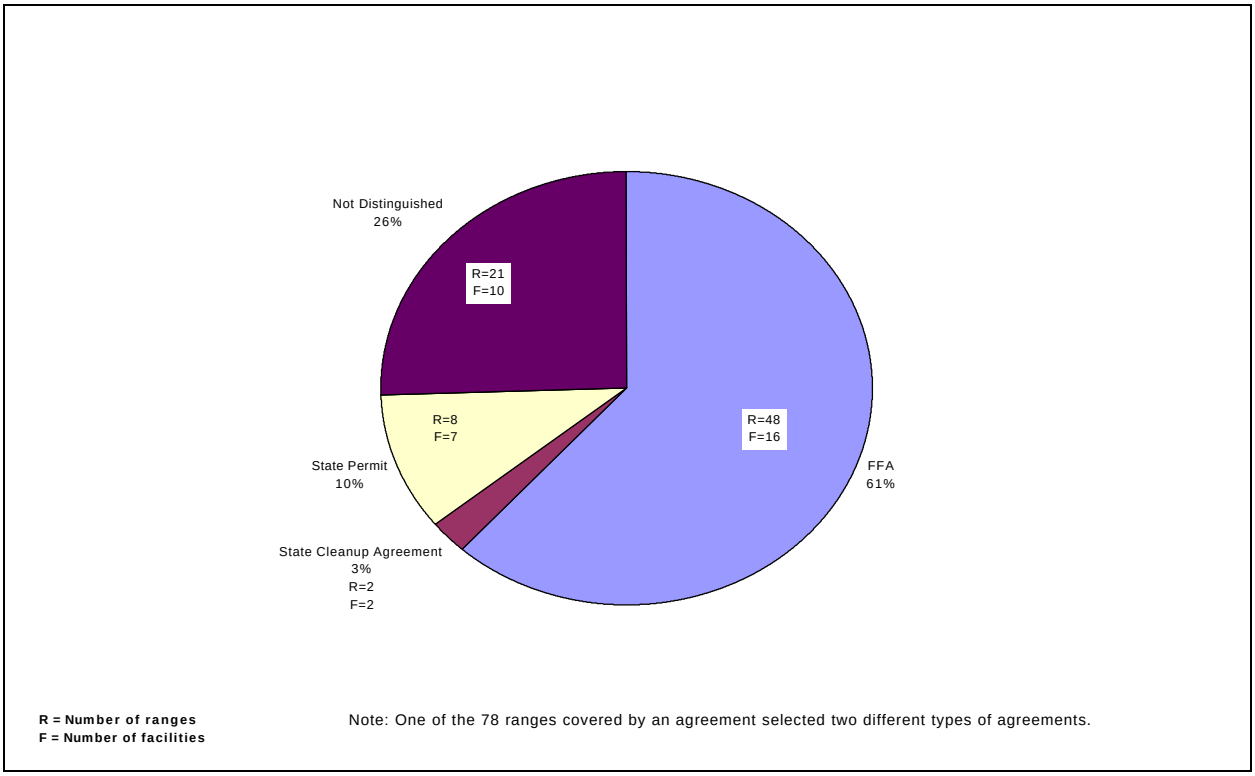


Figure 36. Types of Agreements, Permits, or Orders? (by range) (Appendix F, Table F-6)

6.7 Institutional Controls/Land Use Controls

Institutional or land use controls are engineering or site access controls that separate people from hazards (e.g., a fence) or legal, regulatory, and procedural controls that perform the same function (e.g., deed restrictions, zoning). All are commonly used to protect the public from UXO and other environmental hazards. The techniques used on a range may include fencing the area of UXO contamination, posting warning signs, notifying local authorities, placing deed restrictions on the property, imposing groundwater or dig restrictions, or designing facility-specific security procedures.

According to survey respondents, 46 percent of ranges are known to employ institutional or land use controls. The most commonly used type of land use control is fencing the area to keep out trespassers (Figure 37), but a variety of facility-specific procedures are also used, such as posting guards and patrols. Respondents also were asked if institutional controls have been effective. Of the 99 ranges that have employed institutional or land use controls, 33 percent reported that they have been effective, 25 percent reported that they have not been effective, and 37 percent either did not know or did not report on the effectiveness of these controls (Figure 38). These latter categories are very important and likely point out the difficulties in measuring the effectiveness of institutional controls.

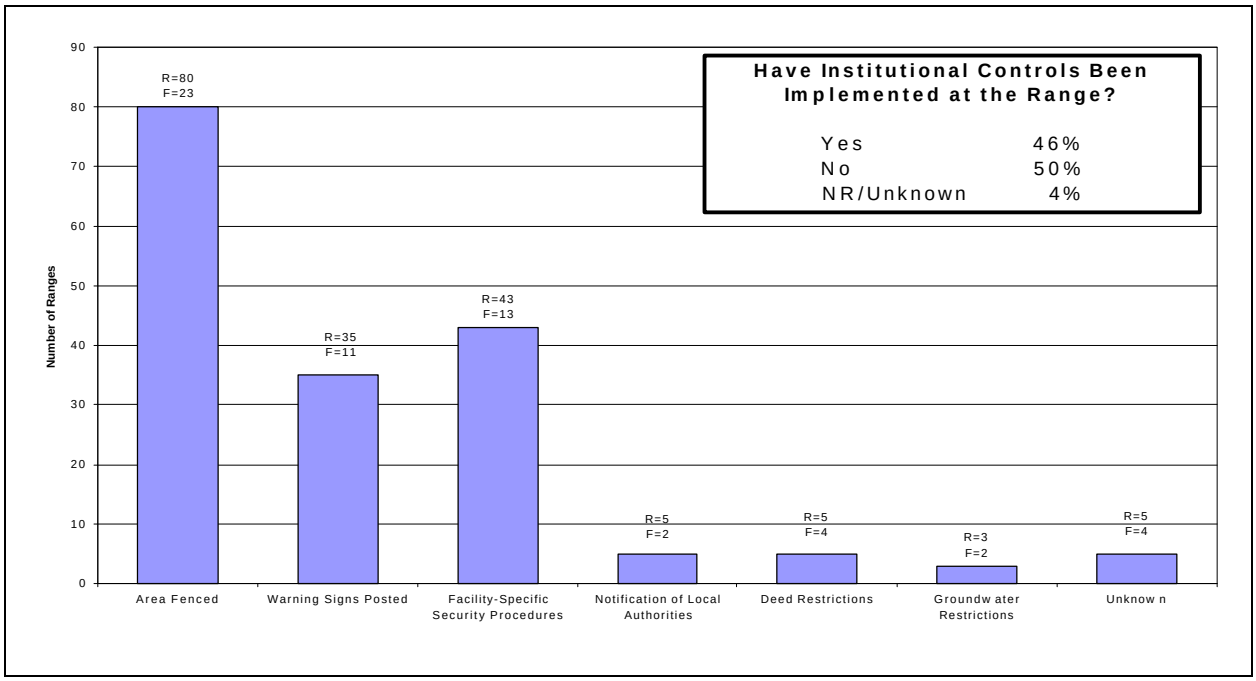


Figure 37. Have Institutional Controls Been Implemented at Range, and if So, What Types? (by range) (Appendix F, Table F-7)

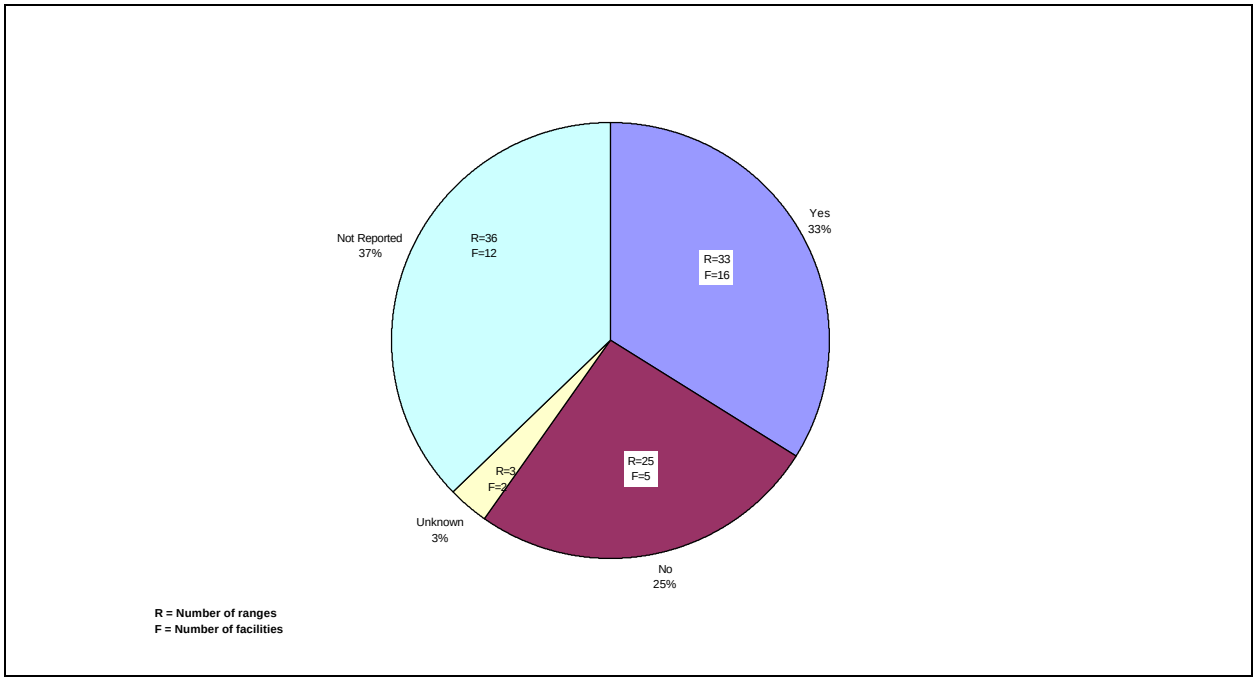


Figure 38. If Institutional Controls Are In Place, Have They Been Effective? (by range) (Appendix F, Table F-7)

7.0 CONCLUSIONS

7.1 Introduction

While the data in this report suggest certain conclusions, an understanding of these conclusions must be moderated by the limitations of the report, which include limitations on the applicability of the findings with regard to other ranges and facilities, and data gaps due to the nature of the survey and its interpretation.

7.2 Applicability of Findings

Several factors limit the applicability of the findings in this report to a large population of ranges:

1. The subset of ranges for which surveys were completed is small relative to the total number of ranges.

2. The surveys were completed by EPA personnel at the Regional level. A high percentage of ranges covered in the survey are those with which EPA is involved, such as those in the NPL or BRAC program. A correspondingly lower percentage of ranges are at active non-NPL facilities or are under private ownership (FUDS).

3. Finally, the numbers presented underestimate the number of ranges at the 61 facilities in the survey. (See Section 7.3.4.)

7.3 Data Gaps

The survey on which this report is based was a broad survey that presented open-ended questions. Although reviewers paid careful attention to interpretations of data, coding of responses in such a questionnaire leaves room for error. In addition, the questionnaire relied on common understanding of certain terms; therefore, the questions may have resulted in different interpretations of the information required. Finally, the combining of responses for multiple ranges into one survey may have obscured differences among ranges and dominated the responses to certain questions.

7.3.1 Inactive Versus Closed Ranges

The range status (e.g., inactive versus closed) was an interpreted answer based on responses to other questions in the survey. Because of plans to conduct a comprehensive survey of inactive ranges to determine which ones should be officially closed, and the controversies that will likely surround this issue, it is important to have more reliable data on range status. In addition to obtaining better data about range status, information about whether factors exist that would make the inactive ranges incompatible with range use, and thus potentially subject to closure, would provide a more useful and accurate picture of the ranges.

7.3.2 Regulatory Programs

The regulatory program governing the ranges was also an interpreted answer. Survey reviewers were able to ascertain the regulatory programs governing 67 percent of the facilities, but the programs regulating the other 33 percent of facilities remain unknown. In addition, interpretation about which regulatory program drives range cleanup may not always be accurate. This information is important in determining what regulatory authorities apply and if activities on the range have been conducted consistently with applicable regulations. Survey results show that DoD is the regulatory agency at 54 percent of ranges, but it is unclear which regulatory frameworks should be and are followed at DoD-regulated ranges. The survey did ask if cleanups conducted under the auspices of USACE were being conducted consistently with CERCLA. However, information received from the survey indicates that the USACE CERCLA-like procedures are often not consistent with CERCLA and the NCP.

7.3.3 Applicability of Subpart X to OB/OD Ranges

The applicability of RCRA Subpart X to the ranges conducting OB/OD is not known and should be clarified. OB/OD was performed by DoD on 81 percent of ranges. Because the circumstances under which OB/OD occurred are unknown, it is impossible to determine whether the 31 percent of ranges that obtained a RCRA Subpart X permit includes all of the ranges that were required to do so, and whether the remainder of ranges met the requirements for exemption.

7.3.4 Number, Size, and Distribution of Ranges

The actual number of ranges included in the survey is underestimated because the level of information provided in the survey responses varied. A distinction was frequently not made between individual ranges at facilities. Therefore, in analyzing the surveys, if individual ranges were not identified, only one range was associated with the survey, regardless of whether the facility is believed to have multiple ranges. This led to substantial undercounting of ranges at important facilities. In some cases, the survey respondent identified a specific number of ranges at a facility with multiple ranges. Those ranges may have inordinately influenced some of the findings. Distinguishing between ranges on a facility would be useful to further solidify survey results and to illuminate the different characteristics and situations on ranges at the same facility.

Information about the size of a range can provide an indication of the potential costs of range investigation and cleanup. Because acreage is a factor in determining costs, this information would be particularly helpful in predicting the financial requirements of range cleanups, particularly for those ranges for which transfer is planned.

7.4 Risks to Human Health and Safety and the Environment

Contamination resulting from used or fired munitions including UXO is found on almost all ranges in the survey. UXO has been found on 86 percent of the ranges. EPA Regions report that some of these ranges may have chemical or biological weapons.

Ranges in this report potentially pose significant risks to human health and safety because of their proximity to surrounding populations, changes in land use, and new ownership and control of the ranges. Fifty-eight percent of ranges are in rural areas or small towns and 87 percent of ranges are located within 5 miles of the surrounding population. Most ranges are expected to undergo commercial or residential development, in correlation with growing populations. In addition, range ownership, and therefore control, is moving away from DoD and into other Federal agency, State or local government, or private ownership. This evolution in range use and control, coupled with encroaching populations, suggests mounting potential for health and safety risks to human or ecological receptors.

Ranges in this survey are located in a variety of environments, including some ecologically sensitive areas such as wetlands, surface waters, and floodplains. Detecting and clearing used or fired munitions from aquatic ecosystems can be significantly more difficult than from other types of areas, resulting in often difficult and costly assessment and remediation. The prevalence of used and fired munitions on all ranges in the survey indicates that many different ecosystems face potential hazards from contamination.

EPA Regions report that public encounters with UXO have occurred on 38 occasions at seven ranges. While none of these reported encounters actually resulted in death or injury, such encounters with UXO lead to public fear and may pose risks of death and injury.

7.5 Range Status

The focus of this report is closed, transferring, and transferred ranges; however, 49 percent of the ranges for which information is provided are described as inactive by survey respondents. It should be noted that these 49 percent of "inactive" ranges are located at only 12 different facilities, while 17 facilities contain ranges that are reported to be closed. Many of these inactive ranges have not been used for decades. Therefore, future classification is not certain.

7.6 Technical Issues

Several questions on the survey focused attention on potential problems related to assessment and cleanup of ranges. As notable as the problems were that the survey identified, the numbers of facilities and ranges that reported no assessment problems (34 percent of facilities with 17 percent of ranges) and no cleanup problems (36 percent of facilities with 29 percent of ranges) should also be noted. (These numbers do not include facilities and ranges where no assessment or remediation was reported.) However, 84 ranges (41 percent) reported some level of assessment problem. The

most frequently reported problems were lack of historical information on the range (former use and types of munitions), and inaccessible terrain, which makes assessment and use of detection equipment more difficult. In addition, two specific questions were asked concerning the use of statistically based sampling at the ranges. It was apparent from the results that the appropriate use of statistically based sampling to determine range response remains controversial. At 39 percent of the ranges where such sampling was used (representing 17 facilities), respondents reported that unacceptable recommendations were generated from this type of sampling more than 90 percent of the time. Finally, the most frequently reported remediation problem was cost issues. Other issues associated with remediation included issues stemming from inadequate assessment or other technical issues, and the dangers associated with remediation of UXO.

7.7 Regulatory Oversight

Almost 90 percent of the ranges in this survey are in some phase of investigation or cleanup. However, responses to several questions suggest that preparation for cleanup and cleanup activities may be occurring with inadequate regulatory engagement. DoD is the lead regulatory agency at 54 percent of ranges. Anecdotal evidence about the lack of regulator involvement provides further support for this conclusion, as illustrated in the text box below. Insufficient regulator involvement from the beginning of an investigation could result in the delay of actions that require regulatory concurrence, such as delisting of facilities from the NPL or property transfers in the case of BRAC properties.

7.8 General Conclusions

The survey findings presented in this report illustrate the complex nature of CTT and inactive ranges. Because of the prevalence of UXO on ranges, the growing populations on and around ranges, and the transition of ranges from DoD to other governmental or private ownership and control, ranges may present significant risks to human health and welfare and the environment. Further contributing to the potential risks are the limited effectiveness of some statistical sampling and risk estimation procedures and use of older UXO detection techniques, such as “mag and flag.”

DoD and the rest of the country face an immense challenge in conducting range responses. Since the time of this survey, much work has been done to improve the range response process, including the development of “DoD and EPA Management Principles” for CTT ranges. The principles provide interim guidance to DoD and EPA field staff to govern ongoing responses. These principles are included in Appendix H of this report.

APPENDIX A

METHODOLOGY

Appendix A
Methodology

A.1 Overview

In the fall of 1998, the Federal Facilities Restoration and Reuse Office of the Environmental Protection Agency sent a survey to its Remedial Project Managers (RPMs) to assess the number and types of closed, transferring, or transferred military munitions ranges that may have the potential to create an imminent and substantial endangerment to the public health and welfare or to the environment. Figure A-1 provides a copy of the questionnaire sent to the EPA Regions for completion. Eighty-nine completed surveys were submitted to EPA, representing 74 facilities and at least 229 ranges. However, 14 surveys representing 13 facilities and 26 ranges were removed from the data pool, as they reflect responses concerning active ranges and are not the subject of this report (Figure A-2).

A.2 Challenges

Because the survey questions were open ended, in order to create a report that summarized information from all of the questionnaires, the responses first had to be normalized into a common information framework. This presented two major challenges. First, the information contained in the open-ended questions had to be coded accurately so that the data from the questions could be put into a database that could be analyzed. Second, in some cases, interpretation of the responses was necessary in order to capture certain types of information. For example, respondents provided similar information in different formats and in different parts of the questionnaire. Also, some of the information to be captured was supplied by respondents elaborating on an answer. For example, the questionnaire did not ask whether the range was an active, inactive, closed, or transferred range; however, this information was frequently provided and was captured in the coding. In another example, a direct question was asked concerning who regulates the range, but no direct question was asked concerning which program the range was regulated under. However, this information was frequently available in responses to several other questions.

Both of the challenges outlined above presented concerns related to quality assurance and quality control (QA/QC) of the coding of responses. So reviewers could be confident that the results were reported correctly, we imposed several layers of QA/QC.

A.3 Creating an Intermediate Questionnaire

The first step in normalizing the answers to the questionnaire was to create an "intermediate coding instrument." Three analysts reviewed twenty survey questionnaires to create a list of potential responses for each question. The lists developed by the three analysts were then consolidated. Figure A-3 represents the intermediate coding instrument in its final refinement. The coding instrument went through several iterations. A number of coding choices were dropped when analysts reviewing them felt that not enough information was consistently available from all the questionnaires or felt that too much interpretation was required to be confident of the results. The numbers found on the coding instrument, and associated with each separate topic, are either directly related to a

questionnaire number or are an additional piece of information that was provided for most questionnaires. Where numbers are skipped, it is because some of the numbers were deleted for the reasons mentioned above.

A.4 Guiding the Analysis

To ensure that analysts reviewing the questionnaires interpreted answers consistently, a number of definitions were documented. The sources of these definitions varied and included the EPA Munitions Rule, the draft DoD Range Rule, the National Contingency Plan, and other guidance documents. Figure A-4 lists the general definitions that were given to reviewers. In addition, after initial data gathering was complete, several interpretation issues were identified. These interpretation issues were discussed with the EPA technical expert, and documented in a series of Interpretation Guidelines (Figure A-5) provided to the analysts.

A.5 QA/QC of Results

Quality assurance and quality control of the recording of answers into the database and of the interpretation of results took place on several levels. First, a hard-copy file folder was created for each individual survey received. Fact sheets were downloaded from EPA and DoD web sites to provide background information on the range and the facility. The intermediate survey instrument (see Figure A-3) was filled out by hand and included in the file folder, along with any appropriate notations concerning interpretations of data.

Second, specific QA/QC procedures were designed to ensure that answers to questions were interpreted in a consistent manner and in a way that could be understood by a reader familiar with range issues. The intermediate coding instrument with common definitions was designed to build in quality up front. In addition, each questionnaire went through several layers of review. First, one analyst filled in the intermediate form, then a second analyst independently went over the same form to determine if the same answers were obtained. A Senior Policy Analyst supervised the coding process and provided ongoing advice to ensure consistency. Any differences that required discussion were flagged and brought to the Project Manager for review and resolution. Some of the issues were brought by the Project Manager to an EPA technical expert for further discussion and resolution.

Third, data was entered into a Microsoft Access database specifically established for this purpose. The data entry itself had QA/QC built in to ensure that no mistakes were made in this phase. All data entry was checked by an analyst who was not responsible for original data entry.

Finally, as the data were analyzed, final QC checks were developed. Specific questions were cross-checked against each other to make certain that the answers were consistent. For example, information about who regulates a range, which regulatory program governs a range, and what programmatic category a range is in were compared to make sure that these responses were consistent. If the respondent stated that a range is regulated by EPA and coded the range as BRAC NPL regulated under CERCLA, those responses would be consistent. However, if the respondent indicated that the range is regulated by the State, but coded it as BRAC NPL regulated under

CERCLA, reviewers would review the entire survey again to determine whether EPA is in fact involved in regulating the range.

A.6 Understanding the Data

Two issues significantly affect interpretation of the data. Although the report addresses these issues at various points, they are important enough to be highlighted here.

A.6.1 Number of Ranges

The facility respondents were asked to fill out one questionnaire for each facility or site. Therefore, some respondents provided one set of answers for the entire facility, while others related their answers to one or more specific ranges. In most cases the different information for different ranges was contained within a single questionnaire. In other cases, separate questionnaire responses were provided for each separate range. Given the fact that many facilities are quite large and have a number of ranges, each with different past ordnance uses and sometimes with different environmental settings and regulatory frameworks, it was clear that a single answer for the entire facility would not be accurate or appropriate. In fact, many of the questionnaires that provided one answer for the entire facility obscured the differences among the many ranges at the facility. (For example, one questionnaire was received for Aberdeen Proving Ground. The number of ranges at Aberdeen was not provided; therefore, this response was recorded in the database as one facility and one range. Given Aberdeen's large size and the numerous and different types of ranges, use of one facility questionnaire to record issues at Aberdeen probably understated the nature of the situation at this facility.)

Whenever possible, given the data provided, range information was recorded in association with the range to which it was connected. When the same information was provided for multiple ranges, that information was recorded as multiple counts. For example, when the questionnaire indicated that the responses contained in the questionnaire referred to 10 ranges, the information was recorded for each of the 10 ranges. When no information was provided on the number of ranges and no separate information was provided on different ranges, the facility questionnaire was recorded as one range.

One result of this approach is that on certain questions, facilities with a large number of reported ranges dominate the analysis. Those instances are pointed out at key places in the text. A second result is that the number of ranges recorded in the database is understated. The degree of this underestimation is unknown.

A.6.2 Interpreting the Closure Status of the Range

EPA has jurisdiction over closed, transferring, and transferred ranges. In a determination recorded in EPA's Munitions Rule, used munitions at active ranges (those ranges currently in active use as ranges) and inactive ranges (those ranges not in use now, but possibly active in the future) are regulated as hazardous waste, except under certain specific conditions. As the project staff reviewed the questionnaires, it was clear that some of the ranges addressed were at active facilities, and in fact

were active ranges. Many other ranges, both at active and closing facilities, were specifically referred to as inactive. It was often unclear whether the specific reference to a range as "inactive" was made with the legal definition of an inactive range in mind, or was made more casually and without considering the definition of an inactive range.

A very important step toward understanding the data presented was categorizing the ranges included in the surveys into one of five categories (active, inactive, closed, transferring, or transferred). Since the question of whether a range is active, inactive, closed, transferring, or transferred was not asked specifically, categorizing of ranges had to be accomplished by searching text fields for appropriate references. Every effort was made to identify active ranges and remove them from the database. Ten facilities and 23 ranges were removed. It is possible, however, that some remain. After consulting with EPA technical staff, inactive ranges were left in the database. This was done for two reasons. First, it was not always clear that the reference to an inactive range was specific. Second, when the DoD range inventory is completed, it is possible that some of these "inactive" ranges, many of which have been out of operation for years, will be declared to be closed.

The final classification of ranges in the report is found in Figure A-2. In addition to the uncertainty associated with the classification of a range as inactive, the status of 21 percent of the ranges and 34 percent of the facilities in the database is uncertain or just not reported.

A.7 Remainder of the Appendices

In addition to the material referred to in this methodological overview, the remainder of this appendix consists of a series of data tables that support the figures and tables that are the heart of the analysis contained in this report. These tables are provided so the reader can track the analysis and review the supporting data. A reference to the corresponding figure or table in the report is provided for each data table. The data tables are organized in the following manner:

Appendix B: Facility and Range Characteristics

- B-1 EPA Regions Represented by Facilities in Survey (Figure 1)
- B-2 Facilities and Ranges Included in Survey (Table 1)
- B-3 Programmatic Category (Figure 2)
- B-4 Characteristics of Surrounding Area (Figure 3)
- B-5 Range Status (Figure 4)
- B-6 Munitions Employed at Range (Figure 5)
- B-7 Range Ownership (Figure 6)
- B-8 Distribution of Past, Present, and Future Range Ownership Within DoD (Figure 6)

Appendix C: Threats to Human Health and the Environment

- C-1 Range Topography/Landforms (Figure 7)
- C-2 Media Possibly Contaminated with UXO (Figure 8)
- C-3 Past, Present, and Predicted Future Land Uses (Figures 9, 10, and 12)
- C-4 Ordnance-Related Land Use Over Time (Figure 11)

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Figure A-1. Survey Instrument

The following survey instrument was developed by the EPA Federal Facilities Restoration and Reuse Office (FFRRO) and sent to all EPA Regions. Completed surveys were submitted to FFRRO electronically in WordPerfect and in hard copy.

UNEXPLODED ORDNANCE SURVEY

Responses Due by January 8, 1999

It is important that EPA better understand Regional issues concerning Unexploded Ordnance (UXO). Please fill out the following questionnaire (one for each facility/site) so that Headquarters can better address Regional needs concerning UXO. [If you have any questions, please contact Douglas Bell via e-mail at bell.douglas@epa.gov, or at (202) 260-8716]. If possible, we would like your responses provided within the following WordPerfect 6.1 document (but any version of WP will also work).

For each site confirmed or suspected to contain UXO, please fill out the following information:

1. Site Information

Site Name:
Location:

_____ BRAC (NPL): Date Proposed _____ Date Final _____
_____ BRAC (Non-NPL)
_____ NPL: Date Proposed _____ Date Final _____
_____ Formerly Used Defense Site: Date DoD Relinquished Control _____
_____ Private Sites (non-NPL)

2. Describe the range/site. Provide, to the best of your knowledge, the location, size, site setting (topography, geology, etc.).

3. Describe the past, present, potential (future) land uses.

   a) Past:
   b) Present:
   c) Potential Future:

4. To the best of your knowledge:
   (If not known, please put don't know)

   a) Who were the previous range/site owners?
   b) Who are the present range/site owners?
   c) Who will be the future range/site owners?

5. a) How close is the range or site to populated areas?
   b) Describe the populated areas (e.g., farm, subdivision, etc.):

6. What UXO-related problems have you encountered? Please describe:
   a) Assessment Problems:
   b) Remedial Problems:
   c) Incidents Involving UXO:
   d) Other:

7. a) Has UXO been found at the range/site? Yes No

   b) If yes, please fill out the Unexploded Ordnance Summary Sheet provided with this survey. Please note: Detailed information will be appreciated. However, if it is not reasonable for you to submit information for each ordnance type, then you also may fill out the summary sheets for the type or class of ordnance (for example, mortars, etc.)

8. Who currently manages the range or site?

9. Who currently regulates the range or site?

10. Has the Army Corps of Engineers (USACE) been utilized at the site? Yes No

    a) If so, in what capacity?
    b) If the USACE has been utilized, have their activities been in your opinion consistent with CERCLA and the NCP. Please explain:

11. Has DoD, a military service, the USACE, or a contractor indicated that UXO will not, or cannot be addressed? Yes No

    If yes, please describe:

12. Are there any off-range or off-site problems known or suspected? Yes No
    a) If yes, please explain.

13. Have explosives (either bulk high explosives or explosive residues) been identified in on-range or on-site soils or ground water? Yes No

    a) If yes, please explain:

14. Is the range or site covered under a Federal Facility Agreement (FFA), a State cleanup agreement, permit, or order? Yes No

    a) If yes, please describe whether UXO is specifically included within the agreement.

15. Has the USACE or DoD used any statistical methods in an attempt to define UXO at the range or site? Yes No

    a) If yes, explain how this was used at the range or site.
    b) Were any recommendations generated that EPA could not support? Please explain:

16. Have draft work plans to address explosives safety concerns and environmental cleanup been submitted to the Department of Defense Explosives Safety Board for review and approval? Yes No

    a) If your answer was no, why was the plan not submitted to DDESB?
    b) If the plan(s) was submitted, how long did it take for DDESB to review and approve the plan?

17. Have any open burning or open detonation (OB/OD) activities been performed at the range or site? Yes No

    a) If OB/OD activities have occurred, was a RCRA Subpart X permit obtained? Yes No
    b) Who performed the OB/OD activities (e.g., Army, EOD, contractors, etc.) and how were they conducted?

18. Have chemical or biological weapons been found, or are they suspected at any sites you manage or are involved with? Yes No

    a) If yes, please explain:

19. Have institutional controls been implemented at the range or site? Yes No

    a) If so, please describe if these controls have been effective.
    b) If the controls have not been effective, please explain why they are not, and provide suggestions that might improve the situation.

20. Have you faced any situations regarding UXO that you felt were out of your control, but needed immediate attention?

    UNEXPLODED ORDNANCE SUMMARY SHEET

    Please fill out for each type (or class) of unexploded ordnance at the range/site:

    a) Type of Ordnance:

    b) State of Ordnance (Live, Inert, or Unknown):

    c) Condition (Undamaged, Damaged, Decomposed, Unknown):

    d) General Dates (When was ordnance used):

    e) Is Ordnance Accessible. Yes No

Thank you for taking the time to fill out this survey. Please return to Douglas Bell at EPA Headquarters by January 8, 1998.

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Figure A-2. Facilities and Ranges Represented by the Surveys

The following table describes the number of completed surveys received by EPA, the number of facilities and ranges represented by the surveys, and the number of inactive, closed, transferring, and transferred ranges and facilities used in the report.

Range Number and Status		
	Information Received	**Information in Report**
Questionnaires Received*:	89	75
Total Number of Facilities:	74	61
Total Number of Ranges:	229	203
Range Status	**# Facilities**	**# Ranges**
In Report:		
Inactive	10	100
Closed	16	45
Transferring	3	4
Transferred	11	11
Status Uncertain	8	15
Not Reported	16	31
Total in Report	**64**	**206**
Active Facilities and Ranges (not in Report)	13	26

* Note: Some respondents submitted one questionnaire per range, while others combined information for multiple ranges in a single questionnaire.

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Figure A-3. Intermediate Coding Instrument

The following forms are printouts of the data fields used in Versar's database. Reviewers used the forms to code survey responses during the review process. The database allows data obtained from completed surveys to be manipulated for interpretation.

Survey Number

Facility Information

Facility Name

21. Region

EPA ID Number

City

State

County

Survey POC

POC Phone Number

Reviewer Name

Date Questionnaire Reviewed

1. Location Type

- BRAC NPL
- BRAC Non-NPL
- NPL Only (Non-BRAC)
- Formerly Used Defense Site (FUDS)
- Private (Non-NPL)
- Active RCRA Permitted Facility
- ***Other***
- Unknown

1i. Date Proposed

1ii. Date Final

22i. BRAC Round

22ii. Is BRAC Use Underway?

1iii. If Other, Please Specify:

1iv. If Location is FUDS, Date DOD Relinquished Control

Number of Ranges Addressed by Questionnaire

Are There Any Indications That There Are Other Ranges Impacted by UXO At This Facility? ☐

☐ UXO Summary Sheet Attached ☐ Other Attachments

5bi. Surrounding Characteristics

- Urban
- Suburban
- Small or Medium Town
- Rural / Remote
- Unknown / Not Reported

Please List All Attachments Used for This Survey

Survey Number

Range Information

23i. Range Name:

23ii. Range I

24. Number of Ranges Covered By This Record:

25i. Total Range Size: Acres

25ii. Area of UXO Concern Acres

26. Last Year Range Was Used (If Known)

27. Range Status

- Active
- Inactive
- Closed
- Transferring
- Transferred
- Inactive or Closed: Status Uncertain
- Not Reported

28. Munitions Employed at Range (Select All That Apply):

- Small Arms Rounds
- Large Caliber Rounds
- Grenades
- Mortar Rounds
- Artillery Rounds / Projectiles
- Missile
- Bomb / Bomblets
- Submunitions - Land Mines
- Submunitions - Chemical
- Military Munition Components
- Unknown
- Not Reported
- Other (Specified)

29. Range Activities (Select All That Apply):

- Storage
- Testing
- Training
- Disposal
- Maintenance
- Impact Range
- Range Buffer Area
- Unknown
- Not Reported
- Other (Specified)

2i. Topography / Landforms (Select All That Apply):

- Mountainous or Rocky
- Steeply Sloping Hills
- Rolling Hills
- Prairie or Flat Terrain
- Surface Water on / near Wetlands on Range
- Surface Water on / near Wetlands Near Range
- Floodplain Located On Range
- Floodplain Located Near Range
- Isolated Area (e.g., Island)
- Unknown
- Not Reported
- Other (Specified)

2ii. Soil Characteristics:

- Generally Fine Grained / Impermeable
- Generally Coarse Grained / Permeable
- Multiple Layers
- Mixed / Variable
- Shallow Bedrock
- Unknown
- Not Reported
- Other (Specified)

5bii. Surrounding Land Use

- Residential
- Industrial / Commercial
- Recreational
- Military Use
- Agricultural / Ranching / Mining
- Educational
- Unknown
- Not Reported
- Other (Specified)

30. Possible Media Contaminated with UXO:

- Soil
- Surface Water
- Sediment
- Groundwater
- Debris
- Unknown
- Not Reported
- Other (Specified)

2iii. Vegetation:

- Grass
- Trees (Light)
- Trees (Heavy)
- Bushes / Shrubs / Brush
- Unknown
- Not Reported
- Other (Specified)

Survey Number

Range Information

3a. Past Land Uses

- Open Space (Vacant)
- Industrial / Commercial
- Recreational
- Residential
- Agricultural / Ranching / Mining
- Ordnance Storage
- Ordnance Testing
- Ordnance Training
- Ordnance Disposal
- Ordnance Maintenance
- Ordnance Impact Range
- Ordnance Buffer
- Military Use Other Than Ordnance
- Eductaional
- Wildlife Refuge

3b. Present Land Uses

- Open Space (Vacant)
- Industrial / Commercial
- Recreational
- Residential
- Agricultural / Ranching / Mining
- Ordnance Storage
- Ordnance Testing
- Ordnance Training
- Ordnance Disposal
- Ordnance Maintenance
- Ordnance Impact Range
- Ordnance Buffer
- Military Use Other Than Ordnance
- Eductaional
- Wildlife Refuge

3c. Future Land Uses

- Open Space (Vacant)
- Industrial / Commercial
- Recreational
- Residential
- Agricultural / Ranching / Mining
- Ordnance Storage
- Ordnance Testing
- Ordnance Training
- Ordnance Disposal
- Ordnance Maintenance
- Ordnance Impact Range
- Ordnance Buffer
- Military Use Other Than Ordnance
- Eductaional
- Wildlife Refuge

4a. Previous Range / Site Owners

- US Army
- US Navy
- US Air Force
- US Marines
- Coast Guard
- Other DoD Agency
- Other Federal Agency
- State or Local Government
- Privately Owned
- Unknown
- Not Reported
- Other (Specified)

Other Agency Name

4b. Present Range / Site Owners

- US Army
- US Navy
- US Air Force
- US Marines
- Coast Guard
- Other DoD Agency
- Other Federal Agency
- State or Local Government
- Privately Owned
- Unknown
- Not Reported
- Other (Specified)

Other Agency Name

4c. Predicted Future Range / Site Owners:

- US Army
- US Navy
- US Air Force
- US Marines
- Coast Guard
- Other DoD Agency
- Other Federal Agency
- State or Local Government
- Privately Owned
- Unknown
- Not Reported
- Other (Specified)

Other Agency Name

31. Under What Program is the Range Regulated?

- RCRA
- CERCLA
- Range Rule
- Unknown
- Not Reported

9. Who Regulates the Range?

- US Army
- US Navy
- US Air Force
- US Marines
- Coast Guard
- Other DoD Agency

Other Agency Name

8. Who Manages the Range?

- US Army
- US Navy
- US Air Force
- US Marines
- Coast Guard
- Other DoD Agency

Other Agency Name

Survey Number

Range Information

5a. Proximity of Range to Nearest Populated Area

- Immediately Adjacent to Range
- <1 Mile
- 1-5 Miles
- 5-10 Miles
- 10-20 Miles
- >20 Miles
- Unknown

5biii. Relative Size of Nearest Populated Area

- >20,000
- 10,000 - 20,000
- 3,000 - 10,000
- <3,000
- Unknown
- Not Reported

6c. Have There Been Any Incidents Involving UXO?

- Yes
- No
- Unknown
- Not Reported
- Not Applicable

If So, How	How Many With Injury?	How Many With Death?

7. Has Known UXO Been Found on Range?

- Yes
- No
- Not Reported
- Unknown

6a. Assessment Problems Related to UXO

- Discovery of UXO Hampered Investigation at Range
- Investigative Techniques Not Adequate fo UXO Assessment
- Incomplete Historical Records
- Misidentification of UXO Types at Range
- Poorly Performed Range Investigation
- No Assessment Performed
- No Problems Encountered
- None Reported
- Other (Specified)

6b. Remediation Problems Related to UXO

- Poorly Performed Assessment
- Remediation is Technically Infeasible
- Remediation Too Dangerous to Attempt
- Remediation Too Costly to Perform
- No Remedial Activities Conducted
- No Problems Encountered
- None Reported
- Other (Specified)

18. Were Chemical or Biological Weapons Found?

- Yes
- No
- Unknown
- Not Reported
- Not Applicable

18a. Explain Any Yes Answers Concerning Problems with UXO

Range Information

10. Has USACE Been Used At The Range?

- ◉ Yes
- ◉ No
- ◉ Unkown
- ◉ Not Reported
- ◉ Not Applicable

10a. If Yes, To What Capacity?

FUDS Project Manager
Technical Assessment
Remediation
Contractual Oversight / Management
Unknown
Other (Specified)

32a. Which of the Following Activities Have Been Conducted at the Range?

Preliminary Assessment
Investigation
Decision on Cleanup / Response
Cleanup / Response
Post-Remedial / Post Removal Activities
Other (Specified)

32b. By Which Organization?

DoD - Army
DoD - Navy
DoD - Marines
DoD - Air Force
Coast Guard
USACE
EPA
Other DoD Organization

10b. Have the Activities Listed Been Performed Consistently with Regards to CERCLA and the NCP?

- ◉ Yes
- ◉ No
- ◉ Not Applicable
- ◉ Not Reported
- ◉ Unknown

11. Has Any Agency Indicated that UXO Will Not or Cannot Be Treated?

- ◉ Yes
- ◉ No
- ◉ Not Applicable
- ◉ Not Reported
- ◉ Unknown

11ai. If An Agency Has Indicated that UXO Will Not or Cannot be Treated, Which Agency Was It?

US Army
US Navy
US Air Force
US Marines
Coast Guard
USACE
EOB
EPA
State
Contractor
Unknown
Not Reported
Other (Specified)

11aii. If Any Selected, Please Explain

Survey Number

Range Information

12. Do Any of the Off-Range Problems Exist?

- Possibility of UXO to have impacted off the Range
- Hydrogeology Conducive to UXO Migration
- Buried Ordnance Floated to Different Depth
- No Off-Range Impacts Reported
- Other (Specified)

13. Have Known or Suspected Explosives or Residue Been Identified on the Range?

- ◉ Yes
- ◉ Not Applicable
- ◉ No
- ◉ Not Reported
- ◉ Unknown

13a. If yes, please comment:

33. If UXO/Explosives Residue Was Found, In Which Media Was It Found In?

- Soil
- Surface Water
- Sediment
- Groundwater
- Unknown
- Not Reported
- Other (Specified)

14. Is The Range Covered Under An FFA, State Cleanup Agreement, Permit or Order?

- ◉ Yes
- ◉ Not Applicable
- ◉ No
- ◉ Not Reported
- ◉ Unknown

Check All That Apply

- FFA
- State Cleanup Agreement
- State Permit
- State or EPA Order
- Not Distinguished

12a. Is UXO Included in the Agreement?

- ◉ Yes
- ◉ Not Applicable
- ◉ No
- ◉ Not Reported
- ◉ Unknown

Range Information

15. Has USACE or DoD Used Any Statistical Methods to Define UXO at
- Yes
- No
- Unknown
- Not Reported
- Not Applicable

15a. If Yes, Please Explain

15bi. If Statistical Methods Were Employed, Were Recommendations Generated that EPA Could Not
- Yes
- No
- Unknown
- Not Reported
- Not Applicable

15bii. If Yes, Please Explain

16. Have / Will Draft Workplans to Address Explosives Safety Concerns and Environmental Cleanup Been / Be Submitted to the DoD Explosives Safety Board for Review and Approval?
- Yes
- No
- Unknown
- Not Reported
- Not Applicable

16a,b. Please Explain (please include review / approval time)

17. Have Any Planned OB / OD Activities Been Performed at Range?
- Yes
- No
- Unknown
- Not Reported
- Not Applicable

17a. RCRA Subpart X Permit Obtained? ☐

17b. Who Performed the Activities
- EOD
- US Army
- US Navy
- US Air Force
- Military Personnel Other Than EOD
- USACE
- National Guard
- State or Local Authorities
- Civilian Contractors
- Other (Please Specify)
- Unknown
- Not Reported

19. Have Any of the Following Institutional Controls Been Implemented at the Range?

Area Fenced
Warning Signs Posted
Facility-Specific Security Procedures
Notification of Local Authorities
Deed Restrictions
Groundwater Restrictions
No Institutional Controls in Place
Unknown
Not Reported

Range Information

19a. If Institutional Controls are in Place, Have They Been Effective?

- Yes
- No
- Unknown
- Not Reported
- Not Applicable

19b. If Institutional Controls Have Not Been Effective, Please Explain or Provide Suggestions to Improve the

20. Have You Faced Any Situations Regarding UXO That You Felt Were Out of Your Control, But Needed Immediate Attention?

- Yes
- No
- Unknown
- Not Reported
- Not Applicable

Explain. WereIssuesResolved?:

Reviewer Comments

Survey Number

Summary Sheet

Range Number

Ordnance Caliber

- Small Arms Rounds
- Large Caliber Rounds
- Grenades
- Mortar Rounds
- Artillery Rounds / Projectiles
- Missile
- Bomb / Bomblets
- Submunitions - Land Mines
- Submunitions - Chemical
- Military Munition Components
- Other (Specified)

Ordnance Type

- Training or Dummy Rounds
- Live Rounds
- Other (Specified)

State of Ordnance

- Live
- Inert
- Suspected Live
- Unknown

Condition of Ordnance

- Undamaged
- Damaged
- Decomposed
- Unknown

Amount of Ordnance Collected or Suspected lbs

Non-Ordnance Scrap Recovered?

- Yes
- No
- Unknown
- Not Reported
- Not Applicable

If Yes, How Much?: lbs

Year Ordnance Was First Used

Year Ordnance Use Ended

Ordnance is Accessible

- General Public
- Trespassers
- Military Personnel
- Government Employees
- Government Contractors
- Ordnance Not Accessible
- Other (Specified)

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Figure A-4. General Definitions

The following list of definitions was developed to ensure consistency and uniformity in the survey review process and to aid reviewers in coding survey responses. The definitions are based on definitions provided in the EPA Munitions Rule, the draft Range Rule, the National Contingency Plan, and other guidance documents.

Definitions

1. **Range —** Any land mass or water body that is or was used for the conduct of training, research, development, testing, or evaluation of military munitions or explosives. Examples include: missile, artillery, aerial bombing, tank, naval surface warfare, mortar, anti-aircraft, grenade, small arms, demolition, and multi-purpose ranges.

2. **Impact area —** The area that is specifically fired upon.

3. **Active range** — Range currently in use.

4. **Inactive range** — Range not in use now, but may be used in the future.

5. **Closed range —** Range that has been taken out of service and either put to new uses that are incompatible with range activities or that are not considered by the military to be a potential range.

6. **Transferring range —** A range whose ownership will be transferred, usually through the Base Realignment and Closure Act.

7. **Transferred range** — A range where ownership has been transferred; a Formerly Used Defense Site (FUDS).

8. **Munitions Rule scope** — Closed, transferred, and transferring ranges (not active or inactive ranges).

9. **Facility classifications —**

   National Priorities List — Facility has been listed on the NPL. It is covered by Superfund regulatory authority. EPA Regions and States are involved.

   Base Realignment and Closure Act (BRAC) — Facilities that Congress has approved for closure or realignment. May be **NPL or non-NPL**. When being realigned (as opposed to closed) certain area of the base may be transferred to another base (or MACOM) so that the mission associated with that area can continue. It is possible to have an active range at a BRAC facility if the range is being "realigned" to another military "ownership." However, if the entire facility is closing (and the range is not being transferred), then the range can be considered closed rather than inactive.

10. Regulatory Authority —

Typically one of four authorities:

a. CERCLA/Superfund — Does not now cover ranges...but at NPL sites, may be covered. State regulatory authorities also apply. EPA is always involved.
b. RCRA — Covers open burning/open detonation permitted sites (OB/OD); Subpart X permit. Also may provide regulatory authority for cleanup. States are delegated under RCRA. Reference to RCRA authority **usually,** but not always, means State regulation.
c. Range Rule — covers closed, transferring, and transferred ranges...Not yet promulgated and not yet in force.
d. Explosive Ordnance Board — DoD body that governs anything to do with ranges.

11. More on BRAC — Non-NPL BRAC will be covered by Superfund, but the State will be more heavily involved than EPA (EPA has some involvement). Either RCRA or CERCLA regulatory authority, or both. Other State regulatory authorities may be involved.

12. Stages of cleanup (Range rule definitions are not included because the range rule is not yet promulgated and in use.)

Stage on Survey	Definition	CERCLA Term	RCRA Term
Preliminary Assessment	Preliminary review of area or site prior to deciding if more detailed investigation or cleanup is necessary.	Preliminary Assessment/ Site Investigation (PA/SI)	RCRA Facilities Assessment (RFA)
Investigation	Detailed investigation of area or site to determine risk (or if there is no risk) and to decide which remedy is appropriate.	Remedial Investigation/ Feasibility Study (RI/FS) — for remedial program Engineering Evaluation/Cost Analysis (EE/CA) — for the removal program	RCRA Facilities Investigation (RFI) Corrective Measures Study (CMS)
Decision on Cleanup/ Response	Formal decision as to what the cleanup activity should be (or the formal decision not to clean up). Usually involves some kind of public review.	Record of Decision (ROD) Action Memorandum (the decision record for a "removal" action)	Statement of Basis RCRA Permit
Cleanup/ Response	Construction of a remedy to clean up the problem or physical removal of the waste from a site. This should also include design phase. Design occurs between decision and cleanup... and involves the engineering design of the remedy.	Remedial Action Removal Action	Corrective Measures Implementation

Stage on Survey	Definition	CERCLA Term	RCRA Term
Post Remedial/ Post Removal Activities	Completion of construction, completion of cleanup, long- term operation of groundwater cleanup systems.	Construction completion Remedy in place Response Complete Remedial Action Operations Long Term Remedial Actions Operation and Maintenance	Corrective Measures Implementation Corrective Measures Completion

13. Institutional controls —

Non-engineering/cleanup controls designed to keep potential receptors (people/animals) away from risk. Can include governmental/ regulatory controls (e.g., deed restrictions, zoning, covenants with the land) or physical controls (e.g., fencing, warning signs).

14. Surrounding area characteristics —

These definitions should not be absolute but provide guidelines on how to consider "naming" the surrounding areas.

a. **Rural** — Rural areas are characterized by either sparse populations or population centers between 250 and 3000 near (anywhere from 1 to 10 miles) the facility. Area residents rely on larger population centers and must travel for most goods and services.
b. **Small or Medium town** — Independent of large municipalities. Populations of between 3000 and 10,000. Self-supporting, separate, and distinct from nearby larger towns.
c. **Suburban** — Suburban facilities are located in areas with typical populations of between 10,000 and 20,000 and are found in proximity to a large municipality of higher population density.
d. **Urban —** Located in a large municipality with a somewhat concentrated population — population greater than 20,000 people.

15. Types of military munitions addressed in report —

Used or Fired Military Munitions are those military munitions that (1) have been primed, fused, armed, or otherwise prepared for action, *and* have been fired, dropped, launched, projected, placed, or otherwise used; (2) are munitions fragments (e.g., shrapnel, casings, fins, and other components, to include arming wires and pins) that result from the use of military munitions; or (3) are malfunctions or misfires.

The term **Unexploded Ordnance, or UXO**, is also used frequently in this report, as most information taken out of the surveys refers to UXO. UXO is a subset of Used or Fired Military Munitions that encompasses military munitions that have been prepared for action and remain unexploded, and that are placed in such a manner as to constitute a hazard.

16. Definitions of nearby populated areas

Residential	Bedroom community, subdivisions, base housing
Industrial/Commercial	Industrial park, defense contractors, manufacturing
Recreational	Park, trails, open space
Military Use	Other military use
Agriculture/Ranching/Mining	Farms, rangeland, timber, mines
Educational	University or any other educational institution
Unknown	Respondent doesn't know
Not Reported	Respondent left blank
Other	Wildlife refuge, highway or other transportation, landfill, wetlands

17. Definitions of military munitions incidents and encounters —

Question 6 of the survey asked respondents to describe any incidents involving UXO. Responses to this question were characterized into the following categories:

UXO Exploded Accidentally	Accidental explosion of UXO.
UXO Discovery	UXO found during range investigations.
UXO Encountered by Public	The public encountered UXO either on-range or off-range.
Unexplained Event	Respondent did not specify what type of incident occurred.

Figure A-5. Interpretation Guidelines

The following guidelines were created to assist reviewers in interpreting responses in order to obtain the important data from the surveys and to ensure consistency and uniformity in coding the surveys.

Interpretation Guidelines

Answers recorded as "not reported" mean that the person filling out the survey did not address this.

Answers recorded as "unknown" mean that the person filling out the survey did not know the answer.

1. Site Information

Site Name: _____

Location: _____

_____ BRAC (NPL): Date Proposed _____ Date Final _____
_____ BRAC (Non-NPL)
_____ NPL: Date Proposed _____ Date Final _____
_____ Formerly Used Defense Site: Date DoD Relinquished Control _____
_____ Private Sites (non-NPL)

Some surveys address whole facilities and appear to cover more than one range, other surveys address only one range, but there is an indication that there is more than one range present, and still other surveys are applicable to a specific range only.

We will record information by facility and by range. We will report the results as representing X number of surveys, with at least Y number of ranges.

In addition, this survey is meant to cover only closed, transferred and transferring ranges. Given the ambiguity over the difference between closed and inactive ranges, we will keep in inactive ranges. However, active ranges should be removed from the database.

2. Describe the Range/Site. Provide, to the best of your knowledge, the location, size, site setting (topography, geology, etc.).

3. Describe the past, present, potential (future) land uses.

a) Past:
b) Present:
c) Potential Future:

4. To the best of your knowledge: (If not known, please put "don't know.")

a) Who were the previous range/site owners?
b) Who are the present range/site owners?
c) Who will be the future range/site owners?

Answers to these are generally clear. With respect to "future," sometimes it is unclear as to whether answer oriented toward immediate future versus longer term. Versar included the answer given.

5. a) How close is the range or site to populated areas?
b) Describe the populated areas (e.g, farm, subdivision, etc.):

Wide range of answers provided for (b). Versar has interpreted terms like "bedroom community" and "barracks" as "residential."

6. What UXO-related problems have you encountered? Please describe:

a) Assessment Problems:
b) Remedial Problems:
c) Incidents Involving UXO:
d) Other:

Problems captured with regard to assessment and remediation can include:

1. Assessment or remediation problem caused by UXO when evaluating hazardous waste.
2. Assessment or remediation problem that has nothing to do with UXO.
3. Assessment or remediation difficulty related to understanding or cleanup of the UXO problem itself.

Drop 1 and 2 above. Do not capture these. If this is all that is noted, record the assessment or remediation problem as not reported.

There is some ambiguity with respect to word "incident." Most answer "no," but some respondents reply that they are not sure what is meant by the term. A few include controlled detonation of UXO as an "incident;" others appear to see the very presence of UXO as an incident. When answered Yes, Versar added clarifying comment explaining what likely drove that answer.

An incident is an unplanned for event. Planned Open Burning/ Open Detonation (OB/OD) is not an incident. In addition, UXO is a waste. The bomb or ordnance material has be used as planned, but there is still some unexploded ordinance. Incidents in the past when the product was being manufactured or stored are not UXO incidents.

7. a) Has UXO been found at the Range/Site? (Circle) Yes No

b) If yes, please fill out the Unexploded Ordnance Summary Sheet provided with this survey. Please note: Detailed information will be appreciated. However, if it is not reasonable for you to submit information for each ordnance type, then you also may fill out the summary sheets for the type or class or ordnance (for example, "mortars", etc.)

Answer generally clear. Sometimes, however, when answer is "Yes,"it is uncertain whether UXO has actually been identified - sometimes, one feels that it is surely there, but has not actually been observed. In this case, would really be suspected rather than found. Where (7a) is answered yes, but no Summary sheet attached, a note has been put on the front of the folder. Versar has answered question as answered by the survey.

We will indicate in the report that the level of evidence concerning the incident may vary.

8. Who currently manages the range or site?

Answer generally clear.

9. Who currently regulates the range or site?

Sometimes, it is unclear as to whether the answer reflects who respondent thinks should be regulating the range, and who actually does. As examples, (1) answer might note that EPA regulates, but elsewhere in the survey noted that EPA is "hands off" or that "no one in Region addressing UXO issues." (2) RCRA Range covered under State Permit, but regulated by DoD - answer might be State or DoD, not always clear which is officially "correct," especially when presence of UXO not specifically confirmed or investigated.

Also sometimes unclear as to whether answer reflects who regulates the UXO problem specifically, or who regulates the site overall - this tends to be more of an issue when the site is clearly both a Superfund and UXO concern.

In reviewing the questionnaire remember, if it is an NPL facility EPA is always involved at the Facility level. However, the range may not be covered by CERCLA (or addressed under the FFA). Therefore if you decide EPA regulates because it is an NPL facility, that would be a wrong answer. If the responder has said the State is the regulator, and there is no other indication that the range is regulated under CERCLA, then chances are EPA is not involved. If it is an NPL facility cross check the FFA question (14) and the Subpart X question (17a). If the range is not covered by the FFA then EPA is probably not involved in regulating the range. If there is a Subpart X RCRA permit, chances are the range is regulated by the State. (EPA may also be involved).

If the answer is very confusing, put it as not reported.

With regard to the intermediate survey question, what program regulates the range, it will be even more confusing. This really may be not reported. Remember, if it is an NPL Facility, the Facility as a whole may be regulated under CERCLA, but the range(s) may not.

10. Has the Army Corps of Engineers (USACE) been utilized at the Site? Yes No

a) If so, in what capacity?
b) If the USACE has been utilized, have their activities been in your opinion consistent with CERCLA and the NCP.

(b) seems to cause some confusion in some cases, as there seems to disagreement as to whether UXO investigation/remediation should be designed to be consistent with CERCLA. For example, one noted that this is a policy decision for AEC to determine, and that USACE should not be making that policy decision.

If the person filling out the questionnaire says something like EPA should not be involved, and doesn't answer whether or not the USACE activities are consistent with CERCLA and the NCP, then the correct answer is "not reported."

11. Has DoD, a military service, the USACE, or a contractor indicated that UXO will not, or cannot be addressed? (Circle) Yes No

a) If yes, please describe:

Answer is generally clear.

12. Are there any off-range or off-site problems known or suspected? (Circle) Yes No

a) If yes, please explain.

Answer is generally clear, although sometimes there is uncertainty as to whether this refers to "off-range" or "off-facility."

Go with the answer given. Note in the comment field any confusion.

13. Have explosives (either bulk high explosives or explosive residues) been identified in on-range or on-site soils or groundwater. (Circle) Yes No

a) If yes, please explain:

There appears to be some confusion about this. Some questionnaires indicate that groundwater is contaminated, but it is uncertain as to whether this contamination is caused by explosives or other environmental issues. For example, some answer "yes" but then mention that VOC contamination is an issue, but fail to mention if explosives were detected, or even analyzed for.

If it is unclear as to whether contamination discussed comes from the range (or from somewhere else on the facility), note "unknown." If it is clear that the contamination comes from some other hazardous waste sites, note "not reported."

14. Is the range or site covered under a Federal Facility Agreement (FFA), a State cleanup agreement, permit, or order? (Circle) Yes No

If the answer is "yes," the type is usually unspecified. In some cases, it is possible to make an interpretation, given other information in the survey (e.g., RCRA permitted facility with State as regulator, if answered as so by #9).

a) If yes, please describe whether UXO is specifically included within the agreement.

If the agreement is FFA, respondent will sometimes note so here (e.g., "FFA does not cover UXO").

15. Has the USACE or DoD used any statistical methods in an attempt to define UXO at the range or site? (Circle) Yes No

There appears to be some confusion as to what this refers to and/or includes. Some mention "grid sampling"; others refer to "mag and flag."

"Mag and Flag" is an investigative technique. It is not statistical sampling. Use of the term grid sampling usually indicates some statistically based sampling.

a) If yes, explain how this was used at the range or site.

This description is very rarely included.

b) Were any recommendations generated that EPA could not support? Please explain:

Generally, this answer is fairly clear, however, one issue emerged related to question 10. One survey noted that EPA did not support the recommendation, not because they had strong feelings about the recommendation itself, but because they were not involved in the process at all (hands-off). ***That answer should be recorded as "not recorded."***

16. Have draft work plans to address explosives safety concerns and environmental cleanup been submitted to the Department of Defense Explosives Safety Board for review and approval? (Circle) Yes No

a) If your answer was no, why was the plan not submitted to DDESB?
b) If the plan(s) was submitted, how long did it take for DDESB to review and approve the plan?

When the answer is yes, it is not always clear what purpose the work plan addressed - environmental concerns in UXO/range areas, or UXO/explosives action itself. ***Just go with the answer given.***

17. Have any open burning or open detonation (OB/OD) activities been performed at the range or site? (Circle) Yes No

a) If OB/OD activities have occurred, was a RCRA Subpart X permit obtained? (Circle) Yes No
b) Who performed the OB/OD activities (e.g., Army, EOD, contractors, etc.) and how were they conducted?

OB/OD is a planned activity to get rid of ordnance. It should not be considered an "incident."

18. Have chemical or biological weapons been found, or are they suspected at any sites you manage or are involved with? (Circle) Yes No

a) If yes, please explain:

Answer is generally clear.

19. Have institutional controls been implemented at the range or site? (Circle) Yes No

a) If so, please describe if these controls have been effective.
b) If the controls have not been effective, please explain why they are not, and provide suggestions that might improve the situation.

With a few exceptions, an answer is generally provided or can be interpreted from other questionnaire answers. Areas of ambiguity include the following: (1) if groundwater restrictions are specified, it is not always clear if these are designed to control UXO/explosives-related contamination or other environmental contaminant problems; (2) if area is "fenced," it is not always clear if this is just the range or if it is the entire facility.

The question is meant to apply to ICs that protect people from exposure to explosives. It should be answered for the range. If you can't tell from the answer if the ICs are for the range or for the facility as a whole, record it as unknown. If it is clear that the ICs are for the facility as a whole, not the range, record that as not reported.

20. Have you faced any situations regarding UXO that you felt were out of your control, but needed immediate attention?

Answer is generally clear.

APPENDICES B-F

INTRODUCTION

The data tables provided in Appendices B-F provide raw data obtained from surveys completed by EPA Regional staff. Raw data from 75 surveys representing 61 facilities and 203 ranges are provided in these appendices. However, since six surveys addressed 13 ranges or groups of ranges separately, these 13 ranges are treated as separate data entries. Therefore, there are 88 separate "surveys" on each data table that lists surveys received from facilities. All data tables are organized in one of two ways, by range/survey and by facility. Table B-2, for example, is organized by range/survey and provides the number of ranges associated with each completed survey. As is evident in that table, several survey responses contained information about multiple ranges. The tables organized by facility contain data analyzed on a facility-wide basis, such as Table B-4, which provides the characteristics of the area surrounding the facility. All tables list the figures in the text of the report that are associated with those data.

APPENDIX B

RAW DATA OF FACILITY AND RANGE CHARACTERISTICS

Appendix B
Raw Data of Facility and Range Characteristics

The following tables provide raw data on the survey responses provided for each parameter in Chapter 2, "Facility and Range Characteristics." All tables are sorted by EPA Region.

Table B-1 EPA Regions Represented by Facilities in Survey (Figure 1)

Facility	Region
Loring AFB	1
Massachusetts Military Reservation	1
Nomans Island	1
Former Morgan Depot/TA Gillespie Loading Co	2
Former Raritan Arsenal	2
Griffiss Air Force Base	2
Naval Weapons Station Earle	2
Picatinny Arsenal	2
Plattsburgh Air Force Base	2
Seneca Army Depot	2
Aberdeen Proving Ground	3
Former Nansemond Ordnance Depot	3
Fort Picket	3
Fort Ritchie Army Garrison	3
Naval Surface Warfare Center - Dahlgren	3
Tobyhanna Army Depot	3
Washington, DC, Army Munitions Site	3
Fort Campbell	4
Fort McClellan	4
Louisiana Army Ammunition Plant BG#5	4
MacDill Air Force Base	4
Myrtle Beach Air Force Base	4
NAS Cecil Field	4
Naval Base Charleston	4
Naval Ordnance Station Louisville	4
Naval Weapons Station Charleston - #2	4
Redstone Arsenal	4
Sangamo Electric Dump	4
Fort Sheridan	5
Grissom Air Force Base	5
Jefferson Proving Grounds	5
Naval Surface Warfare Center	5
New Brighton/Arden Hills	5
Savanna Army Depot Activity	5
US Army Soldier Support Center	5
Barksdale Air Force Base	6
Bergstrom Air Force Base	6
Dallas Naval Weapons Industrial Reserve Plant	6

Facility	Region
Dyess Air Force Base	6
Eaker Air Force Base	6
Fort Chaffee #1	6
Fort Wingate Depot	6
Kirtland Air Force Base	6
Lackland Air Force Base	6
Lone Star Ammunition Plant	6
Longhorn Army Ammunition Plant	6
Melrose Air Force Range	6
Sandia National Laboratories	6
Shumaker Naval Ammunition Depot	6
White Sands Missile Range	6
Cornhusker Army Ammunition Plant	7
Jefferson Barracks	7
Black Hills Ordnance Depot	8
Lowry Bombing Range	8
Tooele Army Depot	8
Fort Ord	9
Mare Island Naval Shipyard	9
Salton Sea Test Base	9
Camp Bonneville	10
NAF Adak	10
Umatilla Army Depot	10

Table B-2 Facilities and Ranges Included in Each Survey Received (Table 1)

Surveys from Facility	Number of Ranges
Loring AFB	4
Massachusetts Military Reservation	2
Nomans Island	1
Former Morgan Depot/TA Gillespie Loading Co	1
Former Raritan Arsenal	1
Griffiss Air Force Base	2
Naval Weapons Station Earle	1
Picatinny Arsenal	1
Plattsburgh Air Force Base - #1	1
Plattsburgh Air Force Base - #2	1
Plattsburgh Air Force Base - #3	1
Plattsburgh Air Force Base - #4	1
Plattsburgh Air Force Base - #5	1
Seneca Army Depot	1
Aberdeen Proving Ground	1
Former Nansemond Ordnance Depot	1
Fort Picket	1
Fort Ritchie Army Garrison	1

Surveys from Facility	Number of Ranges
Naval Surface Warfare Center - Dahlgren #1	1
Naval Surface Warfare Center - Dahlgren #3	1
Naval Surface Warfare Center - Dahlgren #4	1
Naval Surface Warfare Center - Dahlgren #5	1
Tobyhanna Army Depot	1
Washington, DC, Army Munitions Site	1
Fort Campbell	3
Fort McClellan - #1	44
Fort McClellan - #2	17
Louisiana Army Ammunition Plant BG#5	1
MacDill Air Force Base	5
Myrtle Beach Air Force Base	1
NAS Cecil Field	3
Naval Base Charleston	1
Naval Ordnance Station Louisville	1
Naval Weapons Station Charleston - #2	1
Redstone Arsenal	22
Sangamo Electric Dump	1
Fort Sheridan Closed Overwater Artillery Ranges	1
Fort Sheridan Small Arms Range	1
Grissom Air Force Base	2
Jefferson Proving Grounds	1
Naval Surface Warfare Center	4
New Brighton/Arden Hills	1
Savanna Army Depot Activity	1
US Army Soldier Support Center	2
Barksdale Air Force Base #1	1
Barksdale Air Force Base #2	1
Bergstrom Air Force Base	1
Dallas Naval Weapons Industrial Reserve Plant	1
Dyess Air Force Base - #1	1
Dyess Air Force Base - #2	1
Eaker Air Force Base	1
Fort Chaffee #1	1
Fort Wingate Depot	1
Kirtland Air Force Base - #1	1
Kirtland Air Force Base - #2	1
Kirtland Air Force Base - #3	1
Kirtland Air Force Base - #4	1
Kirtland Air Force Base - #5	1
Kirtland Air Force Base - #6	1
Kirtland Air Force Base - #7	1
Lackland Air Force Base - #1	1
Lackland Air Force Base - #2	1
Lone Star Ammunition Plant	1
Longhorn Army Ammunition Plant	1

Surveys from Facility	Number of Ranges
Melrose Air Force Range	1
Sandia National Laboratories	1
Shumaker Naval Ammunition Depot	1
White Sands Missile Range #1 - Tula Peak	1
White Sands Missile Range #2 - OB/OD Disposal	1
White Sands Missile Range #3 - Red Rio Munitions	1
White Sands Missile Range #4 - Bomblet Disposal	1
White Sands Missile Range #5 - Oscura Range	1
Cornhusker Army Ammunition Plant	1
Jefferson Barracks	1
Black Hills Ordnance Depot	1
Lowry Bombing Range	1
Tooele Army Depot SMWU 1, 1a	1
Tooele Army Depot SMWU 10/11	1
Tooele Army Depot SMWU 1b	1
Tooele Army Depot SMWU 1c	1
Tooele Army Depot SMWU 40, OU9	1
Tooele Army Depot SMWU 8, OU8	1
Fort Ord	1
Mare Island Naval Shipyard	1
Salton Sea Test Base	1
Camp Bonneville	1
NAF Adak	18
Umatilla Army Depot	1

Table B-3 Programmatic Category by Facility (Figure 2)

Facility	Location Type
Loring AFB	BRAC NPL
Massachusetts Military Reservation	NPL Only
Nomans Island	BRAC Non-NPL
Former Morgan Depot/TA Gillespie Loading Co	FUDS
Former Raritan Arsenal	FUDS
Griffiss Air Force Base	BRAC NPL
Naval Weapons Station Earle	NPL Only
Picatinny Arsenal	NPL Only
Plattsburgh Air Force Base	BRAC NPL/Active RCRA
Seneca Army Depot	BRAC NPL
Aberdeen Proving Ground	NPL Only
Former Nansemond Ordnance Depot	NPL Only/FUDS
Fort Picket	BRAC Non-NPL
Fort Ritchie Army Garrison	BRAC Non-NPL
Naval Surface Warfare Center - Dahlgren	NPL Only
Tobyhanna Army Depot	NPL Only/FUDS
Washington, DC, Army Munitions Site	FUDS

Facility	Location Type
Fort Campbell	Active RCRA
Fort McClellan	BRAC Non-NPL
Louisiana Army Ammunition Plant BG#5	NPL Only
MacDill Air Force Base	BRAC Non-NPL
Myrtle Beach Air Force Base	BRAC Non-NPL
NAS Cecil Field	BRAC NPL
Naval Base Charleston	BRAC Non-NPL
Naval Ordnance Station Louisville	BRAC Non-NPL
Naval Weapons Station Charleston - #2	Other
Redstone Arsenal	NPL Only
Sangamo Electric Dump	NPL Only/FUDS
Fort Sheridan	Other
Grissom Air Force Base	BRAC Non-NPL
Jefferson Proving Grounds	BRAC Non-NPL/Active RCRA
Naval Surface Warfare Center	BRAC Non-NPL
New Brighton/Arden Hills	NPL Only
Savanna Army Depot Activity	BRAC NPL
US Army Soldier Support Center	BRAC Non-NPL/Active RCRA
Barksdale Air Force Base	Other
Bergstrom Air Force Base	BRAC Non-NPL
Dallas Naval Weapons Industrial Reserve Plant	Active RCRA
Dyess Air Force Base	Other
Eaker Air Force Base	BRAC Non-NPL
Fort Chaffee #1	BRAC Non-NPL
Fort Wingate Depot	BRAC Non-NPL
Kirtland Air Force Base	Active RCRA
Lackland Air Force Base	Other
Lone Star Ammunition Plant	NPL Only
Longhorn Army Ammunition Plant	NPL Only
Melrose Air Force Range	Active RCRA
Sandia National Laboratories	Active RCRA
Shumaker Naval Ammunition Depot	FUDS
White Sands Missile Range	Other
Cornhusker Army Ammunition Plant	NPL Only
Jefferson Barracks	FUDS
Black Hills Ordnance Depot	FUDS
Lowry Bombing Range	FUDS
Tooele Army Depot	BRAC NPL
Fort Ord	BRAC NPL
Mare Island Naval Shipyard	BRAC Non-NPL
Salton Sea Test Base	BRAC Non-NPL
Camp Bonneville	BRAC Non-NPL
NAF Adak	BRAC NPL
Umatilla Army Depot	BRAC NPL

Table B-4 Characteristics of Surrounding Area By Facility (Figure 3)

Facility	Characteristics of Surrounding Area
Loring AFB	Rural
Massachusetts Military Reservation	Not reported
Nomans Island	Rural
Former Morgan Depot/TA Gillespie Loading Co	Suburban
Former Raritan Arsenal	Suburban
Griffiss Air Force Base	Rural
Naval Weapons Station Earle	Small/Medium Town
Picatinny Arsenal	Suburban
Plattsburgh Air Force Base	Small/Medium Town
Seneca Army Depot	Suburban
Aberdeen Proving Ground	Small/Medium Town
Former Nansemond Ordnance Depot	Suburban
Fort Picket	Rural
Fort Ritchie Army Garrison	Not reported
Naval Surface Warfare Center - Dahlgren	Small/Medium Town
Tobyhanna Army Depot	Rural
Washington, DC, Army Munitions Site	Urban
Fort Campbell	Rural
Fort McClellan	Small/Medium Town
Louisiana Army Ammunition Plant BG#5	Rural
MacDill Air Force Base	Suburban
Myrtle Beach Air Force Base	Not reported
NAS Cecil Field	Rural
Naval Base Charleston	Small/Medium Town
Naval Ordnance Station Louisville	Urban
Naval Weapons Station Charleston #2	Not reported
Redstone Arsenal	Small/Medium Town
Sangamo Electric Dump	Rural
Fort Sheridan Closed Overwater Artillery Ranges	Suburban
Grissom Air Force Base	Small/Medium Town
Jefferson Proving Grounds	Rural
Naval Surface Warfare Center	Rural
New Brighton/Arden Hills	Urban
Savanna Army Depot Activity	Rural
US Army Soldier Support Center	Small/Medium Town
Barksdale Air Force Base	Small/Medium Town
Bergstrom Air Force Base	Suburban
Dallas Naval Weapons Industrial Reserve Plant	Urban
Dyess Air Force Base	Small/Medium Town
Eaker Air Force Base	Not reported
Fort Chaffee	Small/Medium Town
Fort Wingate Depot	Rural
Kirtland Air Force Base	Small/Medium Town

Facility	Characteristics of Surrounding Area
Lackland Air Force Base	Suburban
Lone Star Ammunition Plant	Rural
Longhorn Army Ammunition Plant	Rural
Melrose Air Force Range	Not reported
Sandia National Laboratories	Small/Medium Town
Shumaker Naval Ammunition Depot	Suburban
White Sands Missile Range - Tula Peak	Rural
Cornhusker Army Ammunition Plant	Small/Medium Town
Jefferson Barracks	Small/Medium Town
Black Hills Ordnance Depot	Rural
Lowry Bombing Range	Small/Medium Town
Tooele Army Depot SMWU	Not reported
Fort Ord	Small/Medium Town
Mare Island Naval Shipyard	Suburban
Salton Sea Test Base	Not reported
Camp Bonneville	Suburban
NAF Adak	Small/Medium Town
Umatilla Army Depot	Rural

Table B-5 Range Status
(Note: Numbers in cells represent number of ranges covered by survey)
(Figure 4)

Surveys Received From Facility	In	Cl	Tr	Tran	Un	NR
Region 1						
Loring AFB		4				
Massachusetts Military Reservation						2
Nomans Island				1		
Region 2						
Former Morgan Depot/TA Gillespie Loading Co				1		
Former Raritan Arsenal				1		
Griffiss Air Force Base	2					
Naval Weapons Station Earle						1
Picatinny Arsenal						1
Plattsburgh Air Force Base - #1	1					
Plattsburgh Air Force Base - #2					1	
Plattsburgh Air Force Base - #3					1	
Plattsburgh Air Force Base - #4					1	
Plattsburgh Air Force Base - #5			1			
Seneca Army Depot						1
Region 3						
Aberdeen Proving Ground						1
Former Nansemond Ordnance Depot				1		
Fort Picket			1			
Fort Ritchie Army Garrison		1				
Naval Surface Warfare Center - Dahlgren #1					1	

Surveys Received From Facility	In	Cl	Tr	Tran	Un	NR
Naval Surface Warfare Center - Dahlgren #3					1	
Region 3 (Continued)						
Naval Surface Warfare Center - Dahlgren #4					1	
Naval Surface Warfare Center - Dahlgren #5					1	
Tobyhanna Army Depot				1		
Washington, DC Army Munitions Site		1				
Region 4						
Fort Campbell						3
Fort McClellan - #1	44					
Fort McClellan - #2	17					
Louisiana Army Ammunition Plant BG#5					1	
MacDill Air Force Base	5					
Myrtle Beach Air Force Base		1				
NAS Cecil Field	3					
Naval Base Charleston		1				
Naval Ordnance Station Louisville		1				
Naval Weapons Station Charleston - #2	1					
Redstone Arsenal	22					
Sangamo Electric Dump				1		
Region 5						
Fort Sheridan Closed Overwater Artillery Ranges				1		
Fort Sheridan Small Arms Range	1					
Grissom Air Force Base					2	
Jefferson Proving Grounds		1				
Naval Surface Warfare Center						4
New Brighton/Arden Hills						1
Savanna Army Depot Activity			1			
US Army Soldier Support Center						2
Region 6						
Barksdale Air Force Base #1					1	
Barksdale Air Force Base #2		1				
Bergstrom Air Force Base		1				
Dallas Naval Weapons Industrial Reserve Plant						1
Dyess Air Force Base - #1		1				
Dyess Air Force Base - #2		1				
Eaker Air Force Base		1				
Fort Chaffee #1					1	
Fort Wingate Depot	1					
Kirtland Air Force Base -#1		1				
Kirtland Air Force Base -#2		1				
Kirtland Air Force Base -#3		1				
Kirtland Air Force Base -#4		1				
Kirtland Air Force Base -#5		1				
Kirtland Air Force Base -#6		1				
Kirtland Air Force Base -#7		1				
Lackland Air Force Base - #1		1				

Surveys Received From Facility	In	Cl	Tr	Tran	Un	NR
Lackland Air Force Base - #2		1				
Region 6 (Continued)						
Lone Star Ammunition Plant						1
Longhorn Army Ammunition Plant					1	
Melrose Air Force Range						1
Sandia National Laboratories	1					
Shumaker Naval Ammunition Depot				1		
White Sands Missile Range #1 - Tula Peak						1
White Sands Missile Range #2 - OB/OD Disposal						1
White Sands Missile Range #3 - Red Rio Munitions						1
White Sands Missile Range #4 - Bomblet Disposal						1
White Sands Missile Range #5 - Oscura Range						1
Region 7						
Cornhusker Army Ammunition Plant					1	
Jefferson Barracks				1		
Region 8						
Black Hills Ordnance Depot				1		
Lowry Bombing Range				1		
Tooele Army Depot SMWU 1, 1a					1	
Tooele Army Depot SMWU 10/11						1
Tooele Army Depot SMWU 1b						1
Tooele Army Depot SMWU 1c	1					
Tooele Army Depot SMWU 40, OU9						1
Tooele Army Depot SMWU 8, OU8						1
Region 9						
Fort Ord		1				
Mare Island Naval Shipyard		1				
Salton Sea Test Base			1			
Region 10						
Camp Bonneville		1				
NAF Adak		18				
Umatilla Army Depot	1					
Total Number of Ranges	100	45	4	11	15	28

Key: In = Inactive, Cl = Closed, Tr = Transferring, Tran = Transferred, Un = Inactive or closed: Status uncertain, NR = Status unknown

Table B-6 Munitions Employed at Range
(Note: Numbers in cells represent number of ranges covered by survey)
(Figure 5)

Surveys Received From Facility	Arms	Cal	Gren	Mort	Art	Miss	Bomb	Mine	Sub	MMC	Unk	NR	Oth
Region 1													
Loring AFB	4		4										
Massachusetts Military Reservation				2	2	2			2				
Nomans Island	1				1	1	1			1			
Region 2													
Former Morgan Depot/TA Gillespie Loading Co				1	1					1			1
Former Raritan Arsenal									1				1
Griffiss Air Force Base	2												2
Naval Weapons Station Earle	1							1			1		
Picatinny Arsenal			1										
Plattsburgh Air Force Base - #1	1												
Plattsburgh Air Force Base - #2	1												
Plattsburgh Air Force Base - #3										1			1
Plattsburgh Air Force Base - #4			1										
Plattsburgh Air Force Base - #5	1										1		
Seneca Army Depot	1			1	1	1	1			1			
Region 3													
Aberdeen Proving Ground												1	
Former Nansemond Ordnance Depot	1	1		1	1		1			1			
Fort Picket	1	1	1	1	1	1	1			1			
Fort Ritchie Army Garrison			1	1					1				
Naval Surface Warfare Center - Dahlgren #1							1						
Naval Surface Warfare Center - Dahlgren #3		1											
Naval Surface Warfare Center - Dahlgren #4												1	
Naval Surface Warfare Center - Dahlgren #5		1											
Tobyhanna Army Depot					1								
Washington, DC Army Munitions Site									1				
Region 4													
Fort Campbell												3	
Fort McClellan - #1	44	44	44	44	44	44	44	44	44	44			
Fort McClellan - #2	17	17	17	17	17	17	17	17	17	17			
Louisiana Army Ammunition Plant BG#5										1			

Surveys Received From Facility	Arms	Cal	Gren	Mort	Art	Miss	Bomb	Mine	Sub	MMC	Unk	NR	Oth
Region 4 (Continued)													
MacDill Air Force Base	5	5					5						
Myrtle Beach Air Force Base											1		
NAS Cecil Field	3	3								3			
Naval Base Charleston		1					1						
Naval Ordnance Station Louisville												1	
Naval Weapons Station Charleston - #2												1	
Redstone Arsenal		22		22		22	22		22	22			
Sangamo Electric Dump							1	1		1			1
Region 5													
Fort Sheridan Closed Overwater Artillery Ranges	1	1											
Fort Sheridan Small Arms Range	1		1	1	1					1			
Grissom Air Force Base	2		2							2			
Jefferson Proving Grounds	1	1	1	1	1	1	1	1	1	1			
Naval Surface Warfare Center	4										4		
New Brighton/Arden Hills	1	1	1						1	1			1
Savanna Army Depot Activity	1		1	1	1			1	1	1			
US Army Soldier Support Center	2												
Region 6													
Barksdale Air Force Base #1							1						
Barksdale Air Force Base #2												1	
Bergstrom Air Force Base													1
Dallas Naval Weapons Industrial Reserve Plant												1	
Dyess Air Force Base - #1	1		1										1
Dyess Air Force Base - #2	1												1
Eaker Air Force Base	1												1
Fort Chaffee #1			1										
Fort Wingate Depot		1					1						
Kirtland Air Force Base -#1					1					1			
Kirtland Air Force Base -#2				1									
Kirtland Air Force Base -#3	1	1											
Kirtland Air Force Base -#4	1												
Kirtland Air Force Base -#5				1									
Kirtland Air Force Base -#6		1		1									
Kirtland Air Force Base -#7							1						1

Surveys Received From Facility	Arms	Cal	Gren	Mort	Art	Miss	Bomb	Mine	Sub	MMC	Unk	NR	Oth
Region 6 (Continued)													
Lackland Air Force Base - #1	1				1		1						
Lackland Air Force Base - #2					1		1						
Lone Star Ammunition Plant												1	
Longhorn Army Ammunition Plant		1					1						1
Melrose Air Force Range					1	1	1						
Sandia National Laboratories	1			1			1			1			
Shumaker Naval Ammunition Depot						1				1			1
White Sands Missile Range #1 - Tula Peak												1	
White Sands Missile Range #2 - OB/OD Disposal													1
White Sands Missile Range #3 - Red Rio Munitions							1						
White Sands Missile Range #4 - Bomblet Disposal							1						
White Sands Missile Range #5 - Oscura Range							1						
Region 7													
Cornhusker Army Ammunition Plant								1		1			1
Jefferson Barracks	1	1	1	1				1	1	1			
Region 8													
Black Hills Ordnance Depot	1	1	1		1	1	1	1	1	1			
Lowry Bombing Range	1					1	1		1	1			
Tooele Army Depot SMWU 1, 1a		1	1		1	1	1			1			1
Tooele Army Depot SMWU 10/11					1		1						
Tooele Army Depot SMWU 1b			1							1			
Tooele Army Depot SMWU 1c				1	1	1				1			
Tooele Army Depot SMWU 40, OU9		1			1		1			1			
Tooele Army Depot SMWU 8, OU8	1	1											
Region 9													
Fort Ord	1		1	1		1	1	1		1			1
Mare Island Naval Shipyard	1	1	1		1	1	1			1			1
Salton Sea Test Base	1	1	1	1		1				1			1
Region 10													
Camp Bonneville	1	1	1	1	1	1							
NAF Adak	18	18	18	18	18	18	18	18	18	18			18
Umatilla Army Depot	1			1	1		1	1		1			1
Total Number of Ranges/Facilities	130/ 33	129/ 21	103/ 21	121/ 20	102/ 20	117/ 17	133/ 26	88/11	112/ 13	133/ 29	7/4	11/9	39/20

Key: Arms = Small arms, Cal = Large caliber, Gren = Grenades, Mort = Mortar rounds, Art = Artillery rounds/Projectiles, Miss =Missiles, Bomb = Bomb/Bomblets, Mine = Land mines, Sub = Submunitions Chemical, MMC = Military munition components, Unk = Unknown, NR = Not reported, Oth = Other

Table B-7 Range Ownership
(Figure 6)

Surveys Received From Facility	# of Ranges	DoD	Fed	SL	Priv	Unk	NR	Oth
Region 1								
Loring AFB	4	P X	F					
Massachusetts Military Reservation	2			P X		F		
Nomans Island	1	P	P X F					
Region 2								
Former Morgan Depot/TA Gillespie Loading Co	1		P	P X F	P X F			
Former Raritan Arsenal	1	P	P X F	P X F	P X F			
Griffiss Air Force Base	2	P X				F		
Naval Weapons Station Earle	1	X F				P		
Picatinny Arsenal	1	P X F			P			
Plattsburgh Air Force Base - #1	1	P X		F				
Plattsburgh Air Force Base - #2	1	P X		F				
Plattsburgh Air Force Base - #3	1	P X		F				
Plattsburgh Air Force Base - #4	1	P X		F				
Plattsburgh Air Force Base - #5	1	P X		F				
Seneca Army Depot	1	X		F	P			
Region 3								
Aberdeen Proving Ground	1	X F	F					
Former Nansemond Ordnance Depot	1	P		P X F	P X F			
Fort Picket	1	P X		F				
Fort Ritchie Army Garrison	1	P X		P	F			
Naval Surface Warfare Center - Dahlgren #1	1	P X F						
Naval Surface Warfare Center - Dahlgren #3	1	P X F						
Naval Surface Warfare Center - Dahlgren #4	1	P X F						
Naval Surface Warfare Center - Dahlgren #5	1	P X F						
Tobyhanna Army Depot	1	P X F		P X F				
Washington, DC, Army Munitions Site	1	P	P		P X F			
Region 4								
Fort Campbell	3	P X F						
Fort McClellan - #1	44	P X	F	F				
Fort McClellan - #2	17	P X F						
Louisiana Army Ammunition Plant BG#5	1	P X F						
MacDill Air Force Base	5	P X F						
Myrtle Beach Air Force Base	1	P X				F		
NAS Cecil Field	3	P X		F				
Naval Base Charleston	1	P X				F		
Naval Ordnance Station Louisville	1	P			P X F			
Naval Weapons Station Charleston - #2	1	X F				P		
Redstone Arsenal	22	P X F						
Sangamo Electric Dump	1	P	P X F					

Surveys Received From Facility	# of Ranges	DoD	Fed	SL	Priv	Unk	NR	Oth
Region 5								
Fort Sheridan Closed Overwater Artillery Ranges	1			P X F		P		
Fort Sheridan Small Arms Range	1	X		F	P			
Grissom Air Force Base	2	P X F		F	F			
Jefferson Proving Grounds	1	P X			F			
Naval Surface Warfare Center	4	P X F						
New Brighton/Arden Hills	1	P X F						
Savanna Army Depot Activity	1	P X	F			F		
US Army Soldier Support Center	2	P				P X F		
Region 6								
Barksdale Air Force Base #1	1	P X			P	F		
Barksdale Air Force Base #2	1	P X			P	F		
Bergstrom Air Force Base	1	P		P X F	P			
Dallas Naval Weapons Industrial Reserve Plant	1	X F			P			
Dyess Air Force Base - #1	1	P X F						
Dyess Air Force Base - #2	1	P X F						
Eaker Air Force Base	1	P X		F				
Fort Chaffee #1	1	P X		F				
Fort Wingate Depot	1	P	P X F	F				
Kirtland Air Force Base -#1	1	P X F	P X F		P			
Kirtland Air Force Base -#2	1	P X F	P					
Kirtland Air Force Base -#3	1	P X F	P X F					
Kirtland Air Force Base -#4	1	P X F	P		P			
Kirtland Air Force Base -#5	1	P	P X F		P			
Kirtland Air Force Base -#6	1	P X F	P X F					
Kirtland Air Force Base -#7	1	P		P X F	P F			
Lackland Air Force Base - #1	1	P X F						
Lackland Air Force Base - #2	1	P X F						
Lone Star Ammunition Plant	1	P X F						
Longhorn Army Ammunition Plant	1	P X	F					
Melrose Air Force Range	1	X F			P			
Sandia National Laboratories	1	P X F	P X F					
Shumaker Naval Ammunition Depot	1	P			P X F	P X		
White Sands Missile Range #1 - Tula Peak	1	P X F						
White Sands Missile Range #2 - OB/OD Disposal	1	P X F						
White Sands Missile Range #3 - Red Rio Munitions	1	P X F						
White Sands Missile Range #4 - Bomblet Disposal	1	P X F						
White Sands Missile Range #5 - Oscura Range	1	P X F						

Surveys Received From Facility	# of Ranges	DoD	Fed	SL	Priv	Unk	NR	Oth
Region 7								
Cornhusker Army Ammunition Plant	1	P X			F			
Jefferson Barracks	1	P X F		P X F	P X F			
Region 8								
Black Hills Ordnance Depot	1	P	P X	P X	P X	F		
Lowry Bombing Range	1	P		P X F	P X F			
Tooele Army Depot SMWU 1, 1a	1	P X F						
Tooele Army Depot SMWU 10/11	1	P X F						
Tooele Army Depot SMWU 1b	1	P X F						
Tooele Army Depot SMWU 1c	1	P X F						
Tooele Army Depot SMWU 40, OU9	1	P X F						
Tooele Army Depot SMWU 8, OU8	1	P X F						
Region 9								
Fort Ord	1	P X	P X F	F	F			
Mare Island Naval Shipyard	1	P X			F			
Salton Sea Test Base	1	X	P F	P				
Region 10								
Camp Bonneville	1	P X		P F				
NAF Adak	18	P X			F			
Umatilla Army Depot	1	P X F						

Key: P = Past, X = Present, F = Future, Fed = Other Federal, SL = State or local, Priv = Private, Unk = Unknown, NR = Not reported, Oth = Other

Table B-8 Distribution of Past, Present, and Future Range Ownership Within DoD (Figure 6)

Surveys Received From Facility	# of Ranges	Army	Navy	Air Force	Other
Region 1					
Loring AFB	4			P X	
Massachusetts Military Reservation	2				
Nomans Island	1		P		
Region 2					
Former Morgan Depot/TA Gillespie Loading Co	1				
Former Raritan Arsenal	1				P
Griffiss Air Force Base	2			P X	
Naval Weapons Station Earle	1		P X F		
Picatinny Arsenal	1	P X F			
Plattsburgh Air Force Base - #1	1			P X	P
Plattsburgh Air Force Base - #2	1	P		P X	
Plattsburgh Air Force Base - #3	1			P X	P
Plattsburgh Air Force Base - #4	1			P X	P
Plattsburgh Air Force Base - #5	1			P X	P
Seneca Army Depot	1	P X			

Key: P = Past, X = Present, F = Future

Surveys Received From Facility	# of Ranges	Army	Navy	Air Force	Other
Region 3					
Aberdeen Proving Ground	1	P X F			
Former Nansemond Ordnance Depot	1	P	P		
Fort Picket	1	P X			
Fort Ritchie Army Garrison	1	P X			
Naval Surface Warfare Center - Dahlgren #1	1		P X F		
Naval Surface Warfare Center - Dahlgren #3	1		P X F		
Naval Surface Warfare Center - Dahlgren #4	1		P X F		
Naval Surface Warfare Center - Dahlgren #5	1		P X F		
Tobyhanna Army Depot	1	P X F			
Washington, DC, Army Munitions Site	1	P			
Region 4					
Fort Campbell	3	P X F			
Fort McClellan - #1	44	P X			
Fort McClellan - #2	17	P X			F
Louisiana Army Ammunition Plant BG#5	1	P X F			
MacDill Air Force Base	5			P X F	
Myrtle Beach Air Force Base	1			P X	
NAS Cecil Field	3		P X		
Naval Base Charleston	1		P X		
Naval Ordnance Station Louisville	1		P		
Naval Weapons Station Charleston - #2	1		P X F		
Redstone Arsenal	22	P X F			
Sangamo Electric Dump	1				P
Region 5					
Fort Sheridan Closed Overwater Artillery Ranges	1				
Fort Sheridan Small Arms Range	1	P X			
Grissom Air Force Base	2			P X F	
Jefferson Proving Grounds	1	P X			
Naval Surface Warfare Center	4	P X F	P X F		
New Brighton/Arden Hills	1	P X F			
Savanna Army Depot Activity	1	P X			
US Army Soldier Support Center	2	P			
Region 6					
Barksdale Air Force Base #1	1			P X	
Barksdale Air Force Base #2	1			P X	
Bergstrom Air Force Base	1	P			
Dallas Naval Weapons Industrial Reserve Plant	1		P X F		
Dyess Air Force Base - #1	1			P X F	
Dyess Air Force Base - #2	1			P X F	
Eaker Air Force Base	1			P X	
Fort Chaffee #1	1	P X			
Fort Wingate Depot	1	P			
Kirtland Air Force Base - #1	1	P		P X F	
Kirtland Air Force Base - #2	1	P		P X F	
Kirtland Air Force Base - #3	1	P		P X F	

Surveys Received From Facility	# of Ranges	Army	Navy	Air Force	Other
Region 6 (Continued)					
Kirtland Air Force Base - #4	1	P		P X F	
Kirtland Air Force Base - #5	1	P		P	
Kirtland Air Force Base - #6	1	P		P X F	
Kirtland Air Force Base - #7	1			P	
Lackland Air Force Base - #1	1			P X F	
Lackland Air Force Base - #2	1			P X F	
Lone Star Ammunition Plant	1	P X F			
Longhorn Army Ammunition Plant	1	P X			
Melrose Air Force Range	1			P X F	
Sandia National Laboratories	1			P X F	
Shumaker Naval Ammunition Depot	1		P		
White Sands Missile Range #1 - Tula Peak	1	P X F			
White Sands Missile Range #2 - OB/OD Disposal	1	P X F			
White Sands Missile Range #3 - Red Rio Munitions	1	P X F			
White Sands Missile Range #4 - Bomblet Disposal	1	P X F			
White Sands Missile Range #5 - Oscura Range	1	P X F			
Region 7					
Cornhusker Army Ammunition Plant	1	P X			
Jefferson Barracks	1			P X F	P X
Region 8					
Black Hills Ordnance Depot	1	P			
Lowry Bombing Range	1	P	P	P	
Tooele Army Depot SMWU 1, 1a	1	P X F			
Tooele Army Depot SMWU 10/11	1	P X F			
Tooele Army Depot SMWU 1b	1	P X F			
Tooele Army Depot SMWU 1c	1	P X F			
Tooele Army Depot SMWU 40, OU9	1	P X F			
Tooele Army Depot SMWU 8, OU8	1	P X F			
Region 9					
Fort Ord	1	P X			
Mare Island Naval Shipyard	1		P X		
Salton Sea Test Base	1		P X		
Region 10					
Camp Bonneville	1	P X			
NAF Adak	18	P	P X		
Umatilla Army Depot	1	P X			F

APPENDIX C

RAW DATA OF THREATS TO HUMAN HEALTH AND THE ENVIRONMENT

Appendix C
Raw Data of Threats to Human Health and the Environment

The following tables provide raw data on the survey responses provided for parameters in Chapter 3, "Threats to Human Health and the Environment." All tables are sorted by EPA Region.

Table C-1 Range Topography/Landforms
(Figure 7)
(Note: Numbers in cells represent number of ranges covered by survey)

Surveys Received From Facility	Mtn	Slp	Hills	Pra	SWO	SWN	FPO	FPN	Iso	Unk	NR	Oth
Region 1												
Loring AFB											4	
Massachusetts Military Reservation			2									2
Nomans Island			1		1				1			
Region 2												
Former Morgan Depot/TA Gillespie Loading Co					1							
Former Raritan Arsenal												1
Griffiss Air Force Base											2	
Naval Weapons Station Earle					1							
Picatinny Arsenal												1
Plattsburgh Air Force Base - #1				1		1						
Plattsburgh Air Force Base - #2				1		1						
Plattsburgh Air Force Base - #3				1		1						
Plattsburgh Air Force Base - #4				1		1						
Plattsburgh Air Force Base - #5				1		1						
Seneca Army Depot			1			1						
Region 3												
Aberdeen Proving Ground					1	1						1
Former Nansemond Ordnance Depot					1	1						
Fort Picket											1	
Fort Ritchie Army Garrison	1											
Naval Surface Warfare Center - Dahlgren #1					1	1						
Naval Surface Warfare Center - Dahlgren #3					1	1						
Naval Surface Warfare Center - Dahlgren #4					1	1						
Naval Surface Warfare Center - Dahlgren #5					1	1						

Surveys Received From Facility	Mtn	Slp	Hills	Pra	SWO	SWN	FPO	FPN	Iso	Unk	NR	Oth
Region 3 (Continued)												
Tobyhanna Army Depot	1				1							1
Washington, DC Army Munitions Site											1	
Region 4												
Fort Campbell						3						
Fort McClellan - #1			44									
Fort McClellan - #2			17									
Louisiana Army Ammunition Plant BG#5											1	
MacDill Air Force Base						5						
Myrtle Beach Air Force Base											1	
NAS Cecil Field				3								
Naval Base Charleston					1							1
Naval Ordnance Station Louisville											1	
Naval Weapons Station Charleston - #2							1					
Redstone Arsenal				22	22		22					
Sangamo Electric Dump					1							
Region 5												
Fort Sheridan Closed Overwater Artillery Ranges												1
Fort Sheridan Small Arms Range											1	
Grissom Air Force Base			2									
Jefferson Proving Grounds			1		1							
Naval Surface Warfare Center			4		4							4
New Brighton/Arden Hills			1		1			1				
Savanna Army Depot Activity				1								1
US Army Soldier Support Center			2		2							
Region 6												
Barksdale Air Force Base #1			1									
Barksdale Air Force Base #2			1									
Bergstrom Air Force Base				1								
Dallas Naval Weapons Industrial Reserve Plant				1		1						
Dyess Air Force Base - #1				1								
Dyess Air Force Base - #2				1								
Eaker Air Force Base				1								
Fort Chaffee #1			1			1						
Fort Wingate Depot				1								

Surveys Received From Facility	Mtn	Slp	Hills	Pra	SWO	SWN	FPO	FPN	Iso	Unk	NR	Oth
Region 6 (Continued)												
Kirtland Air Force Base -#1	1			1								
Kirtland Air Force Base -#2	1						1					
Kirtland Air Force Base -#3	1											
Kirtland Air Force Base -#4	1											
Kirtland Air Force Base -#5	1											
Kirtland Air Force Base -#6	1											
Kirtland Air Force Base -#7	1											
Lackland Air Force Base - #1											1	
Lackland Air Force Base - #2											1	
Lone Star Ammunition Plant				1								
Longhorn Army Ammunition Plant			1			1		1				
Melrose Air Force Range				1								
Sandia National Laboratories			1									1
Shumaker Naval Ammunition Depot												1
White Sands Missile Range #1 - Tula Peak	1											
White Sands Missile Range #2 - OB/OD Disposal	1											
White Sands Missile Range #3 - Red Rio Munitions	1											
White Sands Missile Range #4 - Bomblet Disposal	1											
White Sands Missile Range #5 - Oscura Range	1											
Region 7												
Cornhusker Army Ammunition Plant						1						
Jefferson Barracks			1								1	
Region 8												
Black Hills Ordnance Depot		1			1							
Lowry Bombing Range			1	1								
Tooele Army Depot SMWU 1, 1a												1
Tooele Army Depot SMWU 10/11											1	
Tooele Army Depot SMWU 1b			1				1					1
Tooele Army Depot SMWU 1c			1									
Tooele Army Depot SMWU 40, OU9											1	
Tooele Army Depot SMWU 8, OU8											1	

Surveys Received From Facility	Mtn	Slp	Hills	Pra	SWO	SWN	FPO	FPN	Iso	Unk	NR	Oth
Region 9												
Fort Ord			1									
Mare Island Naval Shipyard					1							1
Salton Sea Test Base						1						
Region 10												
Camp Bonneville				1		1						
NAF Adak											18	
Umatilla Army Depot			1									
Total Number of Ranges	14	1	86	42	44	26	25	2	1	0	36	18

Key: Mtn = Mountainous, Slp = Steeply sloping hills, Hills = Rolling hills, Pra = Prairie or flat terrain, SWO = Surface water/wetlands on range, SWN = Surface water/wetlands near range, FPO = Floodplain on range, FPN = Floodplain near range, Iso = Isolated area, NR = Not reported, Oth = Other

Table C-2 Possible Media Contaminated with UXO
(Figure 8)
(Note: Numbers in cells represent number of ranges covered by survey)

Surveys Received From Facility	Soil	Sur	Sed	Gro	Deb	Unk	NR	Oth
Region 1								
Loring AFB							4	
Massachusetts Military Reservation	2			2				2
Nomans Island	1							
Region 2								
Former Morgan Depot/TA Gillespie Loading Co							1	
Former Raritan Arsenal	1							
Griffiss Air Force Base	2							
Naval Weapons Station Earle	1		1	1				
Picatinny Arsenal	1			1				
Plattsburgh Air Force Base - #1	1							
Plattsburgh Air Force Base - #2	1							
Plattsburgh Air Force Base - #3	1			1				
Plattsburgh Air Force Base - #4	1							
Plattsburgh Air Force Base - #5	1							
Seneca Army Depot	1			1				
Region 3								
Aberdeen Proving Ground	1			1				
Former Nansemond Ordnance Depot	1	1						
Fort Picket							1	
Fort Ritchie Army Garrison	1			1				
Naval Surface Warfare Center - Dahlgren #1	1							
Naval Surface Warfare Center - Dahlgren #3	1							
Naval Surface Warfare Center - Dahlgren #4	1							
Naval Surface Warfare Center - Dahlgren #5	1							
Tobyhanna Army Depot	1							
Washington, DC Army Munitions Site	1			1				
Region 4								
Fort Campbell							3	
Fort McClellan - #1	44			44				
Fort McClellan - #2	17			17				
Louisiana Army Ammunition Plant BG#5	1			1				
MacDill Air Force Base							5	
Myrtle Beach Air Force Base	1							
NAS Cecil Field							3	
Naval Base Charleston			1					
Naval Ordnance Station Louisville							1	
Naval Weapons Station Charleston - #2	1							
Redstone Arsenal	22	22	22	22	22			
Sangamo Electric Dump	1							
Region 5								
Fort Sheridan Closed Overwater Artillery Ranges		1						
Fort Sheridan Small Arms Range							1	
Grissom Air Force Base	2							
Jefferson Proving Grounds	1							
Naval Surface Warfare Center	4			4				

Surveys Received From Facility	Soil	Sur	Sed	Gro	Deb	Unk	NR	Oth
Region 5 (Continued)								
New Brighton/Arden Hills	1			1				
Savanna Army Depot Activity				1				
US Army Soldier Support Center	2			2				
Region 6								
Barksdale Air Force Base #1	1			1				
Barksdale Air Force Base #2	1			1				
Bergstrom Air Force Base								1
Dallas Naval Weapons Industrial Reserve Plant						1		
Dyess Air Force Base - #1	1			1				
Dyess Air Force Base - #2	1			1				
Eaker Air Force Base							1	
Fort Chaffee #1	1			1				
Fort Wingate Depot	1			1				
Kirtland Air Force Base -#1	1							
Kirtland Air Force Base -#2							1	
Kirtland Air Force Base -#3							1	
Kirtland Air Force Base -#4							1	
Kirtland Air Force Base -#5							1	
Kirtland Air Force Base -#6							1	
Kirtland Air Force Base -#7				1				
Lackland Air Force Base - #1						1		
Lackland Air Force Base - #2						1		
Lone Star Ammunition Plant	1			1				
Longhorn Army Ammunition Plant	1			1				
Melrose Air Force Range							1	
Sandia National Laboratories	1							
Shumaker Naval Ammunition Depot	1			1				
White Sands Missile Range #1 - Tula Peak							1	
White Sands Missile Range #2 - OB/OD Disposal							1	
White Sands Missile Range #3 - Red Rio Munitions							1	
White Sands Missile Range #4 - Bomblet Disposal							1	
White Sands Missile Range #5 - Oscura Range							1	
Region 7								
Cornhusker Army Ammunition Plant							1	
Jefferson Barracks	1							
Region 8								
Black Hills Ordnance Depot	1	1	1	1				
Lowry Bombing Range	1			1				
Tooele Army Depot SMWU 1, 1a	1							
Tooele Army Depot SMWU 10/11	1			1				
Tooele Army Depot SMWU 1b							1	
Tooele Army Depot SMWU 1c	1							
Tooele Army Depot SMWU 40, OU9	1			1				
Tooele Army Depot SMWU 8, OU8	1			1				
Region 9								
Fort Ord	1			1				
Mare Island Naval Shipyard	1		1					
Salton Sea Test Base							1	

Surveys Received From Facility	Soil	Sur	Sed	Gro	Deb	Unk	NR	Oth
Region 10								
Camp Bonneville	1	1		1				
NAF Adak							18	
Umatilla Army Depot	1			1				
Total Number of Ranges	143	26	26	119	22	3	52	3

Key: Soil = Soil, Sur = Surface water, Sed = Sediment, Gro = Groundwater, Deb = Debris, Unk = Unknown, Oth = Other, NR = Not reported

Table C-3 Past, Present, and Predicted Future Land Uses (Figures 9, 10, and 12)

Surveys Received From Facility	# of Ranges	Op	Comm	Rec	Res	Ag	Ord	Mil	Ed	Wild	Unk	NR	Oth
Region 1													
Loring AFB	4	X					P			F			
Massachusetts Military Reservation	2	F				P				F	X		P F
Nomans Island	1						P			P X F			
Region 2													
Former Morgan Depot/TA Gillespie Loading Co	1		X F		X F		P		X F				P
Former Raritan Arsenal	1		X				P		X				F
Griffiss Air Force Base	2	X					P				F		
Naval Weapons Station Earle	1						P				X F		
Picatinny Arsenal	1		P F				P X F						P X F
Plattsburgh Air Force Base - #1	1	X					P F						
Plattsburgh Air Force Base - #2	1	X F	F				P						
Plattsburgh Air Force Base - #3	1	X F	F				P						
Plattsburgh Air Force Base - #4	1	X F	F				P						
Plattsburgh Air Force Base - #5	1						P		X F				
Seneca Army Depot	1					P	P X			F			F
Region 3													
Aberdeen Proving Ground	1				P	P	P X F			F			X
Former Nansemond Ordnance Depot	1		P X F	P F	P F		P	P	P X F				
Fort Picket	1		P F				X						P X
Fort Ritchie Army Garrison	1		F	F	F		P	P	X F				
Naval Surface Warfare Center - Dahlgren #1	1	X					P					F	
Naval Surface Warfare Center - Dahlgren #3	1						P					F	X
Naval Surface Warfare Center - Dahlgren #4	1						P X					F	
Naval Surface Warfare Center - Dahlgren #5	1						P					F	X
Tobyhanna Army Depot	1	X F		X F	X F		P	F	X F				
Washington, DC, Army Munitions Site	1	P	P		P X F		P		P X F				P

Key: P = Past, X = Present, F = Future, Op = Open space, Comm = Industrial/Commercial, Rec = Recreational, Res = Residential, Ag = Agricultural/ Ranching/Mining, Ord = Ordnance related, Mil = Military (not ordnance), Ed = Educational, Wild = Wildlife Refuge, Unk = Unknown, NR = Not Reported, Oth = Other

Surveys Received From Facility	# of Ranges	Op	Comm	Rec	Res	Ag	Ord	Mil	Ed	Wild	Unk	NR	Oth
Region 4													
Fort Campbell	3					P F		X F					
Fort McClellan - #1	44		F		F	P	P			F	X		
Fort McClellan - #2	17						P			F	X		
Louisiana Army Ammunition Plant BG#5	1						P	F					X
MacDill Air Force Base	5			F			P			X F			
Myrtle Beach Air Force Base	1	X	F	F	F		P	X					
NAS Cecil Field	3			F								P	X F
Naval Base Charleston	1		X F										P
Naval Ordnance Station Louisville	1		X F				P						
Naval Weapons Station Charleston - #2	1						X				P F		
Redstone Arsenal	22		P X F	P X F	P X F	P X F	P	P X F	P X F	P X F			P
Sangamo Electric Dump	1		X F	X F		X F				X F			P
Region 5													
Fort Sheridan Closed Overwater Artillery Ranges	1			X F			P						P X F
Fort Sheridan Small Arms Range	1		P	P X F			P						
Grissom Air Force Base	2		F	F	F	P	P X	P X F					
Jefferson Proving Grounds	1		X F	X F	X F	P X F	P						
Naval Surface Warfare Center	4		F	P F	F	P F	X	X					
New Brighton/Arden Hills	1		P X F		F		P			X			P
Savanna Army Depot Activity	1		F	X F	F	P	P X			F			
US Army Soldier Support Center	2			F			P						X
Region 6													
Barksdale Air Force Base #1	1					P	P				F		X
Barksdale Air Force Base #2	1	X				P	P F						P
Bergstrom Air Force Base	1		X			P	P					F	
Dallas Naval Weapons Industrial Reserve Plant	1		P X F				P X F						
Dyess Air Force Base - #1	1		F				P						X F

Surveys Received From Facility	# of Ranges	Op	Comm	Rec	Res	Ag	Ord	Mil	Ed	Wild	Unk	NR	Oth
Region 6 (Continued)													
Dyess Air Force Base - #2	1	X	F				P						
Eaker Air Force Base	1					P	X						X F
Fort Chaffee #1	1	X	F		F		P						
Fort Wingate Depot	1						P X						F
Kirtland Air Force Base -#1	1	X F	P X F	P X F		P	P X	X F					X
Kirtland Air Force Base -#2	1	P X	X F				P						
Kirtland Air Force Base -#3	1	P X	X F	P X		P	P						
Kirtland Air Force Base -#4	1	P X	P X F	P	X	P	P						P
Kirtland Air Force Base -#5	1	P X	P X F	P X		P	P						
Kirtland Air Force Base -#6	1	P	X F	P X		P	P						
Kirtland Air Force Base -#7	1		X	F	F	P	P						
Lackland Air Force Base - #1	1		P X F	P X F	P X F	P	P						
Lackland Air Force Base - #2	1		P X F	P X F	P X F	P	P	X F					
Lone Star Ammunition Plant	1						P X F						
Longhorn Army Ammunition Plant	1						P			F			P X
Melrose Air Force Range	1						P X F						
Sandia National Laboratories	1			F			P X	P X					
Shumaker Naval Ammunition Depot	1				X F		P						P X F
White Sands Missile Range #1 - Tula Peak	1						P X F						
White Sands Missile Range #2 - OB/OD Disposal	1						P X F						
White Sands Missile Range #3 - Red Rio Munitions	1						P X F						
White Sands Missile Range #4 - Bomblet Disposal	1						P X F						
White Sands Missile Range #5 - Oscura Range	1						P X F						
Region 7													
Cornhusker Army Ammunition Plant	1	X	F			F	P						
Jefferson Barracks	1		X F	X F	X F		P	X F					X F

Surveys Received From Facility	# of Ranges	Op	Comm	Rec	Res	Ag	Ord	Mil	Ed	Wild	Unk	NR	Oth
Region 8													
Black Hills Ordnance Depot	1		F		P X F	X F	P	P		X F			
Lowry Bombing Range	1	F	P X F	P X F	P X F	P X							
Tooele Army Depot SMWU 1, 1a	1						P X						F
Tooele Army Depot SMWU 10/11	1						P					X F	
Tooele Army Depot SMWU 1b	1						P X F						
Tooele Army Depot SMWU 1c	1						P X F						
Tooele Army Depot SMWU 40, OU9	1						P F						X
Tooele Army Depot SMWU 8, OU8	1						P F				X		
Region 9													
Fort Ord	1	X F	X F	X F	X F		P		X F	X F			
Mare Island Naval Shipyard	1		P X F		F		P	X					
Salton Sea Test Base	1	X					P	P		F			P
Region 10													
Camp Bonneville	1			F			P						X
NAF Adak	18		X F	P X F	X F		P	P		P X F			
Umatilla Army Depot	1						P F						X

Table C-4 Ordnance-Related Land Use Over Time (Figure 11)

Surveys Received From Facility	# of Ranges	Sto	Test	Tr	Dis	Main	Imp	Buf
Region 1								
Loring AFB	4				P			
Massachusetts Military Reservation	2							
Nomans Island	1			P				
Region 2								
Former Morgan Depot/TA Gillespie Loading Co	1	P						
Former Raritan Arsenal	1	P						
Griffiss Air Force Base	2			P			P	
Naval Weapons Station Earle	1	P		P		P	P	
Picatinny Arsenal	1	P X F	X F					
Plattsburgh Air Force Base - #1	1			P F				
Plattsburgh Air Force Base - #2	1			P				
Plattsburgh Air Force Base - #3	1				P			
Plattsburgh Air Force Base - #4	1			P				
Plattsburgh Air Force Base - #5	1			P				
Seneca Army Depot	1				P X			
Region 3								
Aberdeen Proving Ground	1		P X F					
Former Nansemond Ordnance Depot	1	P			P			
Fort Picket	1				X			
Fort Ritchie Army Garrison	1			P				
Naval Surface Warfare Center - Dahlgren #1	1		P					
Naval Surface Warfare Center - Dahlgren #3	1		P					
Naval Surface Warfare Center - Dahlgren #4	1				P X			
Naval Surface Warfare Center - Dahlgren #5	1		P					
Tobyhanna Army Depot	1			P				
Washington, DC, Army Munitions Site	1		P	P				
Region 4								
Fort Campbell	3							
Fort McClellan - #1	44			P				
Fort McClellan - #2	17			P				
Louisiana Army Ammunition Plant BG#5	1				P			
MacDill Air Force Base	5		P				P	
Myrtle Beach Air Force Base	1						P	
NAS Cecil Field	3							
Naval Base Charleston	1							
Naval Ordnance Station Louisville	1	P						

Key: P = Past, X = Present, F = Future, Sto = Storage, Test = Testing, Tr = Training, Dis = Disposal, Main = Maintenance, Imp = Impact range, Buf = Buffer

Surveys Received From Facility	# of Ranges	Sto	Test	Tr	Dis	Main	Imp	Buf
Region 4 (Continued)								
Naval Weapons Station Charleston - #2	1						X	
Redstone Arsenal	22	P			P			
Sangamo Electric Dump	1							
Region 5								
Fort Sheridan Closed Overwater Artillery Ranges	1			P			P	
Fort Sheridan Small Arms Range	1			P			P	
Grissom Air Force Base	2			P			P X	
Jefferson Proving Grounds	1		P					
Naval Surface Warfare Center	4	X			X			
New Brighton/Arden Hills	1	P	P					
Savanna Army Depot Activity	1	P X	P	P	P		P	
US Army Soldier Support Center	2			P				
Region 6								
Barksdale Air Force Base #1	1			P				
Barksdale Air Force Base #2	1				P F			
Bergstrom Air Force Base	1			P				
Dallas Naval Weapons Industrial Reserve Plant	1	P X F				P X F		
Dyess Air Force Base - #1	1				P			
Dyess Air Force Base - #2	1				P			
Eaker Air Force Base	1				X			
Fort Chaffee #1	1			P				
Fort Wingate Depot	1				P X			
Kirtland Air Force Base -#1	1			P X			P	
Kirtland Air Force Base -#2	1			P				
Kirtland Air Force Base -#3	1			P			P	
Kirtland Air Force Base -#4	1			P			P	
Kirtland Air Force Base -#5	1						P	
Kirtland Air Force Base -#6	1						P	
Kirtland Air Force Base -#7	1		P					
Lackland Air Force Base - #1	1			P			P	
Lackland Air Force Base - #2	1			P			P	
Lone Star Ammunition Plant	1				P X F			
Longhorn Army Ammunition Plant	1	P	P					
Melrose Air Force Range	1			P			P X F	X F
Sandia National Laboratories	1		P X	P			P X	
Shumaker Naval Ammunition Depot	1	P	P		P			
White Sands Missile Range #1 - Tula Peak	1				P X F			
White Sands Missile Range #2 - OB/OD Disposal	1		P X F		P X F		P X F	
White Sands Missile Range #3 - Red Rio Munitions	1			P	P X F			

Surveys Received From Facility	# of Ranges	Sto	Test	Tr	Dis	Main	Imp	Buf
Region 6 (Continued)								
White Sands Missile Range #4 - Bomblet Disposal	1				P X F			
White Sands Missile Range #5 - Oscura Range	1						P X F	
Region 7								
Cornhusker Army Ammunition Plant	1				P			
Jefferson Barracks	1	P		P	P			
Region 8								
Black Hills Ordnance Depot	1	P	P		P	P		
Lowry Bombing Range	1							
Tooele Army Depot SMWU 1, 1a	1	X	P		X			
Tooele Army Depot SMWU 10/11	1				P			
Tooele Army Depot SMWU 1b	1	P X F			P X	P X		
Tooele Army Depot SMWU 1c	1	P X F			P X	P X		
Tooele Army Depot SMWU 40, OU9	1	F	P F					
Tooele Army Depot SMWU 8, OU8	1	F	P	P				
Region 9								
Fort Ord	1			P			P	
Mare Island Naval Shipyard	1					P		
Salton Sea Test Base	1		P	P			P	
Region 10								
Camp Bonneville	1			P				
NAF Adak	18	P		P		P	P	
Umatilla Army Depot	1			P F	P			

Table C-5 Land Use of Surrounding Area
(Figure 13)
(Note: numbers in cells represent ranges covered by survey)

Surveys Received From Facility	Res	Ind	Rec	Mil	Agr	Edu	WR	Unk	NR	Oth
Region 1										
Loring AFB					4					
Massachusetts Military Reservation	2									
Nomans Island							1			
Region 2										
Former Morgan Depot/TA Gillespie Loading Co	1	1								
Former Raritan Arsenal	1	1				1				1
Griffiss Air Force Base					2					
Naval Weapons Station Earle	1	1								
Picatinny Arsenal	1									
Plattsburgh Air Force Base - #1	1	1								
Plattsburgh Air Force Base - #2	1	1								
Plattsburgh Air Force Base - #3	1	1								
Plattsburgh Air Force Base - #4	1	1								
Plattsburgh Air Force Base - #5	1	1				1				

Surveys Received From Facility	Res	Ind	Rec	Mil	Agr	Edu	WR	Unk	NR	Oth
Seneca Army Depot	1				1					
Region 3										
Aberdeen Proving Ground	1		1		1					
Former Nansemond Ordnance Depot	1	1				1				
Fort Picket					1					
Fort Ritchie Army Garrison									1	
Naval Surface Warfare Center - Dahlgren #1	1				1					
Naval Surface Warfare Center - Dahlgren #3	1									
Naval Surface Warfare Center - Dahlgren #4	1									
Naval Surface Warfare Center - Dahlgren #5	1									
Tobyhanna Army Depot	1		1							
Washington, DC Army Munitions Site	1	1								
Region 4										
Fort Campbell					3					
Fort McClellan - #1	44	44			44					
Fort McClellan - #2		17			17					
Louisiana Army Ammunition Plant BG#5									1	
MacDill Air Force Base			5				5			
Myrtle Beach Air Force Base	1									
NAS Cecil Field									3	
Naval Base Charleston	1									1
Naval Ordnance Station Louisville	1									
Naval Weapons Station Charleston - #2	1									
Redstone Arsenal	22	22			22					22
Sangamo Electric Dump	1	1			1					
Region 5										
Fort Sheridan Closed Overwater Artillery Ranges	1									
Fort Sheridan Small Arms Range	1		1							
Grissom Air Force Base					2					
Jefferson Proving Grounds	1				1					
Naval Surface Warfare Center					4					
New Brighton/Arden Hills	1	1								1
Savanna Army Depot Activity					1					
US Army Soldier Support Center	2	2								
Region 6										
Barksdale Air Force Base #1	1	1								
Barksdale Air Force Base #2	1									
Bergstrom Air Force Base	1									
Dallas Naval Weapons Industrial Reserve Plant		1								
Dyess Air Force Base - #1	1	1								1
Dyess Air Force Base - #2	1	1			1					
Eaker Air Force Base									1	
Fort Chaffee #1	1	1	1		1					
Fort Wingate Depot									1	
Kirtland Air Force Base -#1	1									
Kirtland Air Force Base -#2	1									
Kirtland Air Force Base -#3	1									
Kirtland Air Force Base -#4	1									
Kirtland Air Force Base -#5	1									

Surveys Received From Facility	Res	Ind	Rec	Mil	Agr	Edu	WR	Unk	NR	Oth
Kirtland Air Force Base -#6	1									
Region 6 (Continued)										
Kirtland Air Force Base -#7	1									
Lackland Air Force Base - #1	1	1	1							
Lackland Air Force Base - #2	1	1	1							
Lone Star Ammunition Plant									1	
Longhorn Army Ammunition Plant	1				1					
Melrose Air Force Range	1				1					
Sandia National Laboratories	1									
Shumaker Naval Ammunition Depot					1					
White Sands Missile Range #1 - Tula Peak									1	
White Sands Missile Range #2 - OB/OD Disposal	1									
White Sands Missile Range #3 - Red Rio Munitions	1									
White Sands Missile Range #4 - Bomblet Disposal	1									
White Sands Missile Range #5 - Oscura Range	1									
Region 7										
Cornhusker Army Ammunition Plant	1				1					
Jefferson Barracks		1	1			1				1
Region 8										
Black Hills Ordnance Depot	1				1					
Lowry Bombing Range	1		1							
Tooele Army Depot SMWU 1, 1a	1									
Tooele Army Depot SMWU 10/11	1									
Tooele Army Depot SMWU 1b	1			1						
Tooele Army Depot SMWU 1c	1			1						
Tooele Army Depot SMWU 40, OU9	1									
Tooele Army Depot SMWU 8, OU8	1									
Region 9										
Fort Ord	1	1	1			1				
Mare Island Naval Shipyard	1									
Salton Sea Test Base					1					1
Region 10										
Camp Bonneville	1				1					
NAF Adak	18		18				18			
Umatilla Army Depot					1					
Total Number of Ranges	149	106	32	2	115	5	24	0	9	28

Key: Res = Residential, Ind = Industrial/Commercial, Rec = Recreational, Mil = Military use, Agr = Agricultural/Ranching/Mining, Edu = Educational, WR = Wildlife refuge, Unk = Unknown, NR = Not reported, Oth = Other

Table C-6 Proximity to Nearest Populated Area
(Figure 14)
(Note: numbers in cells represent ranges covered by survey)

Surveys Received From Facility	Distance in Miles						
	Adj	<1	1-5	5-10	10-20	>20	Unk
Region 1							
Loring AFB			4				
Massachusetts Military Reservation	2						

Surveys Received From Facility	Distance in Miles						
	Adj	<1	1-5	5-10	10-20	>20	Unk
Nomans Island			1				
Region 2							
Former Morgan Depot/TA Gillespie Loading Co	1						
Former Raritan Arsenal	1						
Griffiss Air Force Base		2					
Naval Weapons Station Earle			1				
Picatinny Arsenal	1						
Plattsburgh Air Force Base - #1			1				
Plattsburgh Air Force Base - #2			1				
Plattsburgh Air Force Base - #3			1				
Plattsburgh Air Force Base - #4			1				
Plattsburgh Air Force Base - #5	1						
Seneca Army Depot		1					
Region 3							
Aberdeen Proving Ground	1						
Former Nansemond Ordnance Depot	1						
Fort Picket							1
Fort Ritchie Army Garrison							1
Naval Surface Warfare Center - Dahlgren #1		1					
Naval Surface Warfare Center - Dahlgren #3		1					
Naval Surface Warfare Center - Dahlgren #4		1					
Naval Surface Warfare Center - Dahlgren #5		1					
Tobyhanna Army Depot		1					
Washington, DC Army Munitions Site	1						
Region 4							
Fort Campbell				3			
Fort McClellan - #1		44					
Fort McClellan - #2			17				
Louisiana Army Ammunition Plant BG#5			1				
MacDill Air Force Base			5				
Myrtle Beach Air Force Base		1					
NAS Cecil Field							3
Naval Base Charleston		1					
Naval Ordnance Station Louisville		1					
Naval Weapons Station Charleston - #2			1				
Redstone Arsenal			22				
Sangamo Electric Dump	1						
Region 5							
Fort Sheridan Closed Overwater Artillery Ranges	1						
Fort Sheridan Small Arms Range		1					
Grissom Air Force Base			2				
Jefferson Proving Grounds	1						
Naval Surface Warfare Center			4				
New Brighton/Arden Hills	1						
Savanna Army Depot Activity			1				
US Army Soldier Support Center			2				
Region 6							
Barksdale Air Force Base #1		1					

Surveys Received From Facility	Distance in Miles						
	Adj	<1	1-5	5-10	10-20	>20	Unk
Barksdale Air Force Base #2			1				
Region 6 (Continued)							
Bergstrom Air Force Base		1					
Dallas Naval Weapons Industrial Reserve Plant			1				
Dyess Air Force Base - #1	1						
Dyess Air Force Base - #2		1					
Eaker Air Force Base							1
Fort Chaffee #1			1				
Fort Wingate Depot				1			
Kirtland Air Force Base -#1			1				
Kirtland Air Force Base -#2			1				
Kirtland Air Force Base -#3				1			
Kirtland Air Force Base -#4			1				
Kirtland Air Force Base -#5					1		
Kirtland Air Force Base -#6					1		
Kirtland Air Force Base -#7				1			
Lackland Air Force Base - #1	1						
Lackland Air Force Base - #2	1						
Lone Star Ammunition Plant			1				
Longhorn Army Ammunition Plant	1						
Melrose Air Force Range			1				
Sandia National Laboratories	1						
Shumaker Naval Ammunition Depot	1						
White Sands Missile Range #1 - Tula Peak						1	
White Sands Missile Range #2 - OB/OD Disposal						1	
White Sands Missile Range #3 - Red Rio Munitions						1	
White Sands Missile Range #4 - Bomblet Disposal						1	
White Sands Missile Range #5 - Oscura Range						1	
Region 7							
Cornhusker Army Ammunition Plant				1			
Jefferson Barracks		1					
Region 8							
Black Hills Ordnance Depot			1				
Lowry Bombing Range	1						
Tooele Army Depot SMWU 1, 1a				1			
Tooele Army Depot SMWU 10/11				1			
Tooele Army Depot SMWU 1b				1			
Tooele Army Depot SMWU 1c				1			
Tooele Army Depot SMWU 40, OU9				1			
Tooele Army Depot SMWU 8, OU8				1			
Region 9							
Fort Ord		1					
Mare Island Naval Shipyard							1
Salton Sea Test Base				1			
Region 10							
Camp Bonneville	1						
NAF Adak		18					
Umatilla Army Depot			1				
Total Number of Ranges	21	79	75	14	2	5	7

Surveys Received From Facility	Distance in Miles						
	Adj	<1	1-5	5-10	10-20	>20	Unk

Key: Adj = Adjacent to range, Unk = Unknown

Table C-7 Has UXO Been Found on Range and Have Chemical or Biological Weapons Been Found or Suspected on Range?
(Figure 15)

Surveys Received From Facility	# of Ranges	Has Known UXO Been Found on the Range?	Were Chemical or Biological Weapons Found?
Region 1			
Loring AFB	4	No	No
Massachusetts Military Reservation	2	Yes	No
Nomans Island	1	Yes	NR
Region 2			
Former Morgan Depot/TA Gillespie Loading Co	1	Yes	No
Former Raritan Arsenal	1	Yes	Yes
Griffiss Air Force Base	2	Yes	Yes
Naval Weapons Station Earle	1	Yes	No
Picatinny Arsenal	1	Yes	No
Plattsburgh Air Force Base - #1	1	Yes	No
Plattsburgh Air Force Base - #2	1	Yes	No
Plattsburgh Air Force Base - #3	1	Yes	No
Plattsburgh Air Force Base - #4	1	Yes	No
Plattsburgh Air Force Base - #5	1	No	No
Seneca Army Depot	1	Yes	Unk
Region 3			
Aberdeen Proving Ground	1	Yes	Yes
Former Nansemond Ordnance Depot	1	Yes	Yes
Fort Picket	1	No	No
Fort Ritchie Army Garrison	1	Yes	Yes
Naval Surface Warfare Center - Dahlgren #1	1	NR	NR
Naval Surface Warfare Center - Dahlgren #3	1	Yes	No
Naval Surface Warfare Center - Dahlgren #4	1	No	No
Naval Surface Warfare Center - Dahlgren #5	1	Yes	No
Tobyhanna Army Depot	1	Yes	No
Washington, DC, Army Munitions Site	1	Yes	Yes
Region 4			
Fort Campbell	3	No	No
Fort McClellan - #1	44	Yes	Yes
Fort McClellan - #2	17	Yes	Yes
Louisiana Army Ammunition Plant BG#5	1	Yes	NR
MacDill Air Force Base	5	Yes	Yes
Myrtle Beach Air Force Base	1	No	No
NAS Cecil Field	3	Yes	No
Naval Base Charleston	1	No	No

Surveys Received From Facility	# of Ranges	Has Known UXO Been Found on the Range?	Were Chemical or Biological Weapons Found?
Naval Ordnance Station Louisville	1	No	NR
Naval Weapons Station Charleston - #2	1	No	No

Key: Unk = Unknown, NR = Not reported

Region 4 (Continued)			
Redstone Arsenal	22	Yes	Yes
Sangamo Electric Dump	1	Yes	No
Region 5			
Fort Sheridan Closed Overwater Artillery Ranges	1	No	No
Fort Sheridan Small Arms Range	1	Yes	No
Grissom Air Force Base	2	Yes	No
Jefferson Proving Grounds	1	Yes	No
Naval Surface Warfare Center	4	Yes	Yes
New Brighton/Arden Hills	1	Yes	No
Savanna Army Depot Activity	1	Yes	Yes
US Army Soldier Support Center	2	Yes	No
Region 6			
Barksdale Air Force Base #1	1	Yes	NR
Barksdale Air Force Base #2	1	NR	NR
Bergstrom Air Force Base	1	No	No
Dallas Naval Weapons Industrial Reserve Plant	1	No	No
Dyess Air Force Base - #1	1	No	No
Dyess Air Force Base - #2	1	No	No
Eaker Air Force Base	1	Yes	No
Fort Chaffee #1	1	Yes	No
Fort Wingate Depot	1	Yes	No
Kirtland Air Force Base -#1	1	Yes	No
Kirtland Air Force Base -#2	1	Yes	No
Kirtland Air Force Base -#3	1	Yes	No
Kirtland Air Force Base -#4	1	Yes	No
Kirtland Air Force Base -#5	1	Yes	No
Kirtland Air Force Base -#6	1	Yes	No
Kirtland Air Force Base -#7	1	Yes	No
Lackland Air Force Base - #1	1	Unk	No
Lackland Air Force Base - #2	1	Unk	No
Lone Star Ammunition Plant	1	Yes	No
Longhorn Army Ammunition Plant	1	Yes	No
Melrose Air Force Range	1	Yes	No
Sandia National Laboratories	1	Yes	No
Shumaker Naval Ammunition Depot	1	No	No
White Sands Missile Range #1 - Tula Peak	1	Yes	Unk
White Sands Missile Range #2 - OB/OD Disposal	1	Yes	Unk
White Sands Missile Range #3 - Red Rio Munitions	1	No	Unk

Surveys Received From Facility	# of Ranges	Has Known UXO Been Found on the Range?	Were Chemical or Biological Weapons Found?
White Sands Missile Range #4 - Bomblet Disposal	1	Unk	Unk
White Sands Missile Range #5 - Oscura Range	1	No	Unk

Surveys Received From Facility	# of Ranges	Has Known UXO Been Found on the Range?	Were Chemical or Biological Weapons Found?
Region 7			
Cornhusker Army Ammunition Plant	1	Yes	No
Jefferson Barracks	1	Yes	Yes
Region 8			
Black Hills Ordnance Depot	1	Yes	Yes
Lowry Bombing Range	1	Yes	Yes
Tooele Army Depot SMWU 1, 1a	1	Yes	Yes
Tooele Army Depot SMWU 10/11	1	No	Yes
Tooele Army Depot SMWU 1b	1	Yes	Yes
Tooele Army Depot SMWU 1c	1	Yes	Yes
Tooele Army Depot SMWU 40, OU9	1	Yes	Yes
Tooele Army Depot SMWU 8, OU8	1	Yes	Yes
Region 9			
Fort Ord	1	Yes	Yes
Mare Island Naval Shipyard	1	Yes	No
Salton Sea Test Base	1	Yes	No
Region 10			
Camp Bonneville	1	Yes	Yes
NAF Adak	18	Yes	No
Umatilla Army Depot	1	Yes	NR

Table C-8 Potential Off-Range Problems
(Figure 17)
(Note: numbers in cells represent ranges covered by survey)

Surveys Received From Facility	Imp	Hydro	Buried	None	Oth
Region 1					
Loring AFB				4	
Massachusetts Military Reservation	2				
Nomans Island	1				
Region 2					
Former Morgan Depot/TA Gillespie Loading Co	1				
Former Raritan Arsenal				1	
Griffiss Air Force Base				2	
Naval Weapons Station Earle					1
Picatinny Arsenal		1			
Plattsburgh Air Force Base - #1				1	
Plattsburgh Air Force Base - #2				1	
Plattsburgh Air Force Base - #3				1	
Plattsburgh Air Force Base - #4				1	
Plattsburgh Air Force Base - #5				1	
Seneca Army Depot				1	

Surveys Received From Facility	Imp	Hydro	Buried	None	Oth
Region 3					
Aberdeen Proving Ground	1				
Former Nansemond Ordnance Depot	1				
Fort Picket				1	
Fort Ritchie Army Garrison				1	
Naval Surface Warfare Center - Dahlgren #1				1	
Naval Surface Warfare Center - Dahlgren #3				1	
Naval Surface Warfare Center - Dahlgren #4				1	
Naval Surface Warfare Center - Dahlgren #5				1	
Tobyhanna Army Depot	1				
Washington, DC Army Munitions Site				1	
Region 4					
Fort Campbell				3	
Fort McClellan - #1				44	
Fort McClellan - #2				17	
Louisiana Army Ammunition Plant BG#5				1	
MacDill Air Force Base				5	
Myrtle Beach Air Force Base					1
NAS Cecil Field				3	
Naval Base Charleston				1	
Naval Ordnance Station Louisville				1	
Naval Weapons Station Charleston - #2				1	
Redstone Arsenal				22	
Sangamo Electric Dump				1	
Region 5					
Fort Sheridan Closed Overwater Artillery Ranges	1				1
Fort Sheridan Small Arms Range					1
Grissom Air Force Base				2	
Jefferson Proving Grounds	1				
Naval Surface Warfare Center				4	
New Brighton/Arden Hills				1	
Savanna Army Depot Activity	1				
US Army Soldier Support Center					2
Region 6					
Barksdale Air Force Base #1				1	
Barksdale Air Force Base #2				1	
Bergstrom Air Force Base				1	
Dallas Naval Weapons Industrial Reserve Plant				1	
Dyess Air Force Base - #1				1	
Dyess Air Force Base - #2				1	
Eaker Air Force Base				1	
Fort Chaffee #1				1	
Fort Wingate Depot	1	1			
Kirtland Air Force Base -#1	1				
Kirtland Air Force Base -#2				1	
Kirtland Air Force Base -#3				1	
Kirtland Air Force Base -#4				1	
Kirtland Air Force Base -#5				1	
Kirtland Air Force Base -#6				1	

Surveys Received From Facility	Imp	Hydro	Buried	None	Oth
Region 6 (Continued)					
Kirtland Air Force Base -#7				1	
Lackland Air Force Base - #1				1	
Lackland Air Force Base - #2				1	
Lone Star Ammunition Plant				1	
Longhorn Army Ammunition Plant				1	
Melrose Air Force Range				1	
Sandia National Laboratories					1
Shumaker Naval Ammunition Depot	1				
White Sands Missile Range #1 - Tula Peak				1	
White Sands Missile Range #2 - OB/OD Disposal	1				
White Sands Missile Range #3 - Red Rio Munitions				1	
White Sands Missile Range #4 - Bomblet Disposal					1
White Sands Missile Range #5 - Oscura Range				1	
Region 7					
Cornhusker Army Ammunition Plant				1	
Jefferson Barracks				1	
Region 8					
Black Hills Ordnance Depot	1				
Lowry Bombing Range				1	
Tooele Army Depot SMWU 1, 1a	1				
Tooele Army Depot SMWU 10/11	1				
Tooele Army Depot SMWU 1b	1				
Tooele Army Depot SMWU 1c	1				
Tooele Army Depot SMWU 40, OU9	1				
Tooele Army Depot SMWU 8, OU8	1				
Region 9					
Fort Ord	1				
Mare Island Naval Shipyard	1				
Salton Sea Test Base				1	
Region 10					
Camp Bonneville	1				
NAF Adak	18				
Umatilla Army Depot				1	
Total Number of Ranges	42	2	0	153	8

Key: Imp = Possibility UXO impacted off range, Hydro = Hydrogeology conducive to UXO migration, Buried = Buried ordnance floated to different depth, None = No off range impacts reported, Oth = Other

Table C-9 UXO and Military Munitions Incidents and Encounters (Figure 18)

Surveys Received From Facility	UXO Exploded Accidentally			UXO Discovery	Encountered by Public
	(# Incidents)	# Injuries	# Deaths	(# Incidents)	(# Incidents)
Region 1					
Massachusetts Military Reservation				1	
Region 2					
Former Morgan Depot/TA Gillespie Loading Co					3
Former Raritan Arsenal				1	
Picatinny Arsenal	2	2	2		
Region 3					
Aberdeen Proving Ground					
Former Nansemond Ordnance Depot					
Fort Ritchie Army Garrison					1
Tobyhanna Army Depot					3
Region 4					
NAS Cecil Field				1	
Region 5					
Fort Sheridan Small Arms Range				1	
Grissom Air Force Base					
Jefferson Proving Grounds					
Naval Surface Warfare Center					
New Brighton/Arden Hills				2	
Savanna Army Depot Activity				3	
Region 6					
Fort Wingate Depot					2
Longhorn Army Ammunition Plant				1	
Melrose Air Force Range					
White Sands Missile Range #2 - OB/OD Disposal	1	0	1		
Region 7					
Cornhusker Army Ammunition Plant	1	0	0		
Jefferson Barracks					
Region 8					
Lowry Bombing Range	1	0	0		25
Region 10					
Camp Bonneville					3
NAF Adak					1

APPENDIX D

RAW DATA OF RANGE MANAGEMENT

Appendix D
Raw Data of Range Management

The following tables provide raw data on the survey responses provided for each parameter in Chapter 4, "Range Management." All tables are sorted by EPA Region.

Table D-1 Who Manages the Range? (Figure 19)

Surveys Received From Facility	# of Ranges	Who Manages the Range?
Region 1		
Loring AFB	4	Army
Massachusetts Military Reservation	2	Army
Nomans Island	1	Other Federal agency
Region 2		
Former Morgan Depot/TA Gillespie Loading Co	1	Privately Owned
Former Raritan Arsenal	1	Other Federal Agency, Privately Owned
Griffiss Air Force Base	2	Air Force
Naval Weapons Station Earle	1	Navy
Picatinny Arsenal	1	Army
Plattsburgh Air Force Base	5	Air Force
Seneca Army Depot	1	Army
Region 3		
Aberdeen Proving Ground	1	Army
Former Nansemond Ordnance Depot	1	Army, Privately Owned
Fort Picket	1	Army
Fort Ritchie Army Garrison	1	Army
Naval Surface Warfare Center - Dahlgren	4	Navy
Tobyhanna Army Depot	1	Army
Washington, DC, Army Munitions Site	1	Privately Owned
Region 4		
Fort Campbell	3	Other DOD
Fort McClellan	61	Army
Louisiana Army Ammunition Plant BG#5	1	Other DOD
MacDill Air Force Base	5	Air Force
Myrtle Beach Air Force Base	1	Air Force
NAS Cecil Field	3	Other
Naval Base Charleston	1	Navy
Naval Ordnance Station Louisville	1	Not Reported
Naval Weapons Station Charleston	1	Navy
Redstone Arsenal	22	Army
Sangamo Electric Dump	1	Other Federal Agency

Surveys Received From Facility	# of Ranges	Who Manages the Range?
Region 5		
Fort Sheridan Closed Overwater Artillery Ranges	1	Other
Fort Sheridan Small Arms Range	1	Army
Grissom Air Force Base	2	Air Force
Jefferson Proving Grounds	1	Army
Naval Surface Warfare Center	4	Army, Navy
New Brighton/Arden Hills	1	Army, Privately Owned
Savanna Army Depot Activity	1	Army
US Army Soldier Support Center	2	Not Reported
Region 6		
Barksdale Air Force Base	2	Air Force
Bergstrom Air Force Base	1	Other
Dallas Naval Weapons Industrial Reserve Plant	1	Navy
Dyess Air Force Base	2	Air Force
Eaker Air Force Base	1	Air Force
Fort Chaffee	1	Army
Fort Wingate Depot	1	Army
Kirtland Air Force Base	7	Air Force
Lackland Air Force Base	2	Air Force
Lone Star Ammunition Plant	1	Privately Owned
Longhorn Army Ammunition Plant	1	Army
Melrose Air Force Range	1	Air Force
Sandia National Laboratories	1	Air Force, Other Federal Agency
Shumaker Naval Ammunition Depot	1	Army
White Sands Missile Range	5	Army
Region 7		
Cornhusker Army Ammunition Plant	1	Army
Jefferson Barracks	1	Air Force
Region 8		
Black Hills Ordnance Depot	1	Privately Owned
Lowry Bombing Range	1	Army
Tooele Army Depot	6	Army
Region 9		
Fort Ord	1	Not Reported
Mare Island Naval Shipyard	1	Navy
Salton Sea Test Base	1	Navy
Region 10		
Camp Bonneville	1	Army
NAF Adak	18	Navy
Umatilla Army Depot	1	Army

Table D-2 What Cleanup Activities Were Conducted at the Range? By Whom? (Figures 20 and 22)
(Note: numbers in cells represent ranges covered by survey)

Surveys Received From Facility	Prelim	Invest	Dec	Cleanup	Post	Oth	Organization
Region 1							
Loring AFB		4		4			USACE
Massachusetts Military Reservation							
Nomans Island			1	1			Navy
Region 2							
Former Morgan Depot/TA Gillespie Loading Co		1	1	1			USACE, EPA
Former Raritan Arsenal		1					USACE
Griffiss Air Force Base		2		2			USACE
Naval Weapons Station Earle		1	1	1			Navy
Picatinny Arsenal	1	1	1	1			USACE
Plattsburgh Air Force Base - #1				1			
Plattsburgh Air Force Base - #2		1	1	1			
Plattsburgh Air Force Base - #3	1	1	1	1			USACE
Plattsburgh Air Force Base - #4	1	1	1	1			
Plattsburgh Air Force Base - #5	1	1					
Seneca Army Depot	1	1		1			USACE
Region 3							
Aberdeen Proving Ground			1		1		Army, EPA
Former Nansemond Ordnance Depot		1	1	1			USACE
Fort Picket	1	1		1			USACE
Fort Ritchie Army Garrison	1	1					Army
Naval Surface Warfare Center - Dahlgren #1							
Naval Surface Warfare Center - Dahlgren #3	1	1	1	1			
Naval Surface Warfare Center - Dahlgren #4							
Naval Surface Warfare Center - Dahlgren #5	1	1		1			
Tobyhanna Army Depot	1	1	1	1			USACE
Washington, DC Army Munitions Site		1		1			USACE
Region 4							
Fort Campbell							
Fort McClellan - #1	44	44					USACE
Fort McClellan - #2	17	17					
Louisiana Army Ammunition Plant BG#5		1					
MacDill Air Force Base		5					USACE
Myrtle Beach Air Force Base	1	1					USACE
NAS Cecil Field		3		3			
Naval Base Charleston	1	1					
Naval Ordnance Station Louisville						1	
Naval Weapons Station Charleston - #2							
Redstone Arsenal	22	22					USACE
Sangamo Electric Dump	1	1	1	1			Army
Region 5							
Fort Sheridan Closed Overwater Artillery Ranges	1						EPA
Fort Sheridan Small Arms Range		1	1	1			
Grissom Air Force Base	2	2	2				USACE
Jefferson Proving Grounds		1		1			USACE
Naval Surface Warfare Center	4	4					USACE

Surveys Received From Facility	Prelim	Invest	Dec	Cleanup	Post	Oth	Organization
Region 5 (Continued)							
New Brighton/Arden Hills	1	1		1			USACE
Savanna Army Depot Activity		1					USACE
US Army Soldier Support Center		2					USACE
Region 6							
Barksdale Air Force Base #1			1				
Barksdale Air Force Base #2							
Bergstrom Air Force Base							
Dallas Naval Weapons Industrial Reserve Plant							
Dyess Air Force Base - #1		1					USACE
Dyess Air Force Base - #2		1					USACE
Eaker Air Force Base				1			
Fort Chaffee #1	1	1					USACE
Fort Wingate Depot		1		1			Army
Kirtland Air Force Base -#1	1						
Kirtland Air Force Base -#2						1	
Kirtland Air Force Base -#3							
Kirtland Air Force Base -#4							
Kirtland Air Force Base -#5							
Kirtland Air Force Base -#6	1						
Kirtland Air Force Base -#7				1			Other DOD
Lackland Air Force Base - #1							
Lackland Air Force Base - #2							
Lone Star Ammunition Plant	1	1					Army
Longhorn Army Ammunition Plant				1	1		Army
Melrose Air Force Range		1					USACE
Sandia National Laboratories	1	1		1			
Shumaker Naval Ammunition Depot	1	1					USACE
White Sands Missile Range #1 - Tula Peak							
White Sands Missile Range #2 - OB/OD Disposal	1	1	1				USACE
White Sands Missile Range #3 - Red Rio Munitions	1	1	1				USACE
White Sands Missile Range #4 - Bomblet Disposal							
White Sands Missile Range #5 - Oscura Range	1	1	1				USACE
Region 7							
Cornhusker Army Ammunition Plant							
Jefferson Barracks		1	1	1			USACE
Region 8							
Black Hills Ordnance Depot	1	1		1			
Lowry Bombing Range		1		1			USACE
Tooele Army Depot SMWU 1, 1a				1			USACE
Tooele Army Depot SMWU 10/11			1	1			USACE
Tooele Army Depot SMWU 1b							
Tooele Army Depot SMWU 1c		1		1			
Tooele Army Depot SMWU 40, OU9							
Tooele Army Depot SMWU 8, OU8							

Surveys Received From Facility	Prelim	Invest	Dec	Cleanup	Post	Oth	Organization
Region 9							
Fort Ord	1	1	1	1			Army, USACE
Mare Island Naval Shipyard	1	1					Navy
Salton Sea Test Base		1		1			USACE
Region 10							
Camp Bonneville	1	1	1	1			USACE
NAF Adak	18	18					USACE
Umatilla Army Depot		1	1	1			USACE
Total Number of Ranges	135	167	24	43	2	2	
Key: Prelim = Preliminary assessment, Invest = Investigation, Dec = Decision on cleanup/response, Cleanup = Cleanup/Response, Post = Post-remedial/post-removal activities, Oth = Other							

Table D-3 What was the Role of USACE in Range Cleanup? (Figure 21)

(Note: numbers in cells represent ranges covered by survey)

Surveys Received From Facility	FUDS	Tech	Rem	Contract	Unk	Oth
Region 1						
Loring AFB				4		4
Massachusetts Military Reservation						2
Nomans Island						
Region 2						
Former Morgan Depot/TA Gillespie Loading Co	1		1			
Former Raritan Arsenal	1					
Griffiss Air Force Base		2	2			
Naval Weapons Station Earle						
Picatinny Arsenal		1				1
Plattsburgh Air Force Base - #1						
Plattsburgh Air Force Base - #2						
Plattsburgh Air Force Base - #3		1	1	1		
Plattsburgh Air Force Base - #4		1	1	1		
Plattsburgh Air Force Base - #5						
Seneca Army Depot		1	1	1		
Region 3						
Aberdeen Proving Ground				1		1
Former Nansemond Ordnance Depot		1	1			
Fort Picket			1	1		
Fort Ritchie Army Garrison						1
Naval Surface Warfare Center - Dahlgren #1						
Naval Surface Warfare Center - Dahlgren #3						
Naval Surface Warfare Center - Dahlgren #4						
Naval Surface Warfare Center - Dahlgren #5						
Tobyhanna Army Depot		1	1			
Washington, DC Army Munitions Site	1		1	1		
Region 4						
Fort Campbell						
Fort McClellan - #1		44		44		44
Fort McClellan - #2						17

Surveys Received From Facility	FUDS	Tech	Rem	Contract	Unk	Oth
Region 4 (Continued)						
Louisiana Army Ammunition Plant BG#5						
MacDill Air Force Base		5				
Myrtle Beach Air Force Base		1				
NAS Cecil Field						
Naval Base Charleston						
Naval Ordnance Station Louisville						
Naval Weapons Station Charleston - #2						
Redstone Arsenal				22		
Sangamo Electric Dump		1				
Region 5						
Fort Sheridan Closed Overwater Artillery Ranges						
Fort Sheridan Small Arms Range		1	1			
Grissom Air Force Base		2	2			
Jefferson Proving Grounds		1	1			
Naval Surface Warfare Center		4				
New Brighton/Arden Hills		1	1			
Savanna Army Depot Activity		1				
US Army Soldier Support Center		2				
Region 6						
Barksdale Air Force Base #1						
Barksdale Air Force Base #2						
Bergstrom Air Force Base						
Dallas Naval Weapons Industrial Reserve Plant						
Dyess Air Force Base - #1				1		
Dyess Air Force Base - #2				1		
Eaker Air Force Base				1		
Fort Chaffee #1		1				
Fort Wingate Depot			1	1		1
Kirtland Air Force Base -#1						
Kirtland Air Force Base -#2						
Kirtland Air Force Base -#3						
Kirtland Air Force Base -#4						
Kirtland Air Force Base -#5						
Kirtland Air Force Base -#6						
Kirtland Air Force Base -#7						
Lackland Air Force Base - #1						
Lackland Air Force Base - #2						
Lone Star Ammunition Plant						
Longhorn Army Ammunition Plant				1		
Melrose Air Force Range		1				
Sandia National Laboratories					1	
Shumaker Naval Ammunition Depot	1					
White Sands Missile Range #1 - Tula Peak						1
White Sands Missile Range #2 - OB/OD Disposal		1	1			
White Sands Missile Range #3 - Red Rio Munitions		1				
White Sands Missile Range #4 - Bomblet Disposal						1
White Sands Missile Range #5 - Oscura Range		1				

Surveys Received From Facility	FUDS	Tech	Rem	Contract	Unk	Oth
Region 7						
Cornhusker Army Ammunition Plant						
Jefferson Barracks		1	1			
Region 8						
Black Hills Ordnance Depot				1		
Lowry Bombing Range	1	1				
Tooele Army Depot SMWU 1, 1a			1			
Tooele Army Depot SMWU 10/11			1			
Tooele Army Depot SMWU 1b						
Tooele Army Depot SMWU 1c		1	1			
Tooele Army Depot SMWU 40, OU9			1			
Tooele Army Depot SMWU 8, OU8			1			
Region 9						
Fort Ord				1		1
Mare Island Naval Shipyard		1				
Salton Sea Test Base		1	1			
Region 10						
Camp Bonneville		1		1		
NAF Adak		18				
Umatilla Army Depot		1	1			
Total Number of Ranges	5	101	25	84	1	74

Key: FUDS = FUDS Project Manager, Tech = Technical assessment, Rem = Remediation, Contract = Contractual oversight/management, Unk = Unknown, Oth = Other

APPENDIX E

RAW DATA OF UXO TECHNICAL ISSUES

Appendix E
Raw Data of UXO Technical Issues

The following tables provide raw data on the survey responses provided for each parameter in Chapter 5, "UXO Technical Issues." All tables are sorted by EPA Region.

Table E-1 Range Assessment Problems
(Figure 23)
(Note: numbers in cells represent ranges covered by survey)

Surveys Received From Facility	Disc	Inv	Incom	MisID	Poor	Cost	Terr	NR	Oth	No Assess	No Prob
Region 1											
Loring AFB	4										
Massachusetts Military Reservation										2	
Nomans Island											1
Region 2											
Former Morgan Depot/TA Gillespie Loading Co								1			
Former Raritan Arsenal		1									
Griffiss Air Force Base								2			
Naval Weapons Station Earle											1
Picatinny Arsenal	1				1						
Plattsburgh Air Force Base - #1											1
Plattsburgh Air Force Base - #2											1
Plattsburgh Air Force Base - #3											1
Plattsburgh Air Force Base - #4											1
Plattsburgh Air Force Base - #5											1
Seneca Army Depot											1
Region 3											
Aberdeen Proving Ground				1			1				
Former Nansemond Ordnance Depot								1			
Fort Picket											1
Fort Ritchie Army Garrison		1			1						
Naval Surface Warfare Center - Dahlgren #1						1					
Naval Surface Warfare Center - Dahlgren #3								1			
Naval Surface Warfare Center - Dahlgren #4						1					

Surveys Received From Facility	Disc	Inv	Incom	MisID	Poor	Cost	Terr	NR	Oth	No Assess	No Prob
Naval Surface Warfare Center - Dahlgren #5								1			
Region 3 (Continued)											
Tobyhanna Army Depot							1				
Washington, DC Army Munitions Site		1							1		
Region 4											
Fort Campbell									3		
Fort McClellan - #1										44	
Fort McClellan - #2										17	
Louisiana Army Ammunition Plant BG#5											1
MacDill Air Force Base									5		
Myrtle Beach Air Force Base									1		
NAS Cecil Field											3
Naval Base Charleston						1					
Naval Ordnance Station Louisville											1
Naval Weapons Station Charleston - #2										1	
Redstone Arsenal			22								
Sangamo Electric Dump								1			
Region 5											
Fort Sheridan Closed Overwater Artillery Ranges		1					1				
Fort Sheridan Small Arms Range											1
Grissom Air Force Base											2
Jefferson Proving Grounds					1				1		
Naval Surface Warfare Center											4
New Brighton/Arden Hills								1			
Savanna Army Depot Activity								1			
US Army Soldier Support Center									2		
Region 6											
Barksdale Air Force Base #1											1
Barksdale Air Force Base #2											1
Bergstrom Air Force Base											1
Dallas Naval Weapons Industrial Reserve Plant											1
Dyess Air Force Base - #1											1
Dyess Air Force Base - #2											1
Eaker Air Force Base											1

Surveys Received From Facility	Disc	Inv	Incom	MisID	Poor	Cost	Terr	NR	Oth	No Assess	No Prob
Fort Chaffee #1											1
Region 6 (Continued)											
Fort Wingate Depot		1							1		
Kirtland Air Force Base -#1									1		
Kirtland Air Force Base -#2											1
Kirtland Air Force Base -#3										1	
Kirtland Air Force Base -#4										1	
Kirtland Air Force Base -#5										1	
Kirtland Air Force Base -#6	1										
Kirtland Air Force Base -#7											1
Lackland Air Force Base - #1										1	
Lackland Air Force Base - #2										1	
Lone Star Ammunition Plant									1		
Longhorn Army Ammunition Plant								1			
Melrose Air Force Range											1
Sandia National Laboratories	1										
Shumaker Naval Ammunition Depot			1		1						
White Sands Missile Range #1 - Tula Peak								1			
White Sands Missile Range #2 - OB/OD Disposal								1			
White Sands Missile Range #3 - Red Rio Munitions								1			
White Sands Missile Range #4 - Bomblet Disposal								1			
White Sands Missile Range #5 - Oscura Range								1			
Region 7											
Cornhusker Army Ammunition Plant	1										
Jefferson Barracks								1			
Region 8											
Black Hills Ordnance Depot											1
Lowry Bombing Range		1	1								
Tooele Army Depot SMWU 1, 1a									1		
Tooele Army Depot SMWU 10/11									1		
Tooele Army Depot SMWU 1b		1									
Tooele Army Depot SMWU 1c		1									
Tooele Army Depot SMWU 40, OU9									1		
Tooele Army Depot SMWU 8, OU8									1		

Surveys Received From Facility	Disc	Inv	Incom	MisID	Poor	Cost	Terr	NR	Oth	No Assess	No Prob
Region 9											
Fort Ord		1							1		
Mare Island Naval Shipyard							1				
Salton Sea Test Base									1		
Region 10											
Camp Bonneville		1									
NAF Adak							18				
Umatilla Army Depot											1
Total Number of Ranges	8	10	24	1	4	3	22	16	22	69	34

Key: Disc = Discovery of UXO hampered investigation, Inv = Investigative techniques not adequate, Incom = Incomplete historical records, MisID = Misidentification of UXO types, Poor = Poorly performed investigation, Cost = Too costly, Terr = Terrain, NR = None reported, Oth = Other, No Assess = No assessment performed, No Prob = No problems encountered

Table E-2 Range Remediation Problems
(Figure 24)
(Note: numbers in cells represent ranges covered by survey)

Surveys Received From Facility	Poor	Inf	Danger	Cost	No Rem	No Prob	NR	Oth
Region 1								
Loring AFB						4		
Massachusetts Military Reservation					2			
Nomans Island							1	
Region 2								
Former Morgan Depot/TA Gillespie Loading Co	1							
Former Raritan Arsenal							1	
Griffiss Air Force Base							2	
Naval Weapons Station Earle						1		
Picatinny Arsenal					1			
Plattsburgh Air Force Base - #1						1		
Plattsburgh Air Force Base - #2						1		
Plattsburgh Air Force Base - #3						1		
Plattsburgh Air Force Base - #4						1		
Plattsburgh Air Force Base - #5						1		
Seneca Army Depot						1		
Region 3								
Aberdeen Proving Ground		1	1					
Former Nansemond Ordnance Depot		1						
Fort Picket							1	
Fort Ritchie Army Garrison	1							1
Naval Surface Warfare Center - Dahlgren #1							1	
Naval Surface Warfare Center - Dahlgren #3		1						
Naval Surface Warfare Center - Dahlgren #4							1	
Naval Surface Warfare Center - Dahlgren #5		1						
Tobyhanna Army Depot							1	
Washington, DC Army Munitions Site								1
Region 4								
Fort Campbell							3	
Fort McClellan - #1					44			
Fort McClellan - #2					17			
Louisiana Army Ammunition Plant BG#5						1		
MacDill Air Force Base					5			
Myrtle Beach Air Force Base								
NAS Cecil Field						3		
Naval Base Charleston					1			
Naval Ordnance Station Louisville						1		
Naval Weapons Station Charleston - #2					1			
Redstone Arsenal						22		
Sangamo Electric Dump							1	
Region 5								
Fort Sheridan Closed Overwater Artillery Ranges					1	1		
Fort Sheridan Small Arms Range							1	
Grissom Air Force Base						2		
Jefferson Proving Grounds	1							

Surveys Received From Facility	Poor	Inf	Danger	Cost	No Rem	No Prob	NR	Oth
Region 5 (Continued)								
Naval Surface Warfare Center						4		
New Brighton/Arden Hills								1
Savanna Army Depot Activity								1
US Army Soldier Support Center								2
Region 6								
Barksdale Air Force Base #1						1		
Barksdale Air Force Base #2						1		
Bergstrom Air Force Base						1		
Dallas Naval Weapons Industrial Reserve Plant						1		
Dyess Air Force Base - #1						1		
Dyess Air Force Base - #2						1		
Eaker Air Force Base						1		
Fort Chaffee #1						1		
Fort Wingate Depot			1	1				
Kirtland Air Force Base -#1					1			
Kirtland Air Force Base -#2					1			
Kirtland Air Force Base -#3					1			
Kirtland Air Force Base -#4					1			
Kirtland Air Force Base -#5					1			
Kirtland Air Force Base -#6					1			
Kirtland Air Force Base -#7						1		
Lackland Air Force Base - #1					1			
Lackland Air Force Base - #2					1			
Lone Star Ammunition Plant								1
Longhorn Army Ammunition Plant							1	
Melrose Air Force Range						1		
Sandia National Laboratories								1
Shumaker Naval Ammunition Depot			1					1
White Sands Missile Range #1 - Tula Peak							1	
White Sands Missile Range #2 - OB/OD Disposal							1	
White Sands Missile Range #3 - Red Rio Munitions							1	
White Sands Missile Range #4 - Bomblet Disposal							1	
White Sands Missile Range #5 - Oscura Range							1	
Region 7								
Cornhusker Army Ammunition Plant			1					
Jefferson Barracks								1
Region 8								
Black Hills Ordnance Depot						1		
Lowry Bombing Range	1							
Tooele Army Depot SMWU 1, 1a								1
Tooele Army Depot SMWU 10/11								1
Tooele Army Depot SMWU 1b							1	
Tooele Army Depot SMWU 1c							1	
Tooele Army Depot SMWU 40, OU9							1	
Tooele Army Depot SMWU 8, OU8							1	

Surveys Received From Facility	Poor	Inf	Danger	Cost	No Rem	No Prob	NR	Oth
Region 9								
Fort Ord	1	1						
Mare Island Naval Shipyard						1		
Salton Sea Test Base						1		
Region 10								
Camp Bonneville								1
NAF Adak				18				
Umatilla Army Depot								1
Total Number of Ranges	5	5	4	19	80	58	23	14

Key: Poor = Poorly performed assessment, Inf = Remediation is technically infeasible, Danger = Remediation is too dangerous to attempt, Cost = Remediation is too costly to perform, No Rem = No remedial activities conducted, No Prob = No problems encountered, NR = None reported, Oth = Other

Table E-3 Were Statistical Methods Employed on Range? Were Recommendations Based on Statistical Methods Generated that EPA Could Not Support? (Figure 25)

Surveys Received From Facility	# of Ranges	Has USACE or DoD Used any Statistical Methods to Define UXO at the Range?	If Statistical Methods were Employed, Were Recommendations Generated That EPA Could Not Support?
Region 1			
Loring AFB	4	No	
Massachusetts Military Reservation	2	No	
Nomans Island	1	Yes	Not Reported
Region 2			
Former Morgan Depot/TA Gillespie Loading Co	1	No	
Former Raritan Arsenal	1	Not Reported	
Griffiss Air Force Base	2	Not Reported	
Naval Weapons Station Earle	1	No	
Picatinny Arsenal	1	No	
Plattsburgh Air Force Base - #1	1	No	
Plattsburgh Air Force Base - #2	1	No	
Plattsburgh Air Force Base - #3	1	No	
Plattsburgh Air Force Base - #4	1	No	
Plattsburgh Air Force Base - #5	1	No	
Seneca Army Depot	1	Yes	Yes
Region 3			
Aberdeen Proving Ground	1	No	
Former Nansemond Ordnance Depot	1	Yes	Yes
Fort Picket	1	Yes	No
Fort Ritchie Army Garrison	1	Yes	Yes
Naval Surface Warfare Center - Dahlgren #1	1	Not Applicable	

Surveys Received From Facility	# of Ranges	Has USACE or DoD Used any Statistical Methods to Define UXO at the Range?	If Statistical Methods were Employed, Were Recommendations Generated That EPA Could Not Support?
Naval Surface Warfare Center - Dahlgren #3	1	No	
Region 3 (Continued)			
Naval Surface Warfare Center - Dahlgren #4	1	No	
Naval Surface Warfare Center - Dahlgren #5	1	No	
Tobyhanna Army Depot	1	Unknown	
Washington, DC, Army Munitions Site	1	No	
Region 4			
Fort Campbell	3	No	
Fort McClellan - #1	44	Yes	Yes
Fort McClellan - #2	17	Not Reported	
Louisiana Army Ammunition Plant BG#5	1	Not Reported	
MacDill Air Force Base	5	No	
Myrtle Beach Air Force Base	1	Unknown	
NAS Cecil Field	3	No	
Naval Base Charleston	1	No	
Naval Ordnance Station Louisville	1	Not Applicable	
Naval Weapons Station Charleston - #2	1	Not Applicable	
Redstone Arsenal	22	No	
Sangamo Electric Dump	1	Yes	No
Region 5			
Fort Sheridan Closed Overwater Artillery Ranges	1	No	
Fort Sheridan Small Arms Range	1	Yes	Yes
Grissom Air Force Base	2	Yes	No
Jefferson Proving Grounds	1	Yes	Yes
Naval Surface Warfare Center	4	No	
New Brighton/Arden Hills	1	No	
Savanna Army Depot Activity	1	Yes	Yes
US Army Soldier Support Center	2	Unknown	
Region 6			
Barksdale Air Force Base #1	1	Not Reported	
Barksdale Air Force Base #2	1	Not Reported	
Bergstrom Air Force Base	1	No	
Dallas Naval Weapons Industrial Reserve Plant	1	No	
Dyess Air Force Base - #1	1	No	
Dyess Air Force Base - #2	1	No	
Eaker Air Force Base	1	No	
Fort Chaffee #1	1	No	
Fort Wingate Depot	1	No	
Kirtland Air Force Base -#1	1	No	
Kirtland Air Force Base -#2	1	No	

Surveys Received From Facility	# of Ranges	Has USACE or DoD Used any Statistical Methods to Define UXO at the Range?	If Statistical Methods were Employed, Were Recommendations Generated That EPA Could Not Support?
Kirtland Air Force Base -#3	1	No	
Kirtland Air Force Base -#4	1	No	
Region 6 (Continued)			
Kirtland Air Force Base -#5	1	No	
Kirtland Air Force Base -#6	1	No	
Kirtland Air Force Base -#7	1	No	
Lackland Air Force Base - #1	1	No	
Lackland Air Force Base - #2	1	No	
Lone Star Ammunition Plant	1	Unknown	
Longhorn Army Ammunition Plant	1	No	
Melrose Air Force Range	1	No	
Sandia National Laboratories	1	No	
Shumaker Naval Ammunition Depot	1	No	
White Sands Missile Range #1 - Tula Peak	1	No	
White Sands Missile Range #2 - OB/OD Disposal	1	No	
White Sands Missile Range #3 - Red Rio Munitions	1	No	
White Sands Missile Range #4 - Bomblet Disposal	1	No	
White Sands Missile Range #5 - Oscura Range	1	No	
Region 7			
Cornhusker Army Ammunition Plant	1	No	
Jefferson Barracks	1	Yes	Yes
Region 8			
Black Hills Ordnance Depot	1	Not Reported	
Lowry Bombing Range	1	Yes	Not Reported
Tooele Army Depot SMWU 1, 1a	1	No	
Tooele Army Depot SMWU 10/11	1	No	
Tooele Army Depot SMWU 1b	1	No	
Tooele Army Depot SMWU 1c	1	No	
Tooele Army Depot SMWU 40, OU9	1	No	
Tooele Army Depot SMWU 8, OU8	1	No	
Region 9			
Fort Ord	1	Yes	Yes
Mare Island Naval Shipyard	1	No	
Salton Sea Test Base	1	Yes	No
Region 10			
Camp Bonneville	1	Yes	Yes
NAF Adak	18	Yes	Yes
Umatilla Army Depot	1	Not Reported	

Table E-4 Has Any Agency Indicated that UXO Would Not Be Treated? (Figure 27)

Surveys Received From Facility	# of Ranges	Has an Agency Indicated that UXO Will Not or Cannot Be Treated?	If Yes, Which Agency?
Region 1			
Loring AFB	4	No	
Massachusetts Military Reservation	2	Yes	Other
Nomans Island	1	No	
Region 2			
Former Morgan Depot/TA Gillespie Loading Co	1	No	
Former Raritan Arsenal	1	Not Reported	
Griffiss Air Force Base	2	Not Reported	
Naval Weapons Station Earle	1	No	
Picatinny Arsenal	1	No	
Plattsburgh Air Force Base - #1	1	No	
Plattsburgh Air Force Base - #2	1	No	
Plattsburgh Air Force Base - #3	1	No	
Plattsburgh Air Force Base - #4	1	No	
Plattsburgh Air Force Base - #5	1	No	
Seneca Army Depot	1	No	
Region 3			
Aberdeen Proving Ground	1	No	
Former Nansemond Ordnance Depot	1	Yes	EOB
Fort Picket	1	No	
Fort Ritchie Army Garrison	1	No	
Naval Surface Warfare Center - Dahlgren #1	1	No	
Naval Surface Warfare Center - Dahlgren #3	1	No	
Naval Surface Warfare Center - Dahlgren #4	1	No	
Naval Surface Warfare Center - Dahlgren #5	1	No	
Tobyhanna Army Depot	1	Yes	Army
Washington, DC, Army Munitions Site	1	No	
Region 4			
Fort Campbell	3	No	
Fort McClellan - #1	44	Yes	Army
Fort McClellan - #2	17	Yes	Army
Louisiana Army Ammunition Plant BG#5	1	Yes	Not Reported
MacDill Air Force Base	5	No	
Myrtle Beach Air Force Base	1	No	
NAS Cecil Field	3	Yes	Navy
Naval Base Charleston	1	No	
Naval Ordnance Station Louisville	1	Not Applicable	
Naval Weapons Station Charleston - #2	1	No	
Redstone Arsenal	22	No	
Sangamo Electric Dump	1	No	

Surveys Received From Facility	# of Ranges	Has an Agency Indicated that UXO Will Not or Cannot Be Treated?	If Yes, Which Agency?
Region 5			
Fort Sheridan Closed Overwater Artillery Ranges	1	No	
Fort Sheridan Small Arms Range	1	Yes	EOB
Grissom Air Force Base	2	No	
Jefferson Proving Grounds	1	Yes	Army
Naval Surface Warfare Center	4	No	
New Brighton/Arden Hills	1	No	
Savanna Army Depot Activity	1	Yes	Army
US Army Soldier Support Center	2	Unknown	
Region 6			
Barksdale Air Force Base #1	1	Not Reported	
Barksdale Air Force Base #2	1	Not Reported	Not Reported
Bergstrom Air Force Base	1	No	
Dallas Naval Weapons Industrial Reserve Plant	1	No	
Dyess Air Force Base - #1	1	No	
Dyess Air Force Base - #2	1	No	
Eaker Air Force Base	1	No	
Fort Chaffee #1	1	No	
Fort Wingate Depot	1	Yes	Army
Kirtland Air Force Base -#1	1	No	
Kirtland Air Force Base -#2	1	No	
Kirtland Air Force Base -#3	1	No	
Kirtland Air Force Base -#4	1	No	
Kirtland Air Force Base -#5	1	No	
Kirtland Air Force Base -#6	1	No	
Kirtland Air Force Base -#7	1	No	
Lackland Air Force Base - #1	1	No	
Lackland Air Force Base - #2	1	No	
Lone Star Ammunition Plant	1	No	
Longhorn Army Ammunition Plant	1	No	
Melrose Air Force Range	1	No	
Sandia National Laboratories	1	Not Applicable	
Shumaker Naval Ammunition Depot	1	Yes	EOB
White Sands Missile Range #1 - Tula Peak	1	No	
White Sands Missile Range #2 - OB/OD Disposal	1	No	
White Sands Missile Range #3 - Red Rio Munitions	1	No	
White Sands Missile Range #4 - Bomblet Disposal	1	No	
White Sands Missile Range #5 - Oscura Range	1	No	
Region 7			
Cornhusker Army Ammunition Plant	1	No	
Jefferson Barracks	1	Yes	EOB

Surveys Received From Facility	# of Ranges	Has an Agency Indicated that UXO Will Not or Cannot Be Treated?	If Yes, Which Agency?
Region 8			
Black Hills Ordnance Depot	1	No	
Lowry Bombing Range	1	No	
Tooele Army Depot SMWU 1, 1a	1	Yes	Army
Tooele Army Depot SMWU 10/11	1	Yes	Army
Tooele Army Depot SMWU 1b	1	Not Reported	Army
Tooele Army Depot SMWU 1c	1	Yes	Army
Tooele Army Depot SMWU 40, OU9	1	Yes	Army
Tooele Army Depot SMWU 8, OU8	1	No	
Region 9			
Fort Ord	1	No	
Mare Island Naval Shipyard	1	No	
Salton Sea Test Base	1	Yes	Navy
Region 10			
Camp Bonneville	1	Yes	EOB
NAF Adak	18	Yes	Navy
Umatilla Army Depot	1	Not Reported	

Table E-5 Have Any Situations Occurred that Were out of Your Control? (Figure 28)

Facility	# of Ranges	Have You Faced Any Situations Regarding UXO That You Felt Were Out of Your Control, But Needed Immediate Attention?
Region 1		
Loring AFB	4	No
Massachusetts Military Reservation	2	Yes
Nomans Island	1	Not Reported
Region 2		
Former Morgan Depot/TA Gillespie Loading Co	1	Yes
Former Raritan Arsenal	1	Not Reported
Griffiss Air Force Base	2	No
Naval Weapons Station Earle	1	No
Picatinny Arsenal	1	No
Plattsburgh Air Force Base - #1	1	No
Plattsburgh Air Force Base - #2	1	No
Plattsburgh Air Force Base - #3	1	No
Plattsburgh Air Force Base - #4	1	No
Plattsburgh Air Force Base - #5	1	No
Seneca Army Depot	1	No

Facility	# of Ranges	Have You Faced Any Situations Regarding UXO That You Felt Were Out of Your Control, But Needed Immediate Attention?
Region 3		
Aberdeen Proving Ground	1	No
Former Nansemond Ordnance Depot	1	Not Reported
Fort Picket	1	No
Fort Ritchie Army Garrison	1	Not Reported
Naval Surface Warfare Center - Dahlgren #1	1	No
Naval Surface Warfare Center - Dahlgren #3	1	No
Naval Surface Warfare Center - Dahlgren #4	1	No
Naval Surface Warfare Center - Dahlgren #5	1	No
Tobyhanna Army Depot	1	No
Washington, DC, Army Munitions Site	1	Not Reported
Region 4		
Fort Campbell	3	Not Reported
Fort McClellan - #1	44	No
Fort McClellan - #2	17	No
Louisiana Army Ammunition Plant BG#5	1	No
MacDill Air Force Base	5	No
Myrtle Beach Air Force Base	1	No
NAS Cecil Field	3	No
Naval Base Charleston	1	No
Naval Ordnance Station Louisville	1	Unknown
Naval Weapons Station Charleston - #2	1	No
Redstone Arsenal	22	No
Sangamo Electric Dump	1	No
Region 5		
Fort Sheridan Closed Overwater Artillery Ranges	1	Yes
Fort Sheridan Small Arms Range	1	Yes
Grissom Air Force Base	2	No
Jefferson Proving Grounds	1	Yes
Naval Surface Warfare Center	4	No
New Brighton/Arden Hills	1	No
Savanna Army Depot Activity	1	No
US Army Soldier Support Center	2	Unknown
Region 6		
Barksdale Air Force Base #1	1	No
Barksdale Air Force Base #2	1	No
Bergstrom Air Force Base	1	No
Dallas Naval Weapons Industrial Reserve Plant	1	No
Dyess Air Force Base - #1	1	No
Dyess Air Force Base - #2	1	No
Eaker Air Force Base	1	No
Fort Chaffee #1	1	No

Facility	# of Ranges	Have You Faced Any Situations Regarding UXO That You Felt Were Out of Your Control, But Needed Immediate Attention?
Region 6 (Continued)		
Fort Wingate Depot	1	No
Kirtland Air Force Base -#1	1	No
Kirtland Air Force Base -#2	1	No
Kirtland Air Force Base -#3	1	No
Kirtland Air Force Base -#4	1	No
Kirtland Air Force Base -#5	1	No
Kirtland Air Force Base -#6	1	No
Kirtland Air Force Base -#7	1	No
Lackland Air Force Base - #1	1	No
Lackland Air Force Base - #2	1	No
Lone Star Ammunition Plant	1	No
Longhorn Army Ammunition Plant	1	No
Melrose Air Force Range	1	No
Sandia National Laboratories	1	No
Shumaker Naval Ammunition Depot	1	Yes
White Sands Missile Range #1 - Tula Peak	1	No
White Sands Missile Range #2 - OB/OD Disposal	1	Yes
White Sands Missile Range #3 - Red Rio Munitions	1	No
White Sands Missile Range #4 - Bomblet Disposal	1	No
White Sands Missile Range #5 - Oscura Range	1	No
Region 7		
Cornhusker Army Ammunition Plant	1	No
Jefferson Barracks	1	Not Reported
Region 8		
Black Hills Ordnance Depot	1	Not Reported
Lowry Bombing Range	1	Yes
Tooele Army Depot SMWU 1, 1a	1	No
Tooele Army Depot SMWU 10/11	1	No
Tooele Army Depot SMWU 1b	1	No
Tooele Army Depot SMWU 1c	1	No
Tooele Army Depot SMWU 40, OU9	1	No
Tooele Army Depot SMWU 8, OU8	1	No
Region 9		
Fort Ord	1	Yes
Mare Island Naval Shipyard	1	No
Salton Sea Test Base	1	No
Region 10		
Camp Bonneville	1	Yes
NAF Adak	18	Yes
Umatilla Army Depot	1	Not Reported

APPENDIX F

RAW DATA OF REGULATORY STATUS AND ISSUES

Appendix F
Raw Data of Regulatory Status and Issues

The following tables provide raw data on the survey responses provided for each parameter in Chapter 6, "Regulatory Status and Issues." All tables are sorted by EPA Region.

Table F-1 Range Regulatory Programs and Authorities (Figure 29)

Facility	# of Ranges	Under What Program is the Range Regulated?
Region 1		
Loring AFB	4	CERCLA
Massachusetts Military Reservation	2	CERCLA
Nomans Island	1	Not Reported
Region 2		
Former Morgan Depot/TA Gillespie Loading Co	1	Not Reported
Former Raritan Arsenal	1	Other
Griffiss Air Force Base	2	CERCLA
Naval Weapons Station Earle	1	RCRA, CERCLA
Picatinny Arsenal	1	RCRA, CERCLA
Plattsburgh Air Force Base	5	CERCLA
Seneca Army Depot	1	RCRA
Region 3		
Aberdeen Proving Ground	1	RCRA, CERCLA
Former Nansemond Ordnance Depot	1	Other
Fort Picket	1	Not Reported
Fort Ritchie Army Garrison	1	Unknown
Naval Surface Warfare Center - Dahlgren	4	CERCLA
Tobyhanna Army Depot	1	CERCLA
Washington, DC, Army Munitions Site	1	CERCLA
Region 4		
Fort Campbell	3	Other
Fort McClellan	61	Unknown
Louisiana Army Ammunition Plant BG#5	1	RCRA
MacDill Air Force Base	5	RCRA
Myrtle Beach Air Force Base	1	Other
NAS Cecil Field	3	CERCLA
Naval Base Charleston	1	RCRA
Naval Ordnance Station Louisville	1	Other
Naval Weapons Station Charleston - #2	1	RCRA
Redstone Arsenal	22	RCRA, CERCLA
Sangamo Electric Dump	1	CERCLA
Region 5		
Fort Sheridan	2	CERCLA
Grissom Air Force Base	2	Unknown

Facility	# of Ranges	Under What Program is the Range Regulated?
Jefferson Proving Grounds	1	RCRA
Region 5 (Continued)		
Naval Surface Warfare Center	4	RCRA
New Brighton/Arden Hills	1	CERCLA
Savanna Army Depot Activity	1	RCRA, CERCLA
US Army Soldier Support Center	2	RCRA
Region 6		
Barksdale Air Force Base	2	RCRA
Bergstrom Air Force Base	1	Unknown
Dallas Naval Weapons Industrial Reserve Plant	1	Unknown
Dyess Air Force Base	2	RCRA
Eaker Air Force Base	1	RCRA
Fort Chaffee #1	1	RCRA
Fort Wingate Depot	1	RCRA
Kirtland Air Force Base	7	RCRA
Lackland Air Force Base	2	Not regulated as range
Lone Star Ammunition Plant	1	RCRA, CERCLA
Longhorn Army Ammunition Plant	1	RCRA, CERCLA
Melrose Air Force Range	1	RCRA
Sandia National Laboratories	1	RCRA
Shumaker Naval Ammunition Depot	1	RCRA
White Sands Missile Range	5	RCRA
Region 7		
Cornhusker Army Ammunition Plant	1	CERCLA
Jefferson Barracks	1	CERCLA
Region 8		
Black Hills Ordnance Depot	1	Unknown
Lowry Bombing Range	1	Unknown
Tooele Army Depot	6	RCRA
Region 9		
Fort Ord	1	Unknown
Mare Island Naval Shipyard	1	Unknown
Salton Sea Test Base	1	Unknown
Region 10		
Camp Bonneville	1	Unknown
NAF Adak	18	RCRA, CERCLA
Umatilla Army Depot	1	CERCLA

Table F-2
Who Regulates the Range
(Figure 30)

Surveys Received From Facility	# of Ranges	Who Regulates the Range?
Region 1		
Loring AFB	4	Not Regulated
Massachusetts Military Reservation	2	Other DOD
Nomans Island	1	Navy
Region 2		
Former Morgan Depot/TA Gillespie Loading Co	1	Not Reported
Former Raritan Arsenal	1	State or Local Agency
Griffiss Air Force Base	2	State or Local Agency, EPA
Naval Weapons Station Earle	1	EPA
Picatinny Arsenal	1	State or Local Agency, EPA
Plattsburgh Air Force Base - #1	1	State or Local Agency, EPA
Plattsburgh Air Force Base - #2	1	State or Local Agency, EPA
Plattsburgh Air Force Base - #3	1	State or Local Agency, EPA
Plattsburgh Air Force Base - #4	1	State or Local Agency, EPA
Plattsburgh Air Force Base - #5	1	State or Local Agency, EPA
Seneca Army Depot	1	Army, State or Local Agency, EPA
Region 3		
Aberdeen Proving Ground	1	Army
Former Nansemond Ordnance Depot	1	Not Regulated
Fort Picket	1	Not Reported
Fort Ritchie Army Garrison	1	Army
Naval Surface Warfare Center - Dahlgren #1	1	Navy
Naval Surface Warfare Center - Dahlgren #3	1	Navy
Naval Surface Warfare Center - Dahlgren #4	1	Navy
Naval Surface Warfare Center - Dahlgren #5	1	Navy
Tobyhanna Army Depot	1	Not Reported
Washington, DC, Army Munitions Site	1	Army
Region 4		
Fort Campbell	3	Not Regulated
Fort McClellan - #1	44	Army
Fort McClellan - #2	17	Army
Louisiana Army Ammunition Plant BG#5	1	Other DOD
MacDill Air Force Base	5	Not Reported
Myrtle Beach Air Force Base	1	Not Regulated
NAS Cecil Field	3	Navy
Naval Base Charleston	1	State or Local Agency
Naval Ordnance Station Louisville	1	Not Reported
Naval Weapons Station Charleston - #2	1	State or Local Agency
Redstone Arsenal	22	Army
Sangamo Electric Dump	1	Other Federal Agency

Surveys Received From Facility	# of Ranges	Who Regulates the Range?
Region 5		
Fort Sheridan Closed Overwater Artillery Ranges	1	Not Regulated
Fort Sheridan Small Arms Range	1	State or Local Agency
Grissom Air Force Base	2	Air Force
Jefferson Proving Grounds	1	Army
Naval Surface Warfare Center	4	State or Local Agency, EPA
New Brighton/Arden Hills	1	State or Local Agency, EPA
Savanna Army Depot Activity	1	State or Local Agency, EPA
US Army Soldier Support Center	2	State or Local Agency, EPA
Region 6		
Barksdale Air Force Base #1	1	Not Reported
Barksdale Air Force Base #2	1	State or Local Agency
Bergstrom Air Force Base	1	State or Local Agency
Dallas Naval Weapons Industrial Reserve Plant	1	State or Local Agency, EPA
Dyess Air Force Base - #1	1	Not Regulated
Dyess Air Force Base - #2	1	Not Regulated
Eaker Air Force Base	1	State or Local Agency
Fort Chaffee #1	1	Army
Fort Wingate Depot	1	State or Local Agency
Kirtland Air Force Base -#1	1	Other DOD
Kirtland Air Force Base -#2	1	Other DOD
Kirtland Air Force Base -#3	1	Other DOD
Kirtland Air Force Base -#4	1	Other DOD
Kirtland Air Force Base -#5	1	Other DOD
Kirtland Air Force Base -#6	1	Other DOD
Kirtland Air Force Base -#7	1	Other DOD
Lackland Air Force Base - #1	1	Not Regulated
Lackland Air Force Base - #2	1	Not Regulated
Lone Star Ammunition Plant	1	State or Local Agency, EPA
Longhorn Army Ammunition Plant	1	State or Local Agency, EPA
Melrose Air Force Range	1	State or Local Agency
Sandia National Laboratories	1	Other Federal Agency
Shumaker Naval Ammunition Depot	1	Other DOD, State or Local Agency, EPA
White Sands Missile Range #1 - Tula Peak	1	Not Regulated
White Sands Missile Range #2 - OB/OD Disposal	1	State or Local Agency
White Sands Missile Range #3 - Red Rio Munitions	1	State or Local Agency
White Sands Missile Range #4 - Bomblet Disposal	1	Not Regulated
White Sands Missile Range #5 - Oscura Range	1	State or Local Agency
Region 7		
Cornhusker Army Ammunition Plant	1	Army
Jefferson Barracks	1	Other DOD, State or Local Agency, EPA

Surveys Received From Facility	# of Ranges	Who Regulates the Range?
Region 8		
Black Hills Ordnance Depot	1	State or Local Agency
Lowry Bombing Range	1	State or Local Agency
Tooele Army Depot SMWU 1, 1a	1	State or Local Agency
Tooele Army Depot SMWU 10/11	1	State or Local Agency
Tooele Army Depot SMWU 1b	1	State or Local Agency
Tooele Army Depot SMWU 1c	1	State or Local Agency
Tooele Army Depot SMWU 40, OU9	1	State or Local Agency
Tooele Army Depot SMWU 8, OU8	1	State or Local Agency
Region 9		
Fort Ord	1	Army, State or Local Agency, EPA
Mare Island Naval Shipyard	1	Navy
Salton Sea Test Base	1	State or Local Agency, EPA
Region 10		
Camp Bonneville	1	State or Local Agency, EPA
NAF Adak	18	Navy, State or Local Agency, EPA
Umatilla Army Depot	1	State or Local Agency, EPA

Table F-3 Have Range Cleanup Activities Been Performed Consistently with Regard to CERCLA and the NCP?
(Figure 31)

Surveys Received From Facility	# of Ranges	Have the Cleanup Activities been Performed Consistently with Regard to CERCLA and the NCP?
Region 1		
Loring AFB	4	Yes
Massachusetts Military Reservation	2	Not Applicable
Nomans Island	1	Not Applicable
Region 2		
Former Morgan Depot/TA Gillespie Loading Co	1	No
Former Raritan Arsenal	1	Yes
Griffiss Air Force Base	2	No
Naval Weapons Station Earle	1	Not Reported
Picatinny Arsenal	1	Not Reported
Plattsburgh Air Force Base - #1	1	Not Applicable
Plattsburgh Air Force Base - #2	1	Not Reported
Plattsburgh Air Force Base - #3	1	Yes
Plattsburgh Air Force Base - #4	1	Yes
Plattsburgh Air Force Base - #5	1	Not Reported
Seneca Army Depot	1	Yes

Surveys Received From Facility	# of Ranges	Have the Cleanup Activities been Performed Consistently with Regard to CERCLA and the NCP?
Region 3		
Aberdeen Proving Ground	1	Yes
Former Nansemond Ordnance Depot	1	No
Fort Picket	1	Yes
Fort Ritchie Army Garrison	1	Yes
Naval Surface Warfare Center - Dahlgren #1	1	Not Applicable
Naval Surface Warfare Center - Dahlgren #3	1	Not Reported
Naval Surface Warfare Center - Dahlgren #4	1	Not Applicable
Naval Surface Warfare Center - Dahlgren #5	1	Not Reported
Tobyhanna Army Depot	1	Unknown
Washington, DC, Army Munitions Site	1	Yes
Region 4		
Fort Campbell	3	Not Applicable
Fort McClellan - #1	44	No
Fort McClellan - #2	17	No
Homestead Air Force Base	1	
Lexington Bluegrass Army Depot	1	
Louisiana Army Ammunition Plant BG#5	1	Not Applicable
MacDill Air Force Base	5	Yes
Marine Corps Recruiting Depot - Parris Island	1	
Myrtle Beach Air Force Base	1	Unknown
NAS Cecil Field	3	Not Applicable
Naval Base Charleston	1	Not Applicable
Naval Ordnance Station Louisville	1	Not Applicable
Naval Weapons Station Charleston - #2	1	Not Applicable
Redstone Arsenal	22	Not Reported
Sangamo Electric Dump	1	Yes
Region 5		
Fort Sheridan Closed Overwater Artillery Ranges	1	Not Applicable
Fort Sheridan Small Arms Range	1	Yes
Grissom Air Force Base	2	Not Applicable
Jefferson Proving Grounds	1	No
Naval Surface Warfare Center	4	Not Reported
New Brighton/Arden Hills	1	Not Applicable
Savanna Army Depot Activity	1	Unknown
US Army Soldier Support Center	2	Not Reported
Region 6		
Barksdale Air Force Base #1	1	Not Reported
Barksdale Air Force Base #2	1	Not Reported
Bergstrom Air Force Base	1	Not Applicable
Dallas Naval Weapons Industrial Reserve Plant	1	Not Applicable

Surveys Received From Facility	# of Ranges	Have the Cleanup Activities been Performed Consistently with Regard to CERCLA and the NCP?
Region 6 (Continued)		
Dyess Air Force Base - #1	1	Not Reported
Dyess Air Force Base - #2	1	Yes
Eaker Air Force Base	1	Not Applicable
Fort Chaffee #1	1	Yes
Fort Wingate Depot	1	No
Kirtland Air Force Base -#1	1	Not Applicable
Kirtland Air Force Base -#2	1	Not Applicable
Kirtland Air Force Base -#3	1	Not Applicable
Kirtland Air Force Base -#4	1	Not Applicable
Kirtland Air Force Base -#5	1	Not Applicable
Kirtland Air Force Base -#6	1	Not Applicable
Kirtland Air Force Base -#7	1	Not Reported
Lackland Air Force Base - #1	1	Not Applicable
Lackland Air Force Base - #2	1	Not Applicable
Lone Star Ammunition Plant	1	Not Reported
Longhorn Army Ammunition Plant	1	Yes
Melrose Air Force Range	1	Yes
Sandia National Laboratories	1	Unknown
Shumaker Naval Ammunition Depot	1	No
White Sands Missile Range #1 - Tula Peak	1	Unknown
White Sands Missile Range #2 - OB/OD Disposal	1	Not Reported
White Sands Missile Range #3 - Red Rio Munitions	1	Not Reported
White Sands Missile Range #4 - Bomblet Disposal	1	Not Reported
White Sands Missile Range #5 - Oscura Range	1	Not Reported
Region 7		
Cornhusker Army Ammunition Plant	1	Not Applicable
Jefferson Barracks	1	Yes
Region 8		
Black Hills Ordnance Depot	1	Not Reported
Lowry Bombing Range	1	No
Tooele Army Depot SMWU 1, 1a	1	Yes
Tooele Army Depot SMWU 10/11	1	Yes
Tooele Army Depot SMWU 1b	1	Not Reported
Tooele Army Depot SMWU 1c	1	Yes
Tooele Army Depot SMWU 40, OU9	1	Yes
Tooele Army Depot SMWU 8, OU8	1	Yes
Region 9		
Fort Ord	1	Yes
Mare Island Naval Shipyard	1	Not Applicable
Salton Sea Test Base	1	Yes

Surveys Received From Facility	# of Ranges	Have the Cleanup Activities been Performed Consistently with Regard to CERCLA and the NCP?
Region 10		
Camp Bonneville	1	No
NAF Adak	18	Not Applicable
Umatilla Army Depot	1	Not Reported

Table F-4 Have/Will Draft Workplans Been/Be Submitted to Department of Defense Explosives Safety Board for Review and Approval?
(Figure 32)

Surveys Received From Facility	# of Ranges	Have/Will Draft Workplans to Address Explosives Safety Concerns and Environmental Cleanup Been/Be Submitted to the DDESB for Review and Approval?
Region 1		
Loring AFB	4	Yes
Massachusetts Military Reservation	2	No
Nomans Island	1	Yes
Region 2		
Former Morgan Depot/TA Gillespie Loading Co	1	Unknown
Former Raritan Arsenal	1	Unknown
Griffiss Air Force Base	2	Unknown
Naval Weapons Station Earle	1	Unknown
Picatinny Arsenal	1	Yes
Plattsburgh Air Force Base - #1	1	No
Plattsburgh Air Force Base - #2	1	No
Plattsburgh Air Force Base - #3	1	Yes
Plattsburgh Air Force Base - #4	1	Yes
Plattsburgh Air Force Base - #5	1	No
Seneca Army Depot	1	Yes
Region 3		
Aberdeen Proving Ground	1	Yes
Former Nansemond Ordnance Depot	1	Yes
Fort Picket	1	No
Fort Ritchie Army Garrison	1	No
Naval Surface Warfare Center - Dahlgren #1	1	Yes
Naval Surface Warfare Center - Dahlgren #3	1	Yes
Naval Surface Warfare Center - Dahlgren #4	1	Yes
Naval Surface Warfare Center - Dahlgren #5	1	Yes
Tobyhanna Army Depot	1	Yes
Washington, DC, Army Munitions Site	1	Yes

Surveys Received From Facility	# of Ranges	Have/Will Draft Workplans to Address Explosives Safety Concerns and Environmental Cleanup Been/Be Submitted to the DDESB for Review and Approval?
Region 4		
Fort Campbell	3	No
Fort McClellan - #1	44	Yes
Fort McClellan - #2	17	Yes
Louisiana Army Ammunition Plant BG#5	1	Yes
MacDill Air Force Base	5	Unknown
Myrtle Beach Air Force Base	1	Unknown
NAS Cecil Field	3	Unknown
Naval Base Charleston	1	Unknown
Naval Ordnance Station Louisville	1	Not Applicable
Naval Weapons Station Charleston - #2	1	Not Applicable
Redstone Arsenal	22	No
Sangamo Electric Dump	1	No
Region 5		
Fort Sheridan Closed Overwater Artillery Ranges	1	Unknown
Fort Sheridan Small Arms Range	1	Unknown
Grissom Air Force Base	2	Yes
Jefferson Proving Grounds	1	Yes
Naval Surface Warfare Center	4	Yes
New Brighton/Arden Hills	1	Yes
Savanna Army Depot Activity	1	Yes
US Army Soldier Support Center	2	Unknown
Region 6		
Barksdale Air Force Base #1	1	Not Reported
Barksdale Air Force Base #2	1	Not Reported
Bergstrom Air Force Base	1	No
Dallas Naval Weapons Industrial Reserve Plant	1	Unknown
Dyess Air Force Base - #1	1	No
Dyess Air Force Base - #2	1	No
Eaker Air Force Base	1	Unknown
Fort Chaffee #1	1	No
Fort Wingate Depot	1	Yes
Kirtland Air Force Base -#1	1	No
Kirtland Air Force Base -#2	1	No
Kirtland Air Force Base -#3	1	No
Kirtland Air Force Base -#4	1	No
Kirtland Air Force Base -#5	1	No
Kirtland Air Force Base -#6	1	No
Kirtland Air Force Base -#7	1	No
Lackland Air Force Base - #1	1	No
Lackland Air Force Base - #2	1	No

Surveys Received From Facility	# of Ranges	Have/Will Draft Workplans to Address Explosives Safety Concerns and Environmental Cleanup Been/Be Submitted to the DDESB for Review and Approval?
Region 6 (Continued)		
Lone Star Ammunition Plant	1	Unknown
Longhorn Army Ammunition Plant	1	Unknown
Melrose Air Force Range	1	No
Sandia National Laboratories	1	Unknown
Shumaker Naval Ammunition Depot	1	Unknown
White Sands Missile Range #1 - Tula Peak	1	Yes
White Sands Missile Range #2 - OB/OD Disposal	1	Yes
White Sands Missile Range #3 - Red Rio Munitions	1	Yes
White Sands Missile Range #4 - Bomblet Disposal	1	Yes
White Sands Missile Range #5 - Oscura Range	1	Yes
Region 7		
Cornhusker Army Ammunition Plant	1	Unknown
Jefferson Barracks	1	Yes
Region 8		
Black Hills Ordnance Depot	1	Not Applicable
Lowry Bombing Range	1	Yes
Tooele Army Depot SMWU 1, 1a	1	Not Reported
Tooele Army Depot SMWU 10/11	1	Not Reported
Tooele Army Depot SMWU 1b	1	Unknown
Tooele Army Depot SMWU 1c	1	Unknown
Tooele Army Depot SMWU 40, OU9	1	Not Reported
Tooele Army Depot SMWU 8, OU8	1	Not Reported
Region 9		
Fort Ord	1	Yes
Mare Island Naval Shipyard	1	Yes
Salton Sea Test Base	1	Yes
Region 10		
Camp Bonneville	1	No
NAF Adak	18	Yes
Umatilla Army Depot	1	Not Reported

Table F-5 Have any Planned OB/OD Activities Been Performed at the Range? By Whom? (Figures 33 and 34)

Surveys Received From Facility	# of Ranges	Have any Planned OB/OD Activities Been Performed at the Range?	Was RCRA Subpart X Permit Obtained?	Who Performed the Activities?
Region 1				
Loring AFB	4	Yes	No	EOD
Massachusetts Military Reservation	2	Yes	No	Civilian Contractors
Nomans Island	1	Yes	No	Civilian Contractors
Region 2				
Former Morgan Depot/TA Gillespie Loading Co	1	No	No	
Former Raritan Arsenal	1	Yes	No	Civilian Contractors
Griffiss Air Force Base	2	Yes	No	Civilian Contractors
Naval Weapons Station Earle	1	Yes	Yes	Navy
Picatinny Arsenal	1	Yes	Yes	Army
Plattsburgh Air Force Base - #1	1	No	No	
Plattsburgh Air Force Base - #2	1	No	No	
Plattsburgh Air Force Base - #3	1	Yes	No	EOD
Plattsburgh Air Force Base - #4	1	No	No	
Plattsburgh Air Force Base - #5	1	No	No	
Seneca Army Depot	1	Yes	Yes	Army
Region 3				
Aberdeen Proving Ground	1	Yes	No	Army
Former Nansemond Ordnance Depot	1	Unknown	No	
Fort Picket	1	No	No	
Fort Ritchie Army Garrison	1	No	No	
Naval Surface Warfare Center - Dahlgren #1	1	Yes	Yes	Other Than EOD
Naval Surface Warfare Center - Dahlgren #3	1	Yes	Yes	Other Than EOD
Naval Surface Warfare Center - Dahlgren #4	1	Yes	Yes	Other Than EOD
Naval Surface Warfare Center - Dahlgren #5	1	Yes	Yes	Other Than EOD
Tobyhanna Army Depot	1	Yes	No	USACE
Washington, DC, Army Munitions Site	1	No	No	
Region 4				
Fort Campbell	3	No	No	
Fort McClellan - #1	44	Yes	No	Army
Fort McClellan - #2	17	Yes	No	Army
Louisiana Army Ammunition Plant BG#5	1	Yes	No	Civilian Contractors
MacDill Air Force Base	5	Yes	Yes	Not Reported
Myrtle Beach Air Force Base	1	No	No	
NAS Cecil Field	3	Yes	No	EOD
Naval Base Charleston	1	Unknown	No	
Naval Ordnance Station Louisville	1	No	No	

Surveys Received From Facility	# of Ranges	Have any Planned OB/OD Activities Been Performed at the Range?	Was RCRA Subpart X Permit Obtained?	Who Performed the Activities?
Region 4 (Continued)				
Naval Weapons Station Charleston - #2	1	Yes	No	EOD
Redstone Arsenal	22	Yes	Yes	Other Than EOD
Sangamo Electric Dump	1	Yes	No	Civilian Contractors
Region 5				
Fort Sheridan Closed Overwater Artillery Ranges	1	No	No	
Fort Sheridan Small Arms Range	1	No	No	
Grissom Air Force Base	2	No	No	
Jefferson Proving Grounds	1	Yes	No	Army
Naval Surface Warfare Center	4	Yes	Yes	Army
New Brighton/Arden Hills	1	Yes	Yes	Army
Savanna Army Depot Activity	1	Yes	Yes	EOD
US Army Soldier Support Center	2	No	No	
Region 6				
Barksdale Air Force Base #1	1	Not Reported	No	
Barksdale Air Force Base #2	1	Yes	No	Unknown
Bergstrom Air Force Base	1	Yes	No	EOD
Dallas Naval Weapons Industrial Reserve Plant	1	Yes	No	Navy
Dyess Air Force Base - #1	1	Yes	No	EOD
Dyess Air Force Base - #2	1	No	No	
Eaker Air Force Base	1	Yes	Yes	Air Force
Fort Chaffee #1	1	No	No	
Fort Wingate Depot	1	Yes	No	Army
Kirtland Air Force Base -#1	1	No	No	
Kirtland Air Force Base -#2	1	No	No	
Kirtland Air Force Base -#3	1	No	No	
Kirtland Air Force Base -#4	1	No	No	
Kirtland Air Force Base -#5	1	No	No	
Kirtland Air Force Base -#6	1	No	No	
Kirtland Air Force Base -#7	1	No	No	
Lackland Air Force Base - #1	1	No	No	
Lackland Air Force Base - #2	1	No	No	
Lone Star Ammunition Plant	1	Yes	No	Not Reported
Longhorn Army Ammunition Plant	1	Yes	Yes	Other
Melrose Air Force Range	1	Yes	Yes	EOD
Sandia National Laboratories	1	No	No	
Shumaker Naval Ammunition Depot	1	Yes	Yes	Civilian Contractors
White Sands Missile Range #1 - Tula Peak	1	Unknown	No	
White Sands Missile Range #2 - OB/OD Disposal	1	Yes	Yes	EOD

Surveys Received From Facility	# of Ranges	Have any Planned OB/OD Activities Been Performed at the Range?	Was RCRA Subpart X Permit Obtained?	Who Performed the Activities?
White Sands Missile Range #3 - Red Rio Munitions	1	Yes	No	Unknown
Region 6 (Continued)				
White Sands Missile Range #4 - Bomblet Disposal	1	Unknown		
White Sands Missile Range #5 - Oscura Range	1	No	No	
Region 7				
Cornhusker Army Ammunition Plant	1	Yes	No	Army
Jefferson Barracks	1	Yes	No	USACE
Region 8				
Black Hills Ordnance Depot	1	Yes	No	Not Reported
Lowry Bombing Range	1	Yes	No	Civilian Contractors
Tooele Army Depot SMWU 1, 1a	1	Yes	Yes	Unknown
Tooele Army Depot SMWU 10/11	1	Yes	Yes	Unknown
Tooele Army Depot SMWU 1b	1	Yes	Yes	Army
Tooele Army Depot SMWU 1c	1	Yes	Yes	Unknown
Tooele Army Depot SMWU 40, OU9	1	Yes	Yes	Unknown
Tooele Army Depot SMWU 8, OU8	1	Yes	Yes	Unknown
Region 9				
Fort Ord	1	Yes	No	Other Than EOD
Mare Island Naval Shipyard	1	Yes	No	Other Than EOD
Salton Sea Test Base	1	Yes	No	Army
Region 10				
Camp Bonneville	1	Yes	No	EOD
NAF Adak	18	Yes	No	Navy
Umatilla Army Depot	1	Not Reported	No	

Table F-6 Is the Range Covered Under a Federal Facilities Agreement, a State Cleanup Agreement or Permit, or an Administrative Order? What Type of Agreement? (Figures 35 and 36)

Surveys Received From Facility	# of Ranges	Is Range Covered by an Agreement?	What type of Agreement?
Region 1			
Loring AFB	4	Yes	Not Distinguished
Massachusetts Military Reservation	2	Yes	Federal Facilities Agmt
Nomans Island	1	No	
Region 2			
Former Morgan Depot/TA Gillespie Loading Co	1	No	
Former Raritan Arsenal	1	Unknown	
Griffiss Air Force Base	2	No	
Naval Weapons Station Earle	1	Yes	Not Distinguished
Picatinny Arsenal	1	Yes	Not Distinguished

Surveys Received From Facility	# of Ranges	Is Range Covered by an Agreement?	What type of Agreement?
Plattsburgh Air Force Base - #1	1	Yes	Federal Facilities Agmt
Plattsburgh Air Force Base - #2	1	Yes	Federal Facilities Agmt
Plattsburgh Air Force Base - #3	1	Yes	Federal Facilities Agmt
Region 2 (Continued)			
Plattsburgh Air Force Base - #4	1	Yes	Federal Facilities Agmt
Plattsburgh Air Force Base - #5	1	Yes	Federal Facilities Agmt
Seneca Army Depot	1	Yes	Federal Facilities Agmt
Region 3			
Aberdeen Proving Ground	1	Yes	Federal Facilities Agmt
Former Nansemond Ordnance Depot	1	No	
Fort Picket	1	No	
Fort Ritchie Army Garrison	1	No	
Naval Surface Warfare Center - Dahlgren #1	1	Yes	Federal Facilities Agmt
Naval Surface Warfare Center - Dahlgren #3	1	Yes	Federal Facilities Agmt
Naval Surface Warfare Center - Dahlgren #4	1	Yes	Federal Facilities Agmt
Naval Surface Warfare Center - Dahlgren #5	1	Yes	Federal Facilities Agmt
Tobyhanna Army Depot	1	Yes	Federal Facilities Agmt
Washington, DC, Army Munitions Site	1	No	
Region 4			
Fort Campbell	3	No	
Fort McClellan - #1	44	No	
Fort McClellan - #2	17	No	
Louisiana Army Ammunition Plant BG#5	1	Yes	Federal Facilities Agmt
MacDill Air Force Base	5	Yes	Not Distinguished
Myrtle Beach Air Force Base	1	Yes	Not Distinguished
NAS Cecil Field	3	Yes	Federal Facilities Agmt
Naval Base Charleston	1	Yes	Not Distinguished
Naval Ordnance Station Louisville	1	Unknown	
Naval Weapons Station Charleston - #2	1	No	
Redstone Arsenal	22	No	
Sangamo Electric Dump	1	Yes	Federal Facilities Agmt
Region 5			
Fort Sheridan Closed Overwater Artillery Ranges	1	No	
Fort Sheridan Small Arms Range	1	No	State Permit
Grissom Air Force Base	2	No	
Jefferson Proving Grounds	1	No	
Naval Surface Warfare Center	4	Yes	Not Distinguished
New Brighton/Arden Hills	1	Yes	Federal Facilities Agmt
Savanna Army Depot Activity	1	Yes	Federal Facilities Agmt
US Army Soldier Support Center	2	Yes	State Permit
Region 6			
Barksdale Air Force Base #1	1	Unknown	
Barksdale Air Force Base #2	1	Unknown	
Bergstrom Air Force Base	1	No	
Dallas Naval Weapons Industrial Reserve Plant	1	Yes	State Permit
Dyess Air Force Base - #1	1	No	
Dyess Air Force Base - #2	1	Yes	Not Distinguished
Eaker Air Force Base	1	Yes	State Permit
Fort Chaffee #1	1	No	
Fort Wingate Depot	1	No	
Kirtland Air Force Base -#1	1	No	
Kirtland Air Force Base -#2	1	No	

Surveys Received From Facility	# of Ranges	Is Range Covered by an Agreement?	What type of Agreement?
Kirtland Air Force Base -#3	1	No	
Kirtland Air Force Base -#4	1	No	
Kirtland Air Force Base -#5	1	No	
Region 6 (Continued)			
Kirtland Air Force Base -#6	1	No	
Kirtland Air Force Base -#7	1	No	
Lackland Air Force Base - #1	1	No	
Lackland Air Force Base - #2	1	No	
Lone Star Ammunition Plant	1	Yes	State Permit
Longhorn Army Ammunition Plant	1	Yes	Federal Facilities Agmt
Melrose Air Force Range	1	No	
Sandia National Laboratories	1	Yes	State Permit
Shumaker Naval Ammunition Depot	1	No	
White Sands Missile Range #1 - Tula Peak	1	No	
White Sands Missile Range #2 - OB/OD Disposal	1	Yes	State Permit
White Sands Missile Range #3 - Red Rio Munitions	1	Yes	Not Distinguished
White Sands Missile Range #4 - Bomblet Disposal	1	No	
White Sands Missile Range #5 - Oscura Range	1	Yes	Not Distinguished
Region 7			
Cornhusker Army Ammunition Plant	1	Yes	Not Distinguished
Jefferson Barracks	1	No	
Region 8			
Black Hills Ordnance Depot	1	Unknown	
Lowry Bombing Range	1	Yes	State Cleanup Agmt.
Tooele Army Depot SMWU 1, 1a	1	Yes	
Tooele Army Depot SMWU 10/11	1	Yes	Federal Facilities Agmt
Tooele Army Depot SMWU 1b	1	Yes	Federal Facilities Agmt
Tooele Army Depot SMWU 1c	1	Yes	Federal Facilities Agmt
Tooele Army Depot SMWU 40, OU9	1	Yes	Federal Facilities Agmt
Tooele Army Depot SMWU 8, OU8	1	Yes	Federal Facilities Agmt
Region 9			
Fort Ord	1	Yes	Federal Facilities Agmt
Mare Island Naval Shipyard	1	Yes	State Cleanup Agmt.
Salton Sea Test Base	1	No	
Region 10			
Camp Bonneville	1	No	
NAF Adak	18	Yes	Federal Facilities Agmt
Umatilla Army Depot	1	Yes	Federal Facilities Agmt

Table F-7 Were Institutional Controls Employed? What Types? Were they Effective?
(Figures 37 and 38)
(Note: numbers in cells represent ranges covered by survey)

Surveys Received From Facility	Fence	Signs	FS	Notify	Deed	GW	None	Unk	NR	Controls Effective?
Region 1										
Loring AFB	4	4		4						Yes
Massachusetts Military Reservation							2			
Nomans Island		1		1						No
Region 2										
Former Morgan Depot/TA Gillespie Loading Co							1			
Former Raritan Arsenal									1	
Griffiss Air Force Base	2		2		2					Yes
Naval Weapons Station Earle	1	1								Yes
Picatinny Arsenal							1			
Plattsburgh Air Force Base - #1							1			
Plattsburgh Air Force Base - #2							1			
Plattsburgh Air Force Base - #3							1			
Plattsburgh Air Force Base - #4							1			
Plattsburgh Air Force Base - #5					1					Not Reported
Seneca Army Depot							1			
Region 3										
Aberdeen Proving Ground							1			
Former Nansemond Ordnance Depot							1			
Fort Picket							1			
Fort Ritchie Army Garrison	1	1								No
Naval Surface Warfare Center - Dahlgren #1							1			
Naval Surface Warfare Center - Dahlgren #3							1			
Naval Surface Warfare Center - Dahlgren #4							1			
Naval Surface Warfare Center - Dahlgren #5							1			
Tobyhanna Army Depot		1					1			
Washington, DC Army Munitions Site							1			
Region 4										
Fort Campbell	3		3							Yes
Fort McClellan - #1							44			
Fort McClellan - #2							17			
Louisiana Army Ammunition Plant BG#5	1		1		1					Yes

Surveys Received From Facility	Fence	Signs	FS	Notify	Deed	GW	None	Unk	NR	Controls Effective?
Region 4 (Continued)										
MacDill Air Force Base	5	5								Yes
Myrtle Beach Air Force Base							1			
NAS Cecil Field							3			
Naval Base Charleston			1							Not Reported
Naval Ordnance Station Louisville							1			
Naval Weapons Station Charleston - #2							1			
Redstone Arsenal	22		22							Not Reported
Sangamo Electric Dump	1									Yes
Region 5										
Fort Sheridan Closed Overwater Artillery Ranges							1			
Fort Sheridan Small Arms Range	1									Yes
Grissom Air Force Base						2				Yes
Jefferson Proving Grounds							1			
Naval Surface Warfare Center							4			
New Brighton/Arden Hills			1			1				Yes
Savanna Army Depot Activity	1		1							Not Reported
US Army Soldier Support Center								2		Unknown
Region 6										
Barksdale Air Force Base #1			1							Not Reported
Barksdale Air Force Base #2	1		1							Not Reported
Bergstrom Air Force Base							1			
Dallas Naval Weapons Industrial Reserve Plant			1							Not Reported
Dyess Air Force Base - #1								1		Not Reported
Dyess Air Force Base - #2					1					Yes
Eaker Air Force Base							1			
Fort Chaffee #1							1			
Fort Wingate Depot			1							Yes
Kirtland Air Force Base -#1	1		1							No
Kirtland Air Force Base -#2									1	
Kirtland Air Force Base -#3	1		1							No
Kirtland Air Force Base -#4		1	1							Yes
Kirtland Air Force Base -#5	1		1							No
Kirtland Air Force Base -#6	1		1							No
Kirtland Air Force Base -#7			1							Yes

Surveys Received From Facility	Fence	Signs	FS	Notify	Deed	GW	None	Unk	NR	Controls Effective?
Region 6 (Continued)										
Lackland Air Force Base - #1							1			
Lackland Air Force Base - #2							1			
Lone Star Ammunition Plant								1		Not Reported
Longhorn Army Ammunition Plant							1			
Melrose Air Force Range	1	1								Yes
Sandia National Laboratories			1							Not Reported
Shumaker Naval Ammunition Depot	1									Unknown
White Sands Missile Range #1 - Tula Peak	1		1							Not Reported
White Sands Missile Range #2 - OB/OD Disposal										
White Sands Missile Range #3 - Red Rio Munitions								1		Not Reported
White Sands Missile Range #4 - Bomblet Disposal	1									Not Reported
White Sands Missile Range #5 - Oscura Range										
Region 7										
Cornhusker Army Ammunition Plant	1									Yes
Jefferson Barracks							1			
Region 8										
Black Hills Ordnance Depot	1	1								Not Reported
Lowry Bombing Range							1			
Tooele Army Depot SMWU 1, 1a	1									Yes
Tooele Army Depot SMWU 10/11	1									Yes
Tooele Army Depot SMWU 1b	1									Yes
Tooele Army Depot SMWU 1c	1									Yes
Tooele Army Depot SMWU 40, OU9	1									Yes
Tooele Army Depot SMWU 8, OU8	1									Yes
Region 9										
Fort Ord	1	1					1			
Mare Island Naval Shipyard							1			
Salton Sea Test Base	1									No
Region 10										
Camp Bonneville							1			
NAF Adak	18	18								No
Umatilla Army Depot	1									Not Reported
Total Number of Ranges	80	35	43	5	5	3	102	5	2	

Key: FS = Facility-Specific, Notify = Notification , Deed = Deed Restriction, GW = Groundwater Restriction, None = No Institutional Controls, Unk = Unknown, NR = Not Reported

APPENDIX G

LETTER FROM TIM FIELDS, ASSISTANT ADMINISTRATOR, OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE, EPA, TO SHERRI WASSERMAN GOODMAN, DEPUTY UNDER SECRETARY FOR ENVIRONMENTAL SECURITY, DoD, APRIL 22, 1999

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 22 1999

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Ms. Sherri W. Goodman
Deputy Under Secretary of Defense
(Environmental Security)
Department of Defense
3000 Defense Pentagon
Washington, D.C. 20301-3000

Dear Ms. Goodman: Sherri,

During the past several years, the Environmental Protection Agency (EPA) has made a significant commitment to support the development of a Department of Defense (DoD) Range Rule. We have also supported numerous related DoD efforts, including the Range Rule Risk Methodology and the Military Munitions Dialogue. Through our cooperative efforts, substantial progress has been made on the resolution of many overarching issues, improving the process presented within the proposed Rule, and developing a process to assess risks from unexploded ordnance (UXO). I am encouraged by DoD's recent decision to modify the Range Rule Risk Methodology towards a risk management strategy. I believe this decision will lead to more realistic assessments for remedial decisions at military ranges.

Both EPA and DoD had hoped that by this time a promulgated Range Rule would have addressed the multitude of serious issues at closed, transferred, and transferring military ranges. However, the completion of the Range Rule is still uncertain. During the last several years, EPA has become increasingly concerned with the UXO and hazardous chemical contamination situations at military ranges nationwide. For many reasons, it appears that closed, transferred, and transferring military ranges are not being adequately addressed in a manner consistent with accepted environmental or explosive safety standards and practices. Although the final Range Rule would presumably help to address some of these issues at specific sites, we feel a number of these issues go beyond the scope of the Range Rule, and are fundamental policy issues. Therefore, I believe these issues are better addressed by national policy, sooner rather than later. Judging by the increasing number of sites with UXO or UXO-related issues, we are now at a juncture where these issues need both your and my immediate attention.

Many ranges or sites known or suspected to contain UXO and other hazardous constituents have already been transferred from DoD control, and many more are in the process of being transferred. The risks from many of these Base Realignment and Closure (BRAC) ranges and Formerly Used Defense Sites (FUDS) have not been adequately assessed, and if required, addressed. As these formerly remote or restricted ranges are developed or as the public increases its use of these properties, the risks correspondingly will increase. Consequently, I would like to schedule a two hour meeting with you soon to begin a dialogue on our concerns. I do not believe we can resolve the myriad of issues in such a short meeting, but I feel it is important for us to begin to lay the foundation for working towards a joint resolution.

The enclosed list of EPA issues should be used as the basis for our discussion. Overall, EPA's, and in many cases, the States, Tribes, and public stakeholders concerns with the Service's and the Army Corps of Engineer's (USACE) activities can be summarized as follows: 1) range assessment and investigation issues where utilization of selected field screening, detection, statistical sampling, and other investigation techniques often result in mis-characterization of UXO and hazardous contaminants; 2) non-compliance with EPA and DoD existing regulatory authorities; 3) generally poor coordination and information distribution with Federal, State, Tribal and local government regulators as evidenced by incomplete UXO and contaminant information from the Services and USACE on a site-specific and national basis; 4) remedy selection and implementation problems such as large-scale UXO cleanups being planned or performed as "CERCLA-like" actions; and 5) general concerns over property transferred with remaining UXO. The enclosed list of EPA concerns elaborates on each of these five general points.

Our concerns are critical to ongoing responses as well as longer-term (Range Rule) efforts at closed, transferred, and transferring military ranges. Although I recognize that DoD has made significant progress over the last several years in addressing or beginning to address a number of these concerns, we have reached a critical crossroads where we must address the growing number of issues. It is my hope that resolution of these issues will establish a solid foundation for both EPA and DoD to effectively address future environmental restoration activities. I am optimistic we can find an appropriate solution to each issue, and further develop a viable DoD Range Rule and other policies as appropriate. Ultimately, solving these issues will lead to better protection of human health and the environment and will increase the public confidence in our actions.

As always, I look forward to working with you and DoD to resolve these issues. My Office will be contacting you in the near future to set up a meeting. In the meantime, questions about the enclosure can be directed to Douglas Bell at (202) 260-8716, or Ken Shuster at (703) 308-8759.

Sincerely,

Timothy Fields, Jr.
Acting Assistant Administrator

Enclosure

cc: Raymond Fatz, Deputy Assistant Secretary, Environment, Safety, and Occupational Health, Army
Elsie Munsell, Deputy Assistant Secretary, Environment and Safety, Navy
Thomas McCall, Jr., Deputy Assistant Secretary, Environment, Safety, and Occupational Health, Air Force
Patricia Rivers, Chief, Environmental Division, USACE
Col. Wilkerson, Deputy Director, Army Environmental Programs
Col. Tompkins, Chairman, DoD Explosives Safety Board

ENCLOSURE

EPA ISSUES AT CLOSED, TRANSFERRED, AND TRANSFERRING MILITARY RANGES

During the last several years an increasing number of issues have arisen relative to UXO, hazardous contaminants, and military range cleanup. The following represents a description of the major EPA issues or concerns along with installations where we have encountered these problems. This list should not be construed as exhaustive.

1) Range Assessment and Investigation

a) Range investigations often lack sufficient site-specific information. The Services and the USACE generally are not adhering to CERCLA standards and procedures for assessment and cleanup. The PA/SI, RI/FS, Removal, Remedial, and NOFA processes need to be equivalent to those specified under CERCLA and the NCP. [For example, at the Black Hills Army Depot the PA/SI did not meet the minimum requirements set by EPA for assessment. The RI/FS workplans and all associated documents were based upon this deficient PA/SI and were also determined not to meet EPA minimum requirements. Other sites with similar issues include Savanna Army Depot, Badlands Bombing Range, Lowry Bombing Range, Fort Ritchie, Fort Meade, and the Nansemond Ordnance Depot.]

b) There has been an increasing tendency for UXO investigations to use statistical grid sampling methods. Although statistical grid sampling may yield additional information, extrapolation of these results often lead to inappropriate decisions. The statistical grid sampling approach used by the USACE would only be appropriate if one expected a relatively uniform distribution of UXO, which is not the case at military ranges. EPA believes that in order to achieve protection of human health and the environment, UXO investigations should be based on a combination of information such as historical data (e.g., archives, photos, interviews), range use information, visual site inspections, previous detection surveys, previous Explosives and Ordnance Demolition (EOD) Unit response actions, and the resultant knowledge of impact zones and "hot spots." [For example, at the Lowry Bombing Range the USACE proposed and attempted to use the statistical sampling and extrapolation methodology. The State of Colorado has recently indicated that those methods significantly underestimated the amount of ordnance present (inert or live). Other sites that have similar issues are Savanna Army Depot, Fort Ord, Fort Ritchie, and the Nansemond Army Depot.]

c) Military ranges generally are not designated by the Services or the USACE as areas of concern (AOC) even when the installation is listed on the Superfund National Priorities List (NPL). EPA believes all areas at closed, transferred, and transferring bases with

known or suspected UXO are areas of concern and need to be evaluated in the CERCLA and NCP context. More recently, the Services and the USACE have unilaterally excluded UXO areas from proposed CERCLA Records of Decisions (RODs) or from RODs being implemented where UXO was included in the remedy (e.g., NAF Adak, Umatilla Army Depot). [At the Umatilla Army Depot, the Army has indicated that they will not address UXO as specified in the ROD. This decision is now in dispute resolution. At NAF Adak, the Navy has recently indicated that they do not wish to proceed with a ROD for a separate UXO operable unit. At Savanna Army Depot, the entire depot (approximately 21 square miles) was initially utilized as a firing range. Activities up to 1997 were not directed at UXO assessment and response, rather they were directed in large degree toward open burning and disposal grounds and non-explosive chemical contamination. Up to this time, UXO in potential firing areas was not included within the realm of the potential cleanup, therefore, most UXO prone or suspected areas were not considered areas of concern. In 1998, the Army tentatively agreed to evaluate several options for assessing areas known or suspected to be contaminated with UXO. The USACE has proposed to use Sitestats/Gridstats which EPA believes is a very problematic analytical method (see 1b above). Other facilities that have ranges with similar issues include, but are not limited to: Jefferson Proving Ground, Lowry Bombing Range, Badlands Bombing Range, Fort Meade, Camp Bonneville, Fort Ord, Aberdeen Proving Ground, Tobyhanna Army Depot, NAF Adak, and Fort Ritchie.]

d) EPA is encouraged by DoD's recent shift to address ranges through a "risk management" strategy focusing on both range assessment and remediation for UXO and other constituents. DoD needs to continue to develop and ultimately implement this approach through the USACE and the Services. However, despite this recent change in strategy, EPA has noted at a number of ranges the USACE continues to apply statistical sampling and risk assessment methods which often lead to premature "informed risk management decisions." Since the proposed Range Rule process is heavily dependent upon accurate "informed risk management decision making," DoD needs to ensure that this revised strategy develops accurate information, reduces short-term risks, and sets the stage to achieve long-term risk reduction goals. The current approach utilized by the USACE generally does not address these goals. [For example, at Fort Ritchie, the Army had proposed to surface clear and provide contractor support in UXO areas that have been proposed by the LRA to include a residential area. Based in large degree upon the statistical sampling, the Army wanted to perform only a surface clearance, even though the DDESB standards recommend much more conservative clearance for residential land use. It is important to note that in many areas where UXO clearance is not performed to the frost line or sufficient depth, additional UXO is likely to surface via frost heaving or erosional processes (i.e., mortars have been found to surface on a golf course). These and other UXO-related issues require the Army develop a long-term UXO remedial strategy for this area. Other ranges with similar circumstances include Savanna Army Depot, Lowry Bombing Range, Fort Meade, Nansemond Army Depot, Fort Ord, Jefferson Proving Ground, and Badlands Bombing Range.]

e) DoD is generally not applying the best available technologies to assess and remediate UXO. In most cases, there appears to be a standard approach to default to the traditional methods known as "mag and flag". Yet, according to the USACE and others, application of these methods often results in more expensive, slower, and less accurate UXO detections than other demonstrated technologies. DoD needs to begin using better technologies earlier to achieve the most protective level of UXO cleanup, while continuing to examine the capabilities, uncertainties, and acceptabilities of the various detection approaches. [For example, at Fort Ritchie only surface clearance is proposed for areas known to be contaminated with UXO that will be used for residential and commercial purposes. When asked what measures would be used during excavation, the Army indicated they would only have personnel on-site with a magnetometer. At Badlands Bombing Range, the artillery impact area was surveyed using mag and flag but this location would have been suitable for using multiple towed array sensor methods that have yielded more reliable results at other similar locations at Badlands.]

f) In those cases where UXO investigations at ranges (or UXO sites) have been performed, the general approach has been to limit investigation to known ranges/ UXO sites only. Investigations should not be limited to within the "fenceline," especially when information suggests that UXO problems are more extensive. [Although Aberdeen Proving Ground has agreed to perform additional clearance ¼ mile around the existing facility, no additional investigation is being performed off-site (e.g., especially in the adjacent rivers or in the Chesapeake Bay). Other sites with similar issues include the Badlands Bombing Range, Savanna Army Depot, Tooele Army Depot, Lowry Bombing Range, Jefferson Proving Ground, and NAF Adak.]

2) <u>Non-Compliance with Regulatory Authorities</u>

a) DDESB 6055.9 Standards for depth of clearance generally are not being followed. [For example, at Fort Ritchie a surface clearance is proposed for a residential area. DDESB 6055.9 Standards (Chapter 12) specifies that default depths of clearance to 10 feet should be used unless an alternative is justified and approved by the DDESB based on detailed site-specific information. As no detailed investigations have taken place over the range areas at Fort Ritchie, a default clearance depth of 10 feet should be used (unless bedrock is shallower). Please note that EPA views Chapter 12 as critical due to the nature of explosives safety issues. In addition, many other range situations have already been documented to have uncontrolled listed wastes (and/or hazardous substances) and may present an imminent and substantial endangerment to human health and the environment. Other ranges with similar problems include: Savanna Army Depot, Fort Meade, Fort Ord, Badlands Bombing Range, Lowry Bombing Range, Umatilla Army Depot, Camp Bonneville, Jefferson Proving Ground, Nansemond Ordnance Depot, Tooele Army Depot, and NAF Adak.]

b) Current EPA environmental regulations, including, but not limited to, RCRA and CERCLA, are applicable, but generally are not being followed. [This is particularly relevant to the depth of clearance of UXO. Many UXO-contaminated areas at closed, transferred, or transferring military ranges are: 1) not being investigated, or 2) when discovered, are not being addressed consistent with human health, environmental, or explosives safety regulations. These types of situations have been noted at many ranges including: Savanna Army Depot, Fort Meade, Fort Ord, Badlands Bombing Range, Lowry Bombing Range, Umatilla Army Depot, Camp Bonneville, Jefferson Proving Ground, Nansemond Ordnance Depot, Tooele Army Depot, and NAF Adak. Other information pertinent to this issue is presented in 1(a) above, and 4(a) below.]

3) <u>Communication, Coordination and Dissemination of Information</u>

Efforts by the Services and the USACE to communicate the scope, nature, and extent of UXO response activities have not always been successful. In some cases, there has been little or no effort. Regulators and the public need to be better informed during all stages of the efforts to address military ranges. The over-reliance on time-critical response actions also tends to reduce coordination with the regulators and other non-DoD parties. [For example, the regulators and the public have been discouraged by the USACE lack of cooperation at the Black Hills Army Depot. Adequate information and answers concerning investigations and cleanup activities have not been provided to these parties. At Fort Wingate there has been little or no public involvement concerning UXO issues. At BRAC RAB meetings only cursory information is presented on the USACE activities. Neither the State, Tribes, or the general public have received sufficient documentation on the USACE UXO activities at Fort Wingate that has both BRAC and FUDS properties. Another example is with the proposed transfer of property at Fort McClellan. The Army has been in the process of negotiating a transfer of UXO contaminated property with the U.S. Fish and Wildlife Service (USFWS). It appears that State and Federal regulatory agencies have not been contacted to participate in these negotiations. Similar situations have been noted at the Badlands Bombing Range, Lowry Bombing Range, Jefferson Proving Ground, Fort Ord, and Fort Ritchie.]

4) <u>Remedy Selection and Implementation</u>

a) EPA believes some range UXO detection/clearance operations may not be appropriate for CERCLA removal nor RCRA emergency situations. To further complicate matters is the Service/USACE preference to implement "CERCLA-like" accelerated actions. Some of these actions may not be consistent with CERCLA and the NCP and generally result in less regulator and public oversight/involvement. Using time-critical/emergency responses as the sole response paradigm should not be a default approach for the Services/USACE, especially for range problems that are well beyond the scope of such actions. [For example, at Fort Ord clearance was conducted for several years as a time-critical removal action. Similar circumstances are noted at Jefferson Proving Ground, Umatilla Army Depot, and Fort Meade.]

b) There is a general over-reliance on institutional controls as the principal remedy component or as the only remedy to ensure protectiveness. Where employed, the institutional controls may not be adequately defined, roles and responsibilities are left unclear and ultimately they may not prevent future incidents where UXO is encountered. The Services and the USACE are not always implementing adequate access controls (e.g., fencing, posting of guards, patrols, etc.) where needed. In addition, periodic inspections need to be performed at many locations where UXO has been identified, is suspected, or may have surfaced via erosion or frost heaving at previously cleared areas. [For example, at NAF Adak institutional controls are proposed for vast areas outside the town where UXO will generally not be cleared, nor has the area been adequately investigated despite DoD records indicating potentially extensive UXO contamination. This appears to be a problem because the recent reuse proposals to expand the town's uses are expected to lead to an increase in the population (primarily members of the Aleut Tribe, especially children). At Tobyhanna Army Depot, a 20,000 acre UXO area is now a State park where only signs were posted. The park was closed in 1997 when 53 unexploded 37 mm shells were found and a recent removal action has found significant additional UXO. Other examples of access problems have been noted at Camp Elliott (Tierrasanta), Camp Bonneville, Jefferson Proving Ground, Lowry Bombing Range, Badlands Bombing Range, Fort Ritchie, Fort Wingate, and Nansemond Army Depot.]

c) Effective regulatory and DoD oversight is an important aspect of remedy implementation. When it is not implemented, the risk of incidents increase. [For example, the UXO from the Fort Irwin cleanup was mistaken for clean scrap and transported to a scrap yard for recycling (in violation of RCRA – the UXO went to a non-permitted facility without manifest). An employee was killed when he attempted to cut live UXO with welding equipment. Other examples of where better oversight was needed include, Fort Ord, Jefferson Proving Ground, and Fort Meade where UXO contaminated areas were inappropriately slated for transfer.]

5) <u>Transfer of UXO Contaminated Land</u>

a) EPA believes DoD generally should retain ownership and/or control of UXO areas that are not yet assessed and/or cleaned up as determined by DoD, the appropriate regulatory agencies and the public (e.g., "permanently dudded" impact areas; UXO burial sites; sites not yet scheduled to be remediated). Federal land management agencies generally want DoD to complete all environmental restoration prior to any transfer to them. Present land transfer practices by DoD indicate that UXO contaminated lands continue to be transferred. [At Fort McClellan the transfer of approximately 10,000 acres of UXO contaminated land has been proposed. The area has not been adequately assessed and UXO contamination not yet addressed. The proposed transfer is to the USFWS who do not appear to have sufficient resources to address UXO contamination of this magnitude. At Jefferson Proving

Ground, a portion of UXO contaminated property north of the firing line was proposed for transfer to the USFWS. The area was proposed to be used for recreational purposes, but it has not been thoroughly assessed and UXO not addressed. It has also been mentioned that the USFWS has since decided not to proceed with the transfer. At Nomans Land Island, although the fed-to-fed transfer has already taken place, DoD has a continuing obligation to address UXO safety issues there, as does the USFWS (i.e., to secure the property against trespassers, per the transfer agreement). Although the area is planned to be used as a wildlife refuge, it is known to be frequented by boating enthusiasts, and UXO safety issues remain because storm events and other processes (freeze/thaw) will continue to expose UXO in areas where only surface clearance has been performed. At Fort Wingate, two closed test ranges containing UXO are slated for transfer to the DOI. The land may then be re-developed for residential, commercial, open space, and subsistence farming/ranching uses. Much of these lands are proposed to be transferred to the DOI. Another example is the UXO contaminated areas transferred to the State at the Tobyhanna Army Depot.]

b) In some cases, the Services and the USACE have performed only a cursory investigation (see # 1). Based upon limited information, property has been and is being transferred. Rather than sufficiently assessing sites and making the property safe for use or transfer, the DoD and the Services appear to be transferring the land and then waiting for others to identify problems for DoD response. [For example, DoD is contacted periodically about newly found UXO at a number of transferred sites. This has been noted at the Aberdeen Proving Ground, Raritan Arsenal, Morgan Depot, White Sands Missile Range, Lowry Bombing Range, Badlands Bombing Range, Fort Ritchie, Tobyhanna Army Depot, Fort Ord, Fort Meade (i.e.,Tipton Air Field), Jefferson Proving Ground, Raritan Arsenal, Morgan Depot, and at EPA private sites such as the Cohen Property Site in Massachusetts. Although the EOD units have a good response record, their responses tend to be limited to the newly found UXO, with generally no further investigation performed to determine the nature and extent of any additional UXO. This EOD "house call" type follow-up cannot substitute for adequate investigations.]

APPENDIX H

INTERIM FINAL DoD AND EPA MANAGEMENT PRINCIPLES FOR IMPLEMENTING RESPONSE ACTIONS AT CLOSED, TRANSFERRING, AND TRANSFERRED (CTT) RANGES

DoD and EPA
Management Principles for Implementing Response Actions at Closed, Transferring, and Transferred (CTT) Ranges

Preamble

Many closed, transferring, and transferred (CTT) military ranges are now or soon will be in the public domain. DoD and EPA agree that human health, environmental and explosive safety concerns at these ranges need to be evaluated and addressed. On occasion, DoD, EPA and other stakeholders, however, have had differing views concerning what process should be followed in order to effectively address human health, environmental, and explosive safety concerns at CTT ranges. Active and inactive ranges are beyond the scope of these principles.

To address concerns regarding response actions at CTT ranges, DoD and EPA engaged in discussions between July 1999 and March 2000 to address specific policy and technical issues related to characterization and response actions at CTT ranges. The discussions resulted in the development of this Management Principles document, which sets forth areas of agreement between DoD and EPA on conducting response actions at CTT ranges.

These principles are intended to assist DoD personnel, regulators, tribes, and other stakeholders to achieve a common approach to investigate and respond appropriately at CTT ranges.

General Principles

DoD is committed to promulgating the Range Rule as a framework for response actions at CTT military ranges. EPA is committed to assist in the development of this Rule. To address specific concerns with respect to response actions at CTT ranges prior to implementation of the Range Rule, DoD and EPA agree to the following management principles:

- DoD will conduct response actions on CTT ranges when necessary to address explosives safety, human health and the environment. DoD and the regulators must consider explosives safety in determining the appropriate response actions.

- DoD is committed to communicating information regarding explosives safety to the public and regulators to the maximum extent practicable.

- DoD and EPA agree to attempt to resolve issues at the lowest level. When necessary, issues may be raised to the appropriate Headquarters level. This agreement should not impede an emergency response.

- The legal authorities that support site-specific response actions at CTT ranges include, but are not limited to, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as delegated by Executive Order (E.O.) 12580 and the National Oil and Hazardous Substances Contingency Plan (NCP); the Defense Environmental Restoration Program (DERP); and the DoD Explosives Safety Board (DDESB).

- A process consistent with CERCLA and these management principles will be the preferred response mechanism used to address UXO at a CTT range. EPA and DoD further expect that where this process is followed, it would also meet any applicable RCRA corrective action requirements.

- These principles do not affect federal, state, and tribal regulatory or enforcement powers or authority concerning hazardous waste, hazardous substances, pollutants or contaminants, including imminent and substantial endangerment authorities; nor do they expand or constrict the waiver of sovereign immunity by the United States contained in any environmental law.

1. State and Tribal Participation

DoD and EPA are fully committed to the substantive involvement of States and Indian Tribes throughout the response process at CTT ranges. In many cases, a State or Indian Tribe will be the lead regulator at a CTT range. In working with the State or Indian Tribe, DoD will provide them opportunities to:

- Participate in the response process, to the extent practicable, with the DoD Component.

- Participate in the development of project documents associated with the response process.

- Review and comment on draft project documents generated as part of investigations and response actions.

- Review records and reports.

2. Response Activities under CERCLA

DoD Components may conduct CERCLA response actions to address explosives safety hazards, to include UXO, on CTT military ranges per the NCP. Response activities may include removal actions, remedial actions, or a combination of the two.

- DoD may conduct response actions to address human health, environmental, and explosives safety concerns on CTT ranges. Under certain circumstances, other federal and state agencies may also conduct response actions on CTT ranges.

- Removal action alternatives will be evaluated under the criteria set forth in the National Contingency Plan (NCP), particularly NCP §300.410 and §300.415.

- DoD Components will notify regulators and other stakeholders, as soon as possible and to the extent practicable, prior to beginning a removal action.

- Regulators and other stakeholders will be provided an opportunity for timely consultation, review, and comment on all phases of a removal response, except in the case of an emergency response taken because of an imminent and substantial endangerment to human health and the environment and consultation would be impracticable (see 10 USC 2705).

- Explosives Safety Submissions (ESS), prepared, submitted, and approved per DDESB requirements, are required for Time Critical Removal Actions, Non-Time Critical Removal Actions, and Remedial Actions involving explosives safety hazards, particularly UXO.

- The DoD Component will make available to the regulators, National Response Team, or Regional Response Team, upon request, a complete report, consistent with NCP §300.165, on the removal operation and the actions taken.

- Removal actions shall, to the extent practicable, contribute to the efficient performance of any anticipated long-term remedial action. If the DoD Component determines, in consultation with the regulators and based on these Management Principles and human health, environmental, and explosives safety concerns, that the removal action will not fully address the threat posed and remedial action may be required, the DoD Component will ensure an orderly transition from removal to remedial response activities.

3. Characterization and Response Selection

Adequate site characterization at each CTT military range is necessary to understand the conditions, make informed risk management decisions, and conduct effective response actions.

- Discussions with local land use planning authorities, local officials and the public, as appropriate, should be conducted as early as possible in the response process to determine the reasonably anticipated future land use(s). These discussions should be used to scope efforts to characterize the site, conduct risk assessments, and select the appropriate response(s).

- Characterization plans seek to gather sufficient site-specific information to: identify the location, extent, and type of any explosives safety hazards (particularly UXO), hazardous substances, pollutants or contaminants, and "Other Constituents"; identify the reasonably anticipated future land uses; and develop and evaluate effective response alternatives.

- Site characterization may be accomplished through a variety of methods, used individually or in concert with one another, including, but not limited to: records searches, site visits, or actual data acquisition, such as sampling. Statistical or other mathematical analyses (e.g., models) should recognize the assumptions imbedded within those analyses. Those assumptions, along with the intended use(s) of the analyses, should be communicated at the front end to the regulator(s) and the communities so the results may be better understood. Statistical or other mathematical analyses should be updated to include actual site data as it becomes available.

- Site-specific data quality objectives (DQOs) and QA/QC approaches, developed through a process of close and meaningful cooperation among the various governmental departments and agencies involved at a given CTT military range, are necessary to define the nature, quality, and quantity of information required to characterize each CTT military range and to select appropriate response actions.

- A permanent record of the data gathered to characterize a site and a clear audit trail of pertinent data analysis and resulting decisions and actions are required. To the maximum extent practicable, the permanent record shall include sensor data that is digitally-recorded and geo-referenced. Exceptions to the collection of sensor data that is digitally-recorded and geo-referenced should be limited primarily to emergency response actions or cases where impracticable. The permanent record shall be included in the Administrative Record. Appropriate notification regarding the availability of this information shall be made.

- The most appropriate and effective detection technologies should be selected for each site. The performance of a technology should be assessed using the metrics and criteria for evaluating UXO detection technology described in Section 4.

- The criteria and process of selection of the most appropriate and effective technologies to characterize each CTT military range should be discussed with appropriate EPA, other Federal State, or Tribal agencies, local officials, and the public prior to the selection of a technology.

- In some cases, explosives safety, cost, and/or technical limitations, may limit the ability to conduct a response and thereby limit the reasonably anticipated future land uses. Where these factors come into play, they should be discussed with appropriate EPA, other federal, State or Tribal agencies, local officials, and members of the public and an adequate opportunity for timely review and comment should be provided. Where these factors affect a proposed response action, they should be adequately addressed in any response decision document. In these cases, the scope of characterization should be appropriate for the site conditions. Characterization planning should ensure that the cost of characterization does not become prohibitive or disproportionate to the potential benefits of more extensive characterization or further reductions in the uncertainty of the characterization.

- DoD will incorporate any Technical Impracticability (TI) determination and waiver decisions in appropriate decision documents and review those decisions periodically in coordination with regulators.

- Selection of site-specific response actions should consider risk plus other factors and meet appropriate internal and external requirements.

4. UXO Technology

Advances in technology can provide a significant improvement to characterization at CTT ranges. This information will be shared with EPA and other stakeholders.

- The critical metrics for the evaluation of the performance of a detection technology are the probabilities of detection and false alarms. A UXO detection technology is most completely defined by a plot of the probability of detection versus the probability or rate of false alarms. The performance will depend on the technology's capabilities in relation to factors such as type and size of munitions, the munitions depth distribution, the extent of clutter, and other environmental factors (e.g., soil, terrain, temperature, geology, diurnal cycle, moisture, vegetation). The performance of a technology cannot be properly defined by its probability of detection without identifying the corresponding probability of false alarms. Identifying solely one of these measures yields an ill-defined capability. Of the two, probability of detection is a paramount consideration in selecting a UXO detection technology.

- Explosives safety is a paramount consideration in the decision to deploy a technology at a specific site.

- General trends and reasonable estimates can often be made based on demonstrated performance at other sites. As more tests and demonstrations are completed, transfer of performance information to new sites will become more reliable.

- Full project cost must be considered when evaluating a detection technology. Project cost includes, but is not limited to, the cost of deploying the technology, the cost of excavation resulting from the false alarm rate, and the costs associated with recurring reviews and inadequate detection.

- Rapid employment of the better performing, demonstrated technologies needs to occur.

- Research, development, and demonstration investments are required to improve detection, discrimination, recovery, identification, and destruction technologies.

5. Land Use Controls

Land use controls must be clearly defined, established in coordination with affected parties (e.g., in the case of FUDS, the current owner; in the case of BRAC property, the prospective transferee), and enforceable.

- Because of technical impracticability, inordinately high costs, and other reasons, complete clearance of CTT military ranges may not be possible to the degree that allows certain uses, especially unrestricted use. In almost all cases, land use controls will be necessary to ensure protection of human health and public safety.

- DoD shall provide timely notice to the appropriate regulatory agencies and prospective federal land managers of the intent to use Land Use Controls. Regulatory comments received during the development of draft documents will be incorporated into the final land use controls, as appropriate. For Base Realignment and Closure properties, any unresolved regulatory comments will be included as attachments to the Finding of Suitability to Transfer (FOST).

- Roles and responsibilities for monitoring, reporting and enforcing the restrictions must be clear to all affected parties.

- The land use controls must be enforceable.

- Land use controls (e.g., institutional controls, site access, and engineering controls) may be identified and implemented early in the response process to provide protectiveness until a final remedy has been selected for a CTT range.

- Land use controls must be clearly defined and set forth in a decision document.

- Final land use controls for a given CTT range will be considered as part of the development and evaluation of response alternatives using the nine criteria established under CERCLA regulations (i.e., NCP), supported by a site characterization adequate to evaluate the feasibility of reasonably anticipated future land uses. This will ensure that land use controls are chosen based on a detailed analysis of response alternatives and are not presumptively selected.

- DoD will conduct periodic reviews consistent with the Decision Document to ensure long-term effectiveness of the response, including any land use controls, and allow for evaluation of new technology for addressing technical impracticability determinations.

- When complete UXO clearance is not possible at military CTT ranges, DoD will notify the current land owners and appropriate local authority of the potential presence of an explosives safety hazard. DoD will work with the appropriate authority to implement additional land use controls where necessary.

6. Public Involvement.

Public involvement in all phases of the CTT range response process is crucial to effective implementation of a response.

- In addition to being a requirement when taking response actions under CERCLA, public involvement in all phases of the range response process is crucial to effective implementation of a response.

- Agencies responsible for conducting and overseeing range response activities should take steps to proactively identify and address issues and concerns of all stakeholders in the process. These efforts should have the overall goal of ensuring that decisions made regarding response actions on CTTs reflect a broad spectrum of stakeholder input.

- Meaningful stakeholder involvement should be considered as a cost of doing business that has the potential of efficiently determining and achieving acceptable goals.

- Public involvement programs related to management of response actions on CTTs should be developed and implemented in accordance with DOD and EPA removal and remedial response community involvement policy and guidance.

7. Enforcement

Regulator oversight and involvement in all phases of CTT range investigations are crucial to an effective response, increase credibility of the response, and

promote acceptance by the public. Such oversight and involvement includes timely coordination between DoD components and EPA, state, or tribal regulators, and, where appropriate, the negotiation and execution of enforceable site-specific agreements.

- DoD and EPA agree that, in some instances, negotiated agreements under CERCLA and other authorities play a critical role in both setting priorities for range investigations and response and for providing a means to balance respective interdependent roles and responsibilities. When negotiated and executed in good faith, enforceable agreements provide a good vehicle for setting priorities and establishing a productive framework to achieve common goals. Where range investigations and responses are occurring, DoD and the regulator(s) should come together and attempt to reach a consensus on whether an enforceable agreement is appropriate. Examples of situations where an enforceable agreement might be desirable include locations where there is a high level of public concern and/or where there is significant risk. DoD and EPA are optimistic that field level agreement can be reached at most installations on the desirability of an enforceable agreement.

- To avoid, and where necessary to resolve, disputes concerning the investigations, assessments, or response at CTT ranges, the responsible DoD Component, EPA, state, and tribe each should give substantial deference to the expertise of the other party.

- At NPL sites, disputes that cannot be mutually resolved at the field or project manager level should be elevated for disposition through the tiered process negotiated between DoD and EPA as part of the Agreement for the site, based upon the Model Federal Facility Agreement.

- At non-NPL sites where there are negotiated agreements, disputes that cannot be mutually resolved at the field or project manager level also should be elevated for disposition through a tiered process set forth in the site-specific agreement.

- To the extent feasible, conditions that might give rise to an explosives or munitions emergency (e.g., ordnance explosives) are to be set out in any workplan prepared in accordance with the requirements of any applicable agreement, and the appropriate responses to such conditions described, for example as has been done In the Matter of Former Nansemond Ordnance Depot Site, Suffolk, Virginia, Inter Agency Agreement to Perform a Time Critical Removal Action for Ordnance and Explosives Safety Hazards.

- Within any dispute resolution process, the parties will give great weight and deference to DoD's technical expertise on explosive safety issues.

8. Federal-to-Federal Transfers

DoD will involve current and prospective Federal land managers in addressing explosives safety hazards on CTT ranges, where appropriate.

- DoD may transfer land with potential explosives safety hazards to another federal authority for management purposes prior to completion of a response action, on condition that DoD provides notice of the potential presence of an explosives safety hazard and appropriate institutional controls will be in place upon transfer to ensure that human health and safety is protected.

- Generally, DoD should retain ownership or control of those areas at which DoD has not yet assessed or responded to potential explosives safety hazards.

9. Funding for Characterization and Response

DoD should seek adequate funding to characterize and respond to explosives safety hazards (particularly UXO) and other constituents at CTT ranges when necessary to address human health and the environment.

- Where currently identified CTT ranges are known to pose a threat to human health and the environment, DoD will apply appropriate resources to reduce risk.

- DoD is developing and will maintain an inventory of CTT ranges.

- DoD will maintain information on funding for UXO detection technology development, and current and planned response actions at CTT ranges.

10. Standards for Depths of Clearance

Per DoD 6055.9-STD, removal depths are determined by an evaluation of site-specific data and risk analysis based on the reasonably anticipated future land use.

- In the absence of site-specific data, a table of assessment depths is used for interim planning purposes until the required site-specific information is developed.

- Site specific data is necessary to determine the actual depth of clearance.

11. Other Constituent (OC) Hazards

CTT ranges will be investigated as appropriate to determine the nature and extent of Other Constituents contamination.

- Cleanup of other constituents at CTT ranges should meet applicable standards under appropriate environmental laws and explosives safety requirements.
- Responses to other constituents will be integrated with responses to military munitions, rather than requiring different responses under various other regulatory authorities.

References

A. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9601 et seq.

B. National Oil and Hazardous Substances Pollution Contingency Plan (more commonly called the National Contingency Plan), 40 C.F.R. § 300 et seq.

C. Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 et seq.

D. Military Munitions Rule: Hazardous Waste Identification and Management; Explosives Emergencies; Manifest Exception for Transport of Hazardous Waste on Right-of-Ways on Contiguous Properties; Final Rule, 40 C.F.R. § 260, et al.

E. Defense Environmental Restoration Program, 10 U.S.C. § 2701-2708, 2810.

F. Department of Defense Explosives Safety Board, 10 U.S.C. § 172

G. Executive Order (E.O.) 12580, Superfund Implementation, January 13, 1987, and E.O. 13016, Amendment to Executive Order 12580, August 28, 1996.

H. DoD Ammunition and Explosives Safety Standards, DoD Directive 6055.9-STD, dated July 1999