

# Considerations for Implementing an Army-Wide Consolidation of Open Burning and Open Detonation

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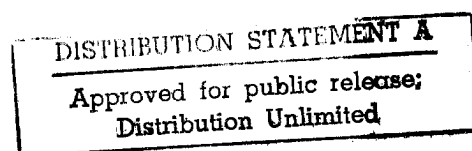
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## Considerations for Implementing an Army-Wide Consolidation of Open Burning and Open Detonation

# Executive Summary

The U.S. Army, as the Single Manager for Conventional Ammunition, is responsible for demilitarizing excess, obsolete, or unserviceable conventional munitions. Munitions that cannot be recycled or resold are disposed of most commonly by open burning and open detonation (OBOD). The U.S. Environmental Protection Agency regulates OBOD operations as hazardous waste management units under the Resource Conservation and Recovery Act (RCRA), and it requires permitting under the Code of Federal Regulations — Miscellaneous Units (40 CFR 264, Subpart X).

Applying for a Subpart X permit is expensive, lengthy and technically complex. At the time of this report, 32 Army installations operating OBOD units under RCRA interim status were pursuing a permit; two other installation's permits had been issued. Due to the high cost of permitting and managing OBOD units in compliance with RCRA, the Army is seeking ways to reduce the number of Subpart X permits being pursued. We evaluated the cost-effectiveness and feasibility of consolidating Army OBOD operations for the U.S. Army Environmental Center. In our evaluation, we compared two alternatives:

- ◆ *Alternative 1* — the “no-action” alternative — assumes that the 32 Army installations currently applying for permits will receive those permits during the FY98 – FY03 budget cycle and will continue to operate OBOD units.
- ◆ *Alternative 2* — the “consolidation” alternative — assumes that 17 Army Materiel Command (AMC) installations and 5 non-AMC installations will receive permits and that all remaining installations will withdraw their permits or applications and transport their munition items to the installations with permits.

Alternative 1 considered costs for completing the permit applications and for operating and maintaining OBOD units at all 32 installations. Alternative 2 considered the operations and maintenance and permit costs for 22 operating installations and the additional costs for transporting and receiving munitions.

The analysis showed the following:

- ◆ For the FY98 – FY03 budget cycle, the estimated total cost for the no-action alternative is \$198.8 million versus \$165.7 million for the consolidation alternative, thereby yielding a potential savings of \$33.1 million.
- ◆ These savings would offset a portion of the costs of closing OBOD operations.
- ◆ Many other factors aside from cost-effectiveness, such as regulatory and mission-related issues, affect the feasibility of consolidation.

We recommend that the Army Environmental Strategic Action Plan Workgroup for Munitions Waste, who are presently coordinating all OBOD issues, do the following:

- ◆ Continue to take steps to educate the command structure on the costs and liabilities of Subpart X permits.
- ◆ Develop a strategy for determining which installations should withdraw their Subpart X applications or permits and where to consolidate these activities.
- ◆ Accelerate discussions on Army-wide consolidation following a combination of strategies recommended by the Armament, Munitions, and Chemical Command (currently part of the Industrial Operations Command) and the U.S. Army Logistics Evaluation Agency.
- ◆ Take the lead in tri-Service efforts to consolidate OBOD activities.

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## CHAPTER 1

# Introduction

## MANAGEMENT OF CONVENTIONAL MUNITIONS

In FY93, the U.S. Army was storing 3.01 million tons of conventional munitions at installations in the continental United States. Of this stockpile, approximately 413,000 tons (14 percent) consisted of excess, obsolete, or unserviceable (EOU) conventional munitions, and another 347,000 tons (12 percent) could be designated as such in the future.<sup>1</sup>

The Army must continuously remove EOU munitions from the stockpile to free up storage space for new production items and for overseas stock scheduled to return. The Army's projected storage requirements exceed its CONUS capacity. EOU munitions are tying up valuable storage space needed for mission requirements. Furthermore, these munitions may become unstable and pose a safety hazard after long periods of storage.

As the Single Manager for Conventional Ammunition, the Army manages the demilitarization of conventional munitions for the entire Department of Defense (DoD) via recycling, resource recovery, or treatment for disposal. When munition items are determined to be excess, obsolete, or unserviceable (EOU), they are placed in DoD's Resource Recovery and Disposition Account. Items in the account that cannot be recycled or resold are eventually targeted for disposal.

Munitions are disposed of by a variety of technologies. Open burning and open detonation (OBOD) are the most commonly used methods for disposal of conventional munitions that cannot be recycled or resold. Open burning is the combustion of waste-energetic material, bulk propellants, or explosive ordnance without controlling the combustion air, containing the combustion reaction, or controlling emissions. Waste materials typically are placed in metal burn pans and remotely ignited. Open detonation is the process of blowing up munitions at a controlled site. Ammunition or explosives are either buried in pits or placed on the ground surface, primed with detonation blocks, and remotely detonated.

## REGULATORY REQUIREMENTS

OBOD operations are regulated as hazardous waste treatment units by the U.S. Environmental Protection Agency (EPA) under the Resource Conservation

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<sup>1</sup>Major General Benchoff, "Keynote Address," Demilitarization Symposium, American Defense Preparedness Association, Arlington, VA, 23 - 25 May 1994.



and Recovery Act (RCRA).<sup>2</sup> Under RCRA, facilities managing hazardous wastes, including federal facilities, must obtain a Part B permit for treatment, storage, or disposal (TSD) operations.<sup>3</sup> This report refers to the RCRA Part B permit application required for OBOD units as the Subpart X permit application.

The permit process involves submitting RCRA Part A and Part B applications to the EPA or state regulatory agency. The Part A application provides limited information on the types and quantities of hazardous wastes treated, stored, or disposed of at the facility. The Part B application provides detailed data on waste characteristics, facility design and operational parameters, potential environmental and public health impacts and risks, characterization of existing environmental contamination at the TSD facility, as well as other assessment data. Installations that submitted a Part B permit application by 8 November 1988 are allowed to continue operating under interim status indefinitely until a decision to permit or close the facility is reached.

If the regulatory agency determines that the permit application is incomplete or contains technical deficiencies, a notice of deficiency (NOD) is issued to the installation. Due to lack of guidance by the EPA on permit requirements, initial applications were seriously deficient. On the basis of experience to date, most installations can expect to go through many rounds of responding to NODs prior to receiving a Subpart X permit. Going through the application process, however, does not ensure that a permit will be issued to an installation. The regulatory factors that may have an impact on implementing an Army-wide OBOD consolidation plan are discussed in Chapter 3.

## COST OF SUBPART X PERMITS

Applying for a Subpart X permit is lengthy, expensive, and technically challenging. Most Army installations submitted an initial Part B application before the November 1988 deadline; however, only two installations, Fort McCoy and Fort Polk, have received a permit to date.

In 1995, the U.S. Army Environmental Center (USAEC) conducted a data survey that gathered a wide range of information related to RCRA Part B permit activities. The 54 Army installations listed in Table 1-1, and organize by major Army command (MACOM), responded to the survey as having OBOD units that were not currently permitted. Included in the 54 installations responding to the survey are the 11 shown in Table 1-2, which reported that they have withdrawn the Subpart X permit applications for their OBOD units. Additionally, Table 1-3 lists 11 additional installations that either have planned to close their OBOD units by FY98 or had never submitted a Subpart X permit application. This leaves 32 Army installations that would continue to pursue permits during the budget years considered in this report (see Table 1-4).

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<sup>2</sup>Miscellaneous Units — 40 CFR 264, Subpart X.

<sup>3</sup>Permit requirements for OBOD units are addressed in 40 CFR 270.23.

**Table 1-1.**  
***Installations Responding to the RCRA Part B Survey***  
***with Unpermitted OBOD Units***

Installation name	MACOM	Type of unit
Aberdeen Proving Ground	AMC	OBOD
Anniston Army Depot	AMC	OBOD
Bluegrass Army Depot	AMC	OBOD
Crane Army Ammunition Activity	AMC	OBOD
Dugway Proving Ground	AMC	OBOD
Hawthorne Army Depot	AMC	OBOD
Holston Army Ammunition Plant	AMC	OB
Indiana Army Ammunition Plant	AMC	OB
Iowa Army Ammunition Plant	AMC	OBOD
Kansas Army Ammunition Plant	AMC	OBOD
Lake City Army Ammunition Plant	AMC	OBOD
Letterkenny Army Depot	AMC	OBOD
Lone Star Army Ammunition Plant	AMC	OBOD
Longhorn Army Ammunition Plant	AMC	OB
Louisiana Army Ammunition Plant	AMC	OBOD
McAlester Army Ammunition Plant	AMC	OBOD
Milan Army Ammunition Plant	AMC	OBOD
Picatinny Arsenal	AMC	OBOD
Pine Bluff Arsenal	AMC	OBOD
Pueblo Army Depot	AMC	OBOD
Radford Army Ammunition Plant	AMC	OB
Ravenna Army Ammunition Plant	AMC	OBOD
Red River Army Depot	AMC	OBOD
Redstone Arsenal	AMC	OBOD
Savanna Army Depot	AMC	OBOD
Seneca Army Depot	AMC	OBOD
Sierra Army Depot	AMC	OBOD
Sunflower Army Ammunition Plant	AMC	OB
Tooele Army Depot	AMC	OBOD
Twin Cities Army Ammunition Plant	AMC	OBOD
Umatilla Depot Activity	AMC	OBOD
Volunteer Army Ammunition Plant	AMC	OB
White Sands Missile Range	AMC	OBOD
Yuma Proving Ground	AMC	OBOD
State of Arizona	ARNG	OBOD
Fort Bragg	FORSCOM	OBOD
Fort Drum	FORSCOM	OBOD
Fort Hood	FORSCOM	OBOD
Fort Lewis (Yakima)	FORSCOM	OBOD
Fort Sam Houston	FORSCOM	OBOD
Fort Stewart	FORSCOM	OB
Fort A.P. Hill	MDW	OB

**Table 1-1.**  
***Installations Responding to the RCRA Part B Survey  
 with Unpermitted OBOD Units (Continued)***

Installation name	MACOM	Type of unit
Fort Belvoir	MDW	OBOD
Fort Benning	TRADOC	OBOD
Fort Bliss	TRADOC	OBOD
Fort Chaffee	TRADOC	OBOD
Fort Huachuca	TRADOC	OBOD
Fort Jackson	TRADOC	OB
Fort Knox	TRADOC	OBOD
Fort Leonardwood	TRADOC	OBOD
Fort McClellan	TRADOC	OBOD
Fort Rucker	TRADOC	OBOD
U.S. Army Hawaii	USARPAC	OBOD
USMA West Point	USMA	OBOD

**Notes:** MDW = Military District of Washington; OBOD = open burning and open detonation; TRADOC = Training and Doctrine Command (U.S. Army); USARPAC = U.S. Army Forces, Pacific Command; USMA = U.S. Military Academy.

**Table 1-2.**  
***Installations Reporting Withdrawal of Subpart X Permit  
 Applications of OBOD Units***

Installation name	MACOM	Type of unit
Indiana Army Ammunition Plant	AMC	OB
Lake City Army Ammunition Plant	AMC	OBOD
Ravenna Army Ammunition Plant	AMC	OBOD
Savanna Army Depot	AMC	OBOD
Seneca Army Depot	AMC	OBOD
Umatilla Depot Activity	AMC	OBOD
Fort Chaffee	TRADOC	OBOD
Fort Leonardwood	TRADOC	OBOD
Fort Rucker	TRADOC	OBOD
U.S. Army Hawaii	USARPAC	OBOD
USMA West Point	USMA	OBOD

**Table 1-3.**  
***Installations That Will Close OBOD Operations by FY98 or Never Submitted Subpart X Permit Applications***

Installation name	MACOM	Comments
Louisiana AAP	AMC	Close by FY98 (AMCCOM Minimization Plan)
Pueblo Army Depot	AMC	Close by FY98 (AMCCOM Minimization Plan)
Sunflower AAP	AMC	Close by FY98 (AMCCOM Minimization Plan)
Twin Cities AAP	AMC	Close by FY98 (AMCCOM Minimization Plan)
Volunteer AAP	AMC	Close by FY98 (AMCCOM Minimization Plan)
State of Arizona	ARNG	Close by FY98 (RCRA Part B Permits Survey)
Fort Benning	TRADOC	Close by FY98 (RCRA Part B Permits Survey)
Fort Huachuca	TRADOC	Never submitted a Subpart X application
Fort Jackson	TRADOC	Never submitted a Subpart X application
Fort Knox	TRADOC	Close by FY98 (RCRA Part B Permits Survey)
Fort McClellan	TRADOC	Close by FY98 (RCRA Part B Permits Survey)

*Notes:* AAP = Army Ammunition Plant; AMC = Army Materiel Command; AMCCOM = Armament, Munitions, and Chemical Command (U.S. Army); ARNG = Army National Guard; TRADOC = Training and Doctrine Command (U.S. Army).

**Table 1-4.**  
***Annual OBOD Quantities Treated at Army Installations Pursuing Subpart X Permits Through the FY98 – FY03 Budget Cycle***

Installation name	MACOM	Annual OBOD treatment quantities (tons)
Iowa Army Ammunition Plant	AMC	10
White Sands Missile Range	AMC	10.1
Bluegrass Army Depot	AMC	12.6
Picatinny Arsenal	AMC	20
Yuma Proving Ground	AMC	26
Pine Bluff Arsenal	AMC	100
Longhorn Army Ammunition Plant	AMC	100
Holston Army Ammunition Plant	AMC	110
Dugway Proving Ground	AMC	200
Redstone Arsenal	AMC	222
Kansas Army Ammunition Plant	AMC	229
Radford Army Ammunition Plant	AMC	300
Red River Army Depot	AMC	350
Milan Army Ammunition Plant	AMC	352
Anniston Army Depot	AMC	467
Lone Star Army Ammunition Plant	AMC	479.4
Hawthorne Army Depot	AMC	1,245
Aberdeen Proving Ground	AMC	1,268
McAlester Army Ammunition Plant	AMC	1,304

**Table 1-4.**  
*Annual OBOD Quantities Treated at Army Installations Pursuing  
 Subpart X Permits Through the FY98 – FY03 Budget Cycle (Continued)*

Installation name	MACOM	Annual OBOD treatment quantities (tons)
Letterkenny Army Depot	AMC	1,425
Crane Army Ammunition Activity	AMC	3,100
Tooele Army Depot	AMC	4,794
Sierra Army Depot	AMC	20,000
Fort Hood	FORSCOM	0
Fort Drum	FORSCOM	0.6
Fort Sam Houston	FORSCOM	0.7
Fort Lewis (Yakima)	FORSCOM	0.9
Fort Stewart	FORSCOM	1
Fort Bragg	FORSCOM	7.2
Fort Belvoir	MDW	0
Fort A.P. Hill	MDW	0.55
Fort Bliss	TRADOC	0.3
Total	—	36,135.35

Obtaining a permit is becoming increasingly expensive due to multiple notices of deficiency and to regulators' requiring additional analytical and modeling data to support the application. Estimated costs for obtaining a Subpart X permit range from \$500,000 to more than \$1 million per installation. This cost includes submitting the application, responding to NODs, and providing additional supporting data. Assuming that the average total cost is \$1 million per installation and that each installation has already expended an average of \$415,000 on applying for the permit, the total cost to the Army for completing all of the current 32 Subpart X applications would be \$18.7 million.

The cost of operations and maintenance (O&M) for OBOD facilities under RCRA standards is also expensive. The USAEC has estimated that annual costs for environmental compliance monitoring may range from \$165,000 to more than \$600,000 for each site. Information obtained during this study indicates that, for installations treating large quantities (greater than 100 tons per year) of munition items by OBOD, O&M costs could be significantly higher. If all 32 installations obtain Subpart X permits, the total annual cost just for environmental monitoring of OBOD facilities (based on the USAEC estimates) would range from approximately \$5 million to \$19 million.

Once an installation has entered the RCRA hazardous waste permit program, the EPA can require the Army to characterize and remediate any solid waste management unit (SWMU) identified on the installation.<sup>4</sup> This includes installations operating under "interim status" that have not been issued a Subpart X permit. A RCRA facility assessment, which is the process used to identify SWMUs, can cost from \$5,000 to more than \$250,000, depending on the size of the installation and the type and length of activities historically conducted there. The cost of conducting the follow-on investigations and cleanup of SWMUs can range from \$500,000 to several million dollars per site.

Closure of OBOD units in compliance with RCRA standards is another significant cost factor. Installations operating OBOD units under interim status that decide to withdraw their Subpart X permit applications are still required to conduct closure of these units and corrective action on the SWMUs identified during the facility assessment, as discussed above. Unless it conducts a "clean closure" (where contaminated media is removed or treated), an installation is required to perform postclosure monitoring at the unit for 30 years. Though it is difficult to develop an average cost for closure, Army estimates range from \$3 million to \$10 million per open burning or open detonation unit. The potential impacts of closure costs are discussed in Chapter 3 of this report.

## UTILIZATION OF FACILITIES

It is estimated that the 32 Army installations currently pursuing a RCRA Subpart X permit annually treat approximately 36,000 short tons of munition items by OBOD. Table 1-4 identifies these installations along with the reported quantities of munition wastes they treated by OBOD during FY93, FY94, or FY95. Of these 32 installations, 16 treat 99 percent of the total quantity of munitions. The remaining 16 treated less than 1 percent. The map in Figure 1-1 shows the location of these installations and of the two installations with permits.

More than a third of the installations pursuing Subpart X permits treat small quantities of munitions by OBOD (less than 15 short tons per installation). They have permitting and maintenance costs similar to those of installations treating much larger quantities. Although the Army's mission requirements will drive installation support requirements, the shrinking defense budget requires the Army to consider the cost-effectiveness of alternatives to meet requirements, such as disposal of conventional munitions.

## STUDY OBJECTIVES

Due to the high cost of permitting and O&M for OBOD units under RCRA standards, the Army is interested in minimizing the number of such units. The Logistics Management Institute was tasked by USAEC to evaluate the feasibility

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<sup>4</sup>Resource Conservation and Recovery Act, Sections 3008h, 3004u, and 3004v.

and cost-effectiveness of an alternative to obtaining RCRA permits for all of the 32 installations identified in this study.

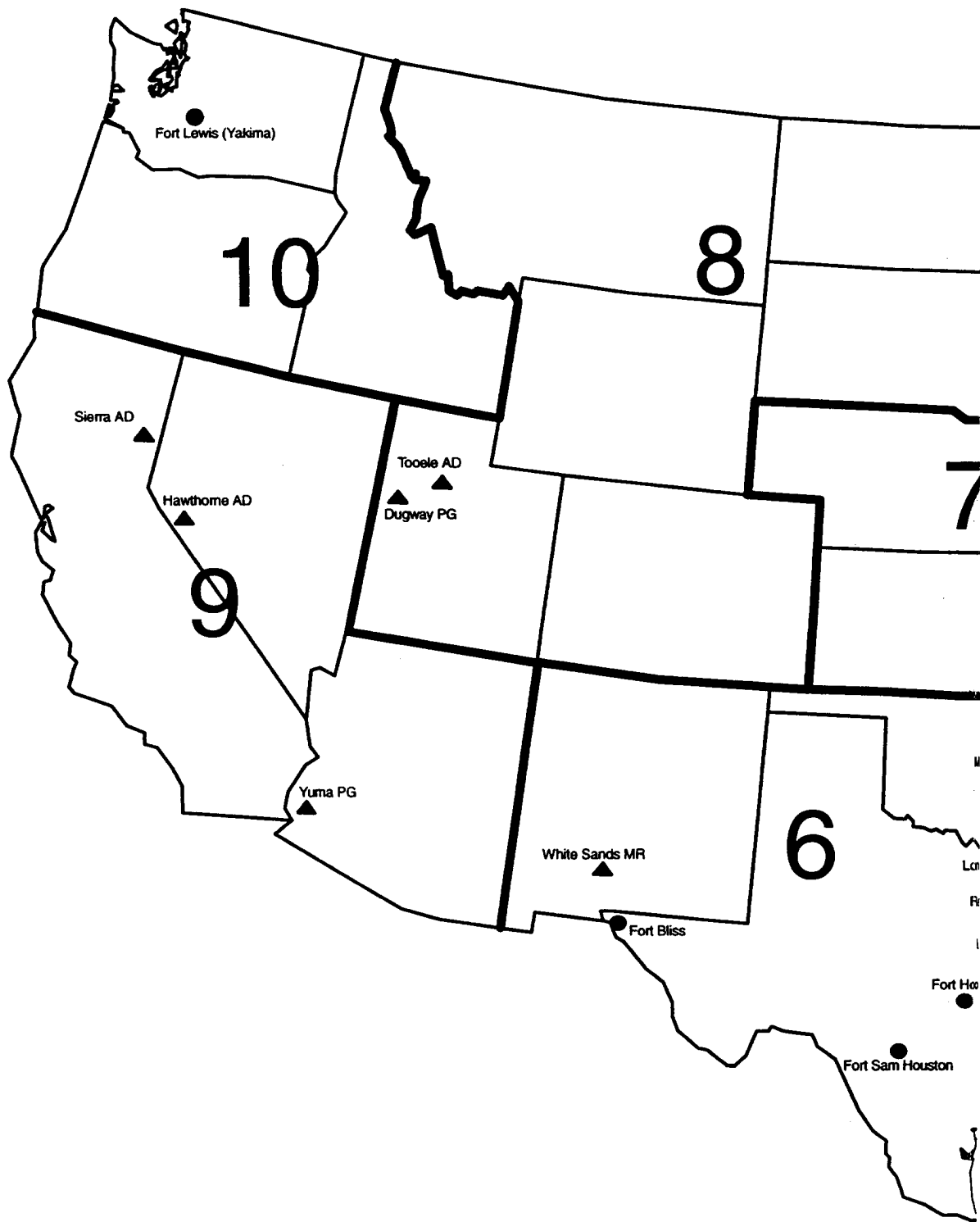
This report presents two alternatives for managing the Army's OBOD activities. Both alternatives can satisfy the Army's mission requirements for the disposal of conventional munitions. Cost estimates were developed on a common basis to compare the alternatives; however, they are not budget-derived. The report presents all of the FY98 through FY03 direct costs for the following management alternatives:

- ◆ *Alternative 1 — No action.* All installations currently pursuing Subpart X permits will have them granted during the FY98 – FY03 budget cycle.
- ◆ *Alternative 2 — Consolidation.* A total of 17 AMC and 3 non-AMC installations will seek a Subpart X permit and continue OBOD operations. Fort McCoy and Fort Polk, which currently have permits, will also continue OBOD operations. The remaining installations will withdraw their permit or applications, discontinue OBOD, and transport munition items to receiving installations for treatment.

## STUDY APPROACH

This study presents a cost analysis of the two management alternatives for the FY98 – FY03 budget cycle to compare their relative cost-effectiveness. Both alternatives consider costs of permit applications and O&M. Alternative 2 addresses the increased cost of O&M at receiving installations and the cost of transporting EOU munitions from installations terminating operations to installations that will continue OBOD activities. Closure and postclosure costs associated with remediation and monitoring are not considered in either alternative because closure of OBOD units will occur at all installations sometime in the future. Therefore, all installations will eventually incur this cost burden. Although the cost of closure must eventually be borne by the installations, it is important to note that the programming of funds to support closure activities must be factored in when considering the implementation of any OBOD consolidation plan. Chapter 3 discusses the impact of potential closure costs.

The cost-effectiveness for each alternative is evaluated on the basis of annual quantity of munition wastes treated by OBOD during FY93, FY94, or FY95. Five ranges of treatment quantities were compared to account for differences in variable costs for O&M and in transportation costs.



**Notes:** AAA = Army Ammunition Activity; AAP = Army Ammunition Plant; AD = Army Depot; MR = Missile Range; PG = Proving Ground.

**Figure 1-1.**  
*Location of Army Installations Pursuing Subpart X Permits by EPA Region*



LEGEND

- Non-AMC Installations
- ▲ AMC Installations
- Permitted Installation



round.

## ORGANIZATION OF THIS REPORT

Chapter 2 of this report identifies the cost factors we considered for each alternative, presents costing data, and discusses how the cost data were developed and the sources used. Chapter 3 analyzes the cost estimates for each alternative and their relative cost-effectiveness, identifies costs in the outyears (past FY03), and discusses other factors that may affect the feasibility of Alternative 2. Chapter 4 presents the conclusions and recommendations of this study.

## CHAPTER 2

# Costing the Management Alternatives

A goal of this report is to determine the cost-effectiveness of reducing the number of Subpart X permits for OBOD sites. This chapter addresses the estimated cost of pursuing the management alternatives presented in Chapter 1 and the potential cost savings from consolidating OBOD activities. The cost figures presented are the estimated total costs that would be incurred or saved during the program objective memorandum (POM) budget cycle covering FY98 through FY03.

At the time of this report, 32 Army installations, presently in RCRA interim status, were planning to pursue Subpart X permits during the POM budget cycle. Table 2-1 identifies these installations and their OBOD treatment rates on the basis of data obtained for one or more years during the period of FY93 – FY96. The cost estimates presented in this report are based on the OBOD data in Table 2-1 because they represent the most complete and accurate data that could be obtained. The information was derived from a number of sources. The most up-to-date information came from the USAEC's 1995 RCRA Part B permit data call of Army installations, which was validated by MACOM personnel. In cases where validated OBOD treatment rates were not available, we estimated them on the basis of the following sources and assumptions:

- ◆ We assumed that planned rates of OBOD activity for FY93 as published in the Army's master demilitarization plan closely reflect actual rates for Army Materiel Command installations.<sup>1</sup>
- ◆ Aberdeen Proving Ground treatment rates were collected by Brown & Root Environmental in January 1996 while supporting the USAEC in a Subpart X permit program.
- ◆ USAEC collected OBOD treatment rates, for either FY93 or FY94, by contacting explosive ordnance personnel at eight AMC installations in February 1995.
- ◆ We assumed that the remaining installations would conduct OBOD treatment at the rates they reported for our 15 December 1993 "Survey of OBOD Operations at Army Installations."

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<sup>1</sup>U.S. Army Armament, Munitions, and Chemical Command (AMCCOM), *Conventional Ammunition Demilitarization Master Plan*, 1 March 1993.

**Table 2-1.**  
**OBOD Quantities Treated at Army Installations Pursuing Subpart X**  
**Permits Through the FY98 – FY03 Budget Cycle**

Installation name	MACOM	OBOD quantities (short tons)	Data source	Calendar years represented
Fort Belvoir	MDW	0	1995 RCRA data call	1993 – 95
Fort Hood	FORSCOM	0	1995 RCRA data call	1993 – 95
Fort Bliss	TRADOC	0.3	1995 RCRA data call	1993 – 95
Fort A.P. Hill	MDW	0.55	1993 OBOD data call	1993
Fort Drum	FORSCOM	0.6	1995 RCRA data call	1993 – 95
Fort Sam Houston	FORSCOM	0.7	1995 RCRA data call	1993 – 95
Fort Lewis (Yakima)	FORSCOM	0.9	1995 RCRA data call	1993 – 95
Fort Stewart	FORSCOM	1	1995 RCRA data call	1993 – 95
Fort Bragg	FORSCOM	7.2	1995 RCRA data call	1993 – 95
Iowa AAP	AMC	10	1995 RCRA data call	1993 – 95
White Sands Missile Range	AMC	10.1	1993 OBOD data call	1993
Bluegrass Army Depot	AMC	12.6	1995 OBOD data call	1993
Picatinny Arsenal	AMC	20	1993 OBOD data call	1993
Yuma Proving Ground	AMC	26	1995 RCRA data call	1993 – 95
Longhorn AAP	AMC	100	1995 RCRA data call	1993 – 95
Pine Bluff Arsenal	AMC	100	1993 CADMP	1993
Holston AAP	AMC	110	1993 OBOD data call	1993
Dugway Proving Ground	AMC	200	1993 OBOD data call	1993
Redstone Arsenal	AMC	222	1993 OBOD data call	1993
Kansas AAP	AMC	229	1993 OBOD data call	1993
Radford AAP	AMC	300	1993 OBOD data call	1993
Red River Army Depot	AMC	350	1993 CADMP	1993
Milan AAP	AMC	352	1995 OBOD data call	1993
Anniston Army Depot	AMC	467	1995 OBOD data call	1994
Lone Star AAP	AMC	479.4	1995 OBOD data call	1994
Hawthorne Army Depot	AMC	1,245	1995 OBOD data call	1994
Aberdeen Proving Ground	AMC	1,268	Brown & Root (1996 )	1995
McAlester AAP	AMC	1,304	1995 OBOD data call	1994
Letterkenny Army Depot	AMC	1,425	1993 OBOD data call	1993
Crane AAA	AMC	3,100	1993 CADMP	1993
Tooele Army Depot	AMC	4,794	1995 OBOD data call	1994
Sierra Army Depot	AMC	20,000	1995 OBOD data call	1994
Total	—	36,135.35	—	—

**Notes:** AAA = Army Ammunition Activity, AAP = Army Ammunition Plant; CADMP = Conventional Ammunition Demilitarization Master Plan; FORSCOM = Forces Command (U.S. Army); MDW = Military District of Washington; TRADOC = Training and Doctrine Command (U.S. Army).

The approach selected for our consolidation model is based on unrelated plans developed by two Army organizations. The U.S. Army Logistics Evaluation Agency (USALEA) made recommendations to consolidate OBOD activities at "retail" (i.e., nonproduction or non-AMC) facilities in the 2 February 1995 study, *Feasibility Assessment of Army Installations Pursuing Munitions Hazardous Waste and Storage Permits*. In 1992, AMCCOM drafted the report *Draft Open Burning/Open Detonation (OB/OD) Minimization Plan*, which made recommendations for reducing OBOD activity within the production community (i.e., AMC facilities). Recommendations from these documents were used to develop the consolidation management strategy for our analysis. Due to changes in mission or the effects of base realignment and closure (BRAC) actions, the original recommendations presented in these Army documents regarding OBOD operations were no longer applicable at specific installations. Changes were made to reflect current conditions and the overall rationale presented in the original documents.

It should be noted that only two Army installations, Fort McCoy and Fort Polk, have been issued Subpart X permits to operate OBOD activities.

## THE COSTING STRATEGY

The management alternatives this report examines are either to continue the pursuit of Subpart X permits at all 32 installations that plan OBOD activities (no action) or to cease these activities at 12 installations and ship the munitions for disposal at installations that are operating permitted or interim status OBOD facilities (consolidation). The following subsections discuss the economic and regulatory assumptions made in developing the cost estimates, as well as the rationale for establishing the specific cost categories applicable to each alternative.

### General Economic and Regulatory Assumptions

This study presents a projection of costs; however, it is grounded in and focused on the present regulatory and economic setting. Therefore, we make certain assumptions to simplify the analysis. These cost-related assumptions are as follows:

- ◆ All cost information is in constant 1996 dollars.
- ◆ Installations will treat the same amount of munitions by OBOD throughout the budget cycle as reported in Table 2-1.
- ◆ Munitions, as discussed in this report, are not considered a hazardous waste until they arrive at the OBOD unit.

- ◆ There is no need to consider RCRA corrective actions at OBOD units in this analysis because the schedule for implementing them will not change under either alternative.
- ◆ RCRA closure is not considered in the direct cost analysis but does play a role in the decisions regarding implementation of consolidation efforts.

## Alternative 1 Costing Strategy

The cost categories for the no-action alternative include all current expenses related to the Subpart X permit application process and the O&M costs associated with OBOD units.

All installations will incur O&M costs associated with labor and other direct expenses while in active status. O&M costs, which include the environmental costs associated with compliance management, have both fixed and variable components associated with maintaining, staffing, and managing OBOD units. The fixed costs are those incurred in having an OBOD facility, and the variable costs are those incurred in its use. The cost components considered in this alternative include on-site transport of munitions to be treated; compliance costs from internal and external environmental oversight and inspections; operating fees assessed by the lead (federal or state) regulatory agency; maintenance and required facility upgrades; and the labor cost of conducting open burning or open detonation.

## Alternative 2 Costing Strategy

The cost categories for the consolidation alternative include the increased expenses that the proposed receiving installations will incur and the costs that consolidated (i.e., closing) installations will incur from shipping munitions to receiving installations. Therefore, the most direct comparisons are made by calculating and listing the AMC and non-AMC costs before and after consolidation.

For receiving installations, the cost categories addressed are permit application, O&M, and permit modification. Installations receiving additional munitions from consolidated installations will most likely need to modify their permits. Furthermore, we assume that receiving installations will have increased O&M and munitions storage costs.

The consolidation alternative assumes that all consolidated installations will withdraw their permit applications, cease normal OBOD operations, and send all munitions items to receiving installations. Accordingly, there are no further costs associated with permit application and O&M for the consolidated installations. However, transportation costs will apply to these installations. We assigned all packing, transport, and unpacking costs to the sending installations.

# COST DATA FOR ALTERNATIVE 1

Table 2-2 presents the cost data for the no-action option. The table presents total costs for each installation, along with a grand total for the estimated cost of Alternative 1 over the six-year POM budget cycle (FY98 – FY03). In addition, installations are organized by MACOM and grouped into AMC and non-AMC installations, with subtotals for each cost category.

## Permit Application Cost

The permit application category represents the costs required to complete the permit application process and obtain a permit during the FY98 – FY03 budget cycle. We used the following assumptions to develop these estimates:

- ◆ All installations will be granted a Subpart X permit during the FY98 – FY03 budget cycle.
- ◆ It costs \$1 million to obtain a Subpart X permit for conducting both open burning and open detonation, and \$750,000 for conducting either OB or OD.
- ◆ If actual cost data were available for funds expended to date on an installation's permit application, the cost to complete what was calculated by subtracting the funds expended from the appropriate estimated total cost (i.e., \$1 million or \$750,000).
- ◆ Using the report control system (RCS) 1383 Database for FY94, the total funds expended on permit applications through FY95 were calculated by adding the FY88 – FY94 obligated funds to the FY95 required funds for permits. This figure was subtracted from the appropriate estimated total cost to derive the cost to obtain an approved permit.
- ◆ If no Subpart X permit projects were found in the RCS 1383 Database for an installation, it was assumed that the installation will have spent \$300,000 on the permit application through FY96, and the appropriate cost to complete the process was calculated.
- ◆ At the Crane Army Ammunition Activity, the Army will cover 25 percent of the permit costs, and the Navy will cover 75 percent.

**Table 2-2.**  
**Cost Data for Alternative 1: Installations Operating**  
**in FY98 Remain Open**

Installation name	MACOM	Permit application cost (\$000)	Total O&M costs (\$000)	Total cost for FY98 – FY03 (\$000)
Aberdeen Proving Ground	AMC	410	13,920	14,330
Anniston Army Depot	AMC	700	5,220	5,920
Bluegrass Army Depot	AMC	800	3,120	3,920
Crane Army Ammunition Activity	AMC	150	13,920	14,070
Dugway Proving Ground	AMC	830	5,220	6,050
Hawthorne Army Depot	AMC	600	13,920	14,520
Holston Army Ammunition Plant	AMC	450	5,220	5,670
Iowa Army Ammunition Plant	AMC	700	1,620	2,320
Kansas Army Ammunition Plant	AMC	500	5,220	5,720
Letterkenny Army Depot	AMC	700	13,920	14,620
Longhorn Army Ammunition Plant	AMC	450	5,220	5,670
Lone Star Army Ammunition Plant	AMC	700	5,220	5,920
McAlester Army Ammunition Plant	AMC	650	13,920	14,570
Milan Army Ammunition Plant	AMC	700	5,220	5,920
Picatinny Arsenal	AMC	700	3,120	3,820
Pine Bluff Arsenal	AMC	700	5,220	5,920
Radford Army Ammunition Plant	AMC	450	5,220	5,670
Red River Army Depot	AMC	700	5,220	5,920
Redstone Arsenal	AMC	700	5,220	5,920
Sierra Army Depot	AMC	270	13,920	14,190
Tooele Army Depot	AMC	500	13,920	14,420
White Sands Missile Range	AMC	600	3,120	3,720
Yuma Proving Ground	AMC	800	3,120	3,920
<b>AMC installations subtotal</b>	<b>—</b>	<b>13,760</b>	<b>168,960</b>	<b>182,720</b>
Fort Bragg	FORSCOM	765	1,620	2,385
Fort Drum	FORSCOM	450	870	1,320
Fort Hood	FORSCOM	450	870	1,320
Fort Lewis (Yakima)	FORSCOM	450	870	1,320
Fort Polk	FORSCOM	0	870	870
Fort Sam Houston	FORSCOM	700	870	1,570
Fort Stewart	FORSCOM	450	1,620	2,070
Fort Bliss	TRADOC	600	870	1,470
Fort Belvoir	MDW	680	870	1,550
Fort A.P. Hill	MDW	440	870	1,310
Fort McCoy	Reserves	0	870	870
<b>Non-AMC installations subtotal</b>	<b>—</b>	<b>4,985</b>	<b>11,070</b>	<b>16,055</b>
<b>Grand total</b>	<b>—</b>	<b>18,745</b>	<b>180,030</b>	<b>198,775</b>



## Operations and Maintenance Cost

Subpart X projects in the RCS 1383 Database demonstrate a wide variation of O&M costs among installations with similar operating conditions. On the basis of information in the database's project narratives, these inconsistencies may be due to (1) including costs for other installation-wide permit projects, (2) not including O&M costs for outyears, and (3) underestimating O&M costs. The cost estimates in Table 2-2 are averages calculated from data supplied by the USALEA from their OBOD database, the AMCCOM *Conventional Ammunition Demilitarization Master Plan* (1993), and from cost information presented in the RCS 1383 Database for specifically defined cost categories (e.g., fees and routine upgrades).

We made the following assumptions in developing annual estimates:

- ◆ The average annual fixed cost for managing compliance at an OBOD facility is \$20,000. This includes the cost of general facility maintenance and management in keeping with RCRA requirements; compliance with other environmental, safety, and health standards; and fees for federal, state, and local oversight.
- ◆ Additional costs for O&M are variable and depend on the quantity of munitions treated by OBOD.
- ◆ To estimate the variable costs for OBOD treatment, we divided the installations into five activity levels, on the basis of short tons of munitions treated annually (Table 2-1): less than 1 ton; 1 – 9 tons; 10 – 99 tons; 100 – 999 tons; and greater than 1,000 tons. (These activity levels follow natural break points in the data shown in Table 2-1.) We calculated activity level averages for compliance management and treatment rates and applied them to all the installations within the level.
- ◆ The average estimated annual cost for munitions treatment via OBOD ranges from \$100,000 to \$2.1 million.

### Cost Estimates for Alternative 1

As expected, operations and maintenance account for the greatest percentage of the total expenses (90.5 percent) under the assumptions of Alternative 1. AMC installations will incur about 95 percent of the estimated O&M costs, reflecting the fact that AMC sites treated more than 99 percent of all munitions.

Of particular interest is a comparison of the costs to complete the permit application process. Costs for the non-AMC installations (\$5 million) are estimated to make up 27 percent of the total permit application costs over the FY98 – FY03 budget cycle. This is especially significant considering the relative treatment rates.

## COST DATA FOR ALTERNATIVE 2

This section summarizes the cost data for the consolidation option for AMC and non-AMC installations. The tables that follow show estimates for the cost of activities required under the consolidation option, as discussed earlier. In addition, we present the transportation data and cost estimates that apply to installations terminating OBOD activities. The totals represent costs of Alternative 2 over the six-year POM budget cycle (FY98 – FY03).

As previously discussed, consolidating OBOD activities assumes a number of regulatory conditions. The cost estimates in this section depend in part on which installations receive the munitions when the consolidated OBOD facilities close. Table 2-3 shows the proposed consolidation scheme on which we base our estimates. The selection of receiving installations is based primarily on (1) installations that plan to continue operation under the AMCCOM, *Draft Open Burning/Open Detonation (OB/OD) Minimization Plan*, (2) the proximity of the sending and receiving installations, and (3) the receiving installation's ability to accept off-site munitions shipments. To reduce potential regulatory conflict, we attempted to keep the transport of munitions within a state, the same EPA region, or at least an adjoining state.

**Table 2-3.**  
*Proposed Consolidation Scheme*

Sending installation	State	Munitions sent (tons/year)	Receiving installation	State	Annual O&M increase (\$000)
Fort Drum	NY	0.6	Letterkenny Army Depot	PA	0.7
Fort Hood	TX	0	Red River Army Depot	TX	0
Fort Sam Houston	TX	0.7	Red River Army Depot	TX	0.8
Fort Belvoir	VA	0	Radford AAP	VA	0.6
Fort A.P. Hill	VA	0.55	Radford AAP	VA	0
Fort Stewart	GA	1	Anniston Army Depot	AL	1.2
Dugway Proving Ground	UT	200	Tooele Army Depot	UT	255
Kansas AAP	KS	229	McAlester AAP	OK	291.6
Longhorn AAP	TX	100	Red River Army Depot	TX	127
Picatinny Arsenal	NJ	20	Letterkenny Army Depot	PA	25.2
Redstone Arsenal	AL	222	Anniston Army Depot	AL	283.1
Yuma Proving Ground	AR	26	Sierra Army Depot	CA	33.1
Total	—	799.85	—	—	1,018.3

Any proposed scheme for consolidation of OBOD operations should be a consensus plan that takes into account installation mission, BRAC considerations, the location of installations, and the regulatory climate of potential receiving installations. Many of these considerations were taken into account in this model when selecting potential receiving installations. Chapter 3 discusses these issues further.

## Receiving Installations

### COST ESTIMATING ASSUMPTIONS

Under the consolidation alternative, the 22 installations identified in both the AMCCOM *Draft Open Burning/Open Detonation (OB/OD) Minimization Plan*, and the USALEA study would continue OBOD activities. Permit application and O&M cost estimates would remain constant for installations that do not receive additional munitions. The cost data for Alternative 2, as presented in Table 2-4, reflect only the changes in the number of installations and not changes in operations from Alternative 1. However, installations that receive additional munitions from consolidated facilities will see an incremental O&M cost increase associated with the additional OBOD activity, as presented in Table 2-3, as well as permit modification costs. The following assumptions were made in calculating these additional costs.

#### *Operations and Maintenance Cost Increase*

The cost of operations and maintenance is an incremental cost to receiving installations and is included as an increase in the variable costs associated solely with treatment. The costs shown in Table 2-3 are based on the tons of munitions items to be shipped to a receiving site (taken from Table 2-1) multiplied by the average cost per ton for OBOD treatment. The average cost per ton for OBOD activity was derived from the planned OBOD treatment rates and requested implementation funds presented in the 1993 AMCCOM *Draft Open Burning/Open Detonation (OB/OD) Minimization Plan*. The cost per ton was adjusted for inflation at a rate of 5 percent per year. The total increase in estimated O&M costs for the receiving installations during the FY98 – FY03 budget cycle is \$6.108 million.

#### *Permit Modification Cost*

All installations that receive additional munitions for OBOD treatment will require a permit modification. This assumption takes a conservative approach; however, regulators will probably require this action. It is highly probable that permit modification issues would involve exceeding permitted threshold treatment rates or adding of new waste streams, or both. The cost estimate of \$100,000 for modifying a permit is based on approximately 1,000 technical labor hours at \$70 per hour, \$25,000 for full laboratory analysis of waste samples, and expenses for preparing a revised permit. The total estimated permit

**Table 2-4.**  
**Cost Data for Alternative 2: Installations Operating in FY98**  
**After Consolidation**

Installation name	MACOM	Permit application cost (\$000)	Total O&M costs (\$000)	Total cost for FY98 – FY03 (\$000)
Aberdeen Proving Ground	AMC	410	13,920	14,330
Anniston Army Depot	AMC	700	5,220	5,920
Bluegrass Army Depot	AMC	800	3,120	3,920
Crane Army Ammunition Activity	AMC	150	13,920	14,070
Hawthorne Army Depot	AMC	600	13,920	14,520
Holston Army Ammunition Plant	AMC	450	5,220	5,670
Iowa Army Ammunition Plant	AMC	700	1,620	2,320
Letterkenny Army Depot	AMC	700	13,920	14,620
Lone Star Army Ammunition Plant	AMC	700	5,220	5,920
McAlester Army Ammunition Plant	AMC	650	13,920	14,570
Milan Army Ammunition Plant	AMC	700	5,220	5,920
Pine Bluff Arsenal	AMC	700	5,220	5,920
Radford Army Ammunition Plant	AMC	450	5,220	5,670
Red River Army Depot	AMC	700	5,220	5,920
Sierra Army Depot	AMC	270	13,920	14,190
Tooele Army Depot	AMC	500	13,920	14,420
White Sands Missile Range	AMC	600	3,120	3,720
AMC installations subtotal	—	9,780	141,840	151,620
Fort Bragg	FORSCOM	765	1,620	2,385
Fort Lewis (Yakima)	FORSCOM	450	870	1,320
Fort Polk <sup>a</sup>	FORSCOM	0	870	870
Fort Bliss	TRADOC	600	870	1,470
Fort McCoy <sup>a</sup>	Reserves	0	870	870
Non-AMC installations subtotal	—	1,815	5,100	6,915
Grand total	—	11,595	146,940	158,535

<sup>a</sup> Fort McCoy and Fort Polk are presently operating OBOD activities under approved permits.

modification expense for the seven proposed receiving installations would be \$700,000.

#### COST ESTIMATES FOR ALTERNATIVE 2 AT RECEIVING INSTALLATIONS

The total cost increase for the receiving installations for the six-year budget cycle is approximately \$6.8 million. Of this, \$6.1 million is derived from summing the annual O&M increases (\$1.081 million per year) and the permit modification expense for these seven installations (\$700,000). O&M costs account for the greatest percentage of this increase (89.7 percent) and represent an annually recurring cost. Costs for permit modification activities are responsible for approximately 10.3 percent of the increased cost and are incurred at the same installations as a one-time expense.

# Consolidated Installations

## COST ESTIMATING ASSUMPTIONS

Under consolidation, six AMC and six non-AMC installations will withdraw their permits or permit applications, discontinue OBOD activities, and ship all munitions items to a preassigned receiving installation. Therefore, the permit application and O&M costs will no longer be applicable, and transporting munitions becomes the sole cost consideration.

The following facts and assumptions were employed in calculating these estimates: Transportation costs include packing munitions at sending installations, transporting munitions to receiving installations via a private contractor, providing security during shipment, and unpacking the munitions at the receiving installation.

Table 2-5 lists actual costs incurred by the Army for munitions transport during FY93.

**Table 2-5.**  
*Costs for Munitions Transport (FY93)*

Method	Number of shipments	Average cost per ton	Average cost per ton-mile
Motor (<10,000 lbs)	19,709	\$1,160	\$1.10
Motor (>10,000 lbs)	16,584	108	0.11
Water (ship and barge)	1	780	1.95
Rail (<10,000 lbs)	2	670	0.38
Rail (>10,000 lbs)	950	65	0.05

*Source:* U.S. Army Military Traffic Command.

Rail transport is the most cost-effective method for transporting munitions based on cost per ton-mile. However, this mode of transportation may not be readily accessible to all installations. Motor carriers (trucks) provide the most flexibility at a reasonable cost for small quantities of munitions. Table 2-6 presents the costs for transporting munitions from consolidated to receiving installations. The assumptions for transportation in this model are as follows:

- ◆ All costs will be borne by the sending installation.
- ◆ All shipments of less than 10 tons will be made by truck.
- ◆ All shipments of more than 10 tons will be made by rail.
- ◆ All receiving installations are less than 1,000 miles from the sending facilities.
- ◆ Shipments are quarterly.

**Table 2-6.**  
***Cost for Transporting Excess Munitions from Consolidated  
to Receiving Installations***

Installation name	OBOD activity (short tons/ year)	Average transportation rate (\$/ton)	Annual transportation cost (\$)	Transportation costs FY98 – FY03 (\$000)
Fort Drum	0.6	1,160	696	4.2
Fort Hood	0 <sup>a</sup>	1,160	116	0.7
Fort Sam Houston	0.7	1,160	812	4.9
Fort A.P. Hill	0.55	1,160	638	3.8
Fort Belvoir	0 <sup>a</sup>	1,160	116	0.7
Fort Stewart	1	1,160	1,160	7
<b>Non-AMC installations subtotal</b>	—	—	—	21.3
Dugway Proving Ground	200	65	13,000	78
Kansas Army Ammunition Plant	229	65	14,885	89.3
Longhorn Army Ammunition Plant	100	65	6,500	39
Picatinny Arsenal	20	108	2,160	13
Redstone Arsenal	222	65	14,430	86.6
Yuma Proving Ground	26	108	2,808	16.8
<b>AMC installation subtotal</b>	—	—	—	322.7
<b>Total transportation costs for consolidation</b>	—	—	—	344

<sup>a</sup> For costing, assumes a minimum shipment of 0.1 short tons per year.

#### COST ESTIMATES FOR ALTERNATIVE 2 AT CONSOLIDATED INSTALLATIONS

The overall cost to the 12 consolidated installations for the six-year budget cycle is approximately \$344,000, which is less than 1 percent of what it would cost these same installations to remain operating under Alternative 1. Although a recurring expense in the outyears, cost for transportation is minimal (\$57,350 annually).

## ESTIMATED SAVINGS FROM ALTERNATIVE 2

The stated purpose of the preceding analysis is to determine the cost-effectiveness of reducing the number of Army RCRA Subpart X permits. The cost estimates for the no-action and consolidation alternatives are based on the best available data. In this model, consolidation of OBOD activities, using the recommendations of the USALEA and AMCCOM documents as guides, is a cost-effective alternative.

Table 2-7 summarizes the costs for all categories applicable to the two alternatives. The figures presented are the estimated total dollar amounts that each management alternative would cost during the POM budget cycle covering FY98 through FY03.

The comparison clearly demonstrates the cost savings (17.7 percent) and efficiency of consolidating OBOD activities at the chosen locations. Although this is an estimate, the magnitude of the results and the conservative approach taken (biasing estimates toward the no-action alternative) add validity to the conclusions to be drawn.

**Table 2-7.**  
*Total Cost Comparison of Alternatives 1 and 2*

Consolidation cost categories	AMC (\$000)	Non-AMC (\$000)	Totals (\$000)
<i>Alternative 1</i>			
Remaining Subpart X permit application costs	13,760	4,985	18,745
Operations and maintenance cost	168,960	11,070	180,030
Alternative 1 total	—	—	198,775
<i>Alternative 2</i>			
Remaining Subpart X permit application costs	9,780	1,815	11,595
Subpart X permit modification costs	700	0	700
Operations and maintenance cost	141,840	5,100	146,940
Operations and maintenance — increased cost	6,108	0	6,108
Consolidation transportation cost <sup>a</sup>	323	21	344
Alternative 2 total	—	—	165,687
Savings from consolidation	—	—	33,088

<sup>a</sup> Figure rounded to the nearest whole number.

## CHAPTER 3

# Factors in Decision-Making

In light of the complex issues to understand, factors to consider, and trade-offs to make, actually implementing OBOD consolidation activities may be considerably more difficult than initially deciding to do so. This chapter presents the cost considerations, regulatory questions, and other issues that bear directly on the decision and on the feasibility of implementing a consolidation plan.

## COST CONSIDERATIONS

### Cost Analysis

The analysis in Chapter 2, summarized in Table 2-7 offers evidence that withdrawing Subpart X permits and applications at the 12 installations, as suggested by the USALEA and AMCCOM documents, and transporting the munitions to receiving locations is a sound choice. In addition, the cost model in this analysis strongly indicates that significant savings would probably occur under almost any of the external cost pressures discussed below.

### The RCRA Closure Process

In discussing the rationale for the cost categories, the issue of RCRA closure of OBOD facilities was mentioned. Since non-AMC facilities would end operations under consolidation, they would need to resubmit their closure plans and begin the closure process within 180 days.

By requirement, installations must submit closure plans with their Subpart X permit application. However, considering the generality of the information installations often provide in these plans, it should be assumed that most or all installations will revise their plans significantly. (Because this cost would be incurred regardless of whether a consolidation strategy is implemented, we do not include this in the cost model.)

Installations can conduct either "clean" or "in-place" closure of OBOD units under RCRA. Clean closure involves treating or removing all contaminated materials to predetermined cleanup levels. In-place closure leaves some or all contaminated material in the unit and requires a postclosure plan. This plan identifies how the unit will be monitored and maintained to protect human health and the environment. It is implemented after closure and must be continued for 30 years. Regulatory authorities generally prefer clean closure, but



installations can justify in-place closure if they cannot safely remediate the unit or if risks to health and the environment are minimal and controllable.

It could be argued that closure costs are irrelevant because all OBOD facilities will eventually close sometime in the future and encounter these costs. However, consolidation of OBOD facilities will accelerate the closure schedule and have significant budgetary impact with regard to identifying and programming funds to support closure activities. This could play a key role in the implementation of an Army-wide consolidation plan.

In addition, the closure costs for OBOD units may exceed the savings during the years immediately following initiation of a consolidation plan. However, this study clearly indicates that savings from OBOD consolidation will be considerable over the outyears.

The following are cost-related advantages of early closure:

- ◆ Costs will be less inflated.
- ◆ Regulatory constraints are known and probably less restrictive than in the future.
- ◆ Estimated costs for closure are partially offset by savings from consolidation.

The only cost disadvantage in early closure might be the loss of savings that could be realized by waiting to use new environmental restoration technologies (yet to be developed) that may be more effective and cheaper.

## Costs in the Outyears

Consolidating OBOD activities will affect costs for many years past FY03. The types of costs and their impact on Army installations are discussed below.

### POSTCLOSURE ACTIVITIES

As described previously, RCRA-regulated hazardous waste management units can be closed in place, meaning that waste materials and contaminated media are left in place and the unit is essentially closed as a landfill. Due to the potential for migration of contaminants in the subsurface, RCRA regulations require postclosure care to be implemented and maintained for 30 years following unit closure. These requirements include conducting routine environmental monitoring, implementing security precautions to restrict access to the site, and performing periodic maintenance and inspection of the unit.

The cost of postclosure care can be high due to the long time it must be maintained. It may be more cost-effective for installations withdrawing Subpart

X permit applications to conduct clean closures. These installations should conduct a feasibility study to determine the most appropriate and cost-effective closure method.

## OPERATIONS AND MAINTENANCE OF OBOD UNITS

Installations that continue to operate OBOD units with RCRA permits will incur annual O&M costs for as long as the units are active. These installations will have to periodically upgrade and replace equipment needed to operate and comply with the regulatory requirements. O&M costs are expected to increase over time due to inflation and to the promulgation of potentially more restrictive regulatory standards.

Installations that withdraw Subpart X permit applications will continue to realize a cost savings by not having to operate and maintain OBOD units under RCRA standards. Furthermore, these installations will reduce their financial liability significantly by avoiding EPA or state fines for compliance violations and avoiding the costs of corrective actions due to potential releases from an OBOD unit.

## PERMIT RENEWAL AND MODIFICATION

Federal RCRA regulations require the renewal of Part B permits at least every 10 years. Some state agencies, however, are requiring renewal of permits more often (e.g., every 5 years). Receiving installations may have to modify their permit applications due to changes in unit operations or new regulatory requirements that affect the design, construction, operation, and maintenance of OBOD units. Installations withdrawing their permits will avoid these future costs.

## REGULATORY CONSIDERATIONS

A number of environmental laws and regulations affect the management of OBOD facilities and also the feasibility and cost-effectiveness of consolidating them. The decision to withdraw or obtain a Subpart X permit must consider all of these regulatory factors.

### Modification of Permitted Treatment Rates

The RCRA Subpart X regulations state that OBOD units must "be located, designed, constructed, operated, maintained, and closed in a manner that will ensure protection of human health and the environment." These requirements establish a specified level of environmental performance on the basis of prescribed standards for the location, design, operations and maintenance, and closure of the unit. The standards are based on information provided in the permit

application and the regulatory review process. As a result, a permit limits the quantity as well as the types of munitions that OBOD units can dispose of within a specified period. For example, an installation may be restricted to open burning energetic material at a rate not to exceed 2,500 pounds per month or open detonating no more than 500 pounds per blow. Treatment rates are different for each installation.

AMC installations targeted to receive munition wastes from off site may have to negotiate new permit requirements to allow OBOD operations to treat a larger quantity or new types of munitions. Changes in treatment rates will require modifying the permit application. The cost of modifying an application depends on whether the regulatory agency requires additional environmental assessments. A permit modification could cost from \$10,000 to more than \$200,000.

Many OBOD units operate under multiple environmental permits. In addition to treatment rates specified in Subpart X permits, many states have issued air quality and noise control permits, each of which may place different operational restrictions on the types or quantities of munitions that can be treated, as well as the frequency of operations. Installations must comply with the operating parameters of all permits.

## Restrictions on Accepting Off-Site Munitions

Some installations operate OBOD units under interim status with the restriction that they cannot accept any off-site wastes (hazardous or nonhazardous), including munitions. State regulatory agencies typically impose this requirement to keep the state from being perceived as a "dumping ground" for wastes from other states and to avoid the liabilities of managing hazardous wastes. Receiving installations with such a requirement in their permit application may be able to renegotiate it with state regulators through an interagency agreement. This issue will have to be handled on an installation-specific basis.

## Federal Facility Compliance Act

The Federal Facility Compliance Act (FFCA), enacted in October 1992 (Public Law 102-386), expanded the waiver of sovereign immunity under RCRA to allow states and the EPA to assess fines and penalties against federal agencies for RCRA violations. Regulations to be promulgated under the FFCA will define when conventional and chemical munitions become hazardous waste and will specifically address storage, transportation, emergency response actions, and management of munition hazardous wastes on firing ranges. Although the new requirements will not apply directly to disposal and treatment operations, they may affect significantly the cost and feasibility of transporting munitions off site and storing them in compliance with RCRA standards. As a result, these regulations could affect installations that withdraw their permit applications and transport munitions off site.

The new regulations are still being developed, so it is difficult to estimate the cost impact. The proposed rule was published in the *Federal Register* on November 8, 1995. EPA is required to promulgate the final rule by no later than December 2, 1996.

## Clean Air Act

The Clean Air Act Amendments (CAAA) of 1990 are the fifth major legislative effort by Congress to address air quality issues and represent the most comprehensive and extensive environmental legislation enacted since RCRA. Several provisions affect OBOD operations: new source review, prevention of significant deterioration, state implementation plans, and operating permit requirements.

Changes in the amount of materials treated at an OBOD unit might require a permit for new source review/prevention of significant deterioration (NSR/PSD). As a result, receiving installations that accept off-site munition wastes from consolidated installations may have to submit an NSR/PSD permit application to the regulatory agency. The Army needs to consider the cost of submitting an application.

Under the CAAA, states are largely responsible for ensuring compliance with air-quality standards. Each state must submit an implementation plan to the EPA for the implementation, maintenance, and enforcement of national ambient air-quality standards. The plan addresses emission limits for air pollutants, emission control strategies, air permits, and enforcement. The requirements set out in the state implementation plan may affect whether receiving installations can increase their treatment rates.

Many states are requiring Army installations to obtain an air quality permit. The application must demonstrate that the treatment unit complies with ambient air-quality criteria established by the EPA and state agency. Furthermore, the air-quality permits issued for OBOD units typically stipulate maximum allowable treatment rates. The rates in the air-quality permit often differ from the rates set by the Subpart X permit application and may be more restrictive.

## National Environmental Policy Act

The National Environmental Policy Act (NEPA) directs federal agencies to consider the environmental impact of all major proposed actions. When considering an action, a detailed statement should identify

- ◆ the environmental impact of the proposed action, including any adverse effects that cannot be avoided if the proposed action is implemented;
- ◆ alternatives to the proposed action;

- ◆ the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; and
- ◆ any irreversible and irretrievable commitments of resources that the proposed action would involve.

The statute suggests that, before an environmental impact statement (EIS) is necessary, an action must be federal, qualify as "major," and have a significant environmental impact.

The Army must consider the potential requirement for an EIS when modifying OBOD operations. This could apply to receiving installations because they will be accepting off-site munition wastes for possible treatment by OBOD and, therefore, increasing the total waste stream quantity. It may also pertain to installations terminating OBOD operations because they will be transporting munitions off site and will have to conduct closure of OBOD units.

Though the Army meets the requirement of being a federal agency, it is not clear whether consolidating OBOD operations would be a major action or have a significant environmental impact. Any substantial commitment of resources, whether funding or man-hours, is enough to qualify a project as major. If fully implemented, the OBOD consolidation plan presented in this study would reallocate millions of dollars within the Department of Defense during FY98 – FY03. Operating an OBOD unit would have some impact on the local environment; however, it is unclear whether regulators would consider the potential impacts of a consolidation plan "significant." Each state regulatory agency would probably define differently what constitutes a significant impact.

With respect to consolidating OBOD operations, the Army could argue that the RCRA Subpart X permit process satisfies the requirements of an EIS because it addresses environmental impacts. However, NEPA requires an agency proposing a regional program made up of individual sites to prepare an EIS that addresses the regional impacts (including transportation issues). It would be more cost-effective for the Army to prepare a programmatic EIS than an EIS independently for each installation.

## OTHER FACTORS

### Base Realignment and Closure

Implementation of a consolidation plan must take into account installations that are targeted for BRAC. Table 3-1 identifies Army installations that are currently on the list for closure or realignment resulting in a loss of installation jobs. The realignment of an installation may or may not affect OBOD operations. Some of these installations may be removed from the BRAC list, or the effective dates may be pushed into the outyears.

**Table 3-1.**  
*Army Installations Recommended for BRAC Actions*

Installation name	MACOM	BRAC action	Estimated date of action
Indiana Army Ammunition Plant	AMC	Underutilized	1993
Louisiana Army Ammunition Plant	AMC	Underutilized	1996
Pueblo Army Depot	AMC	Realignment	1995
Savanna Army Depot	AMC	Closure	—
Seneca Army Depot	AMC	Closure	1995
Umatilla Army Depot	AMC	Realignment	1995

## Public Perception Issues

Public and political opposition to OBOD consolidation is likely. Communities through which munitions are transported will have concerns about shipment safety and the potential for accidents. Communities close to an installation accepting munitions from off post may also be concerned about the health risks in expanded OBOD operations. It will be important to address public concerns prior to implementing an OBOD consolidation plan. If not properly handled, these issues can become major political battles that significantly delay or stop implementation of the plan.

Even though the Army routinely transports explosive materials, some state or local regulatory agencies may not permit extended or frequent transportation. Shipment of energetic materials across state lines will face more regulatory and political obstacles than will intrastate transport. This issue will be further complicated if munitions are also classified as hazardous wastes. The following installations currently may not accept any munition wastes on post: Aberdeen Proving Ground, Hawthorne Army Depot (AD), Holston Army Ammunition Plant (AAP), Bluegrass AD, McAlester AAP, Milan AAP, Sierra AD, and Tooele AD.

## CHAPTER 4

# Conclusions and Recommendations

This report presents cost estimates and comparisons for two OBOD management alternatives: maintaining the current course — no action — and consolidating all OBOD activities at 22 installations.

## CONCLUSIONS

On the basis of our comparison of costs between the two alternatives and the overriding issues discussed in Chapter 3, we conclude the following:

- ◆ It is cost-efficient to follow the combined recommendations of AMCCOM (currently part of the Industrial Operations Command) and USALEA and consolidate OBOD activities from the 32 installations currently seeking Subpart X permits into 17 AMC and 5 non-AMC installations.
- ◆ During the FY98 – FY03 budget cycle, the savings realized through consolidation will offset a portion of the closure costs incurred.
- ◆ The feasibility of consolidating OBOD activities will depend on careful consideration of regulatory and mission-oriented issues.

## RECOMMENDATIONS FOR ACTION

Given the results of this study, the Logistics Management Institute recommends that the Army Environmental Strategic Action Plan Workgroup for Munitions Waste take the following actions, listed in the order that they should be implemented:

- ◆ Continue to take steps to educate the command structure on the costs and liabilities involved in RCRA Part B Subpart X permits.
- ◆ Convene a group of cognizant decision-makers in the OBOD area to develop a strategy for determining which installations should withdraw their Subpart X applications or permits and where to consolidate these activities.
- ◆ Accelerate discussions on Army-wide consolidation following the combination of strategies recommended by the Industrial Operations Command (AMCCOM) and the U.S. Army Logistics Evaluation Agency.
- ◆ Take a leadership role in tri-Service OBOD consolidation efforts.

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