Range Scrap (Firing Point) Study
Data Review and Inventory Report

June 1999

Prepared for

U.S. Army Environmental Center
Aberdeen Proving Ground, Maryland

RANGE SCRAP (FIRING POINT) STUDY
DATA REVIEW AND INVENTORY REPORT

Prepared for:

U.S. Army Environmental Center
Aberdeen Proving Ground, Maryland

U.S. Army Corps of Engineers, Mobile District
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ACRONYMS

ABC	Ammunition Book Complete
AEC	Army Environmental Center
AEDA	Ammunitions, Explosives, and Other Dangerous Articles
ASP	Ammunition Supply Point
BMP	Best Management Practice
CCLI	Commerce Control List Item
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DA	U.S. Department of Army
DoD	U.S. Department of Defense
DoDAAC	DoD Activity Address Code
DoDAC	DoD Ammunition Code
DoDI	DoD Instruction
DRMO	Defense Reutilization and Marketing Office
DRMS	Defense Reutilization and Marketing Services
EPA	U.S. Environmental Protection Agency
ESACC	Expended Small Arms Cartridge Casing
FORSCOM	Forces Command
FY	Fiscal Year
HE	High Explosive
HEAT	High Explosive Anti-Tank
HMX	Cyclotetramethylenetetranitramine
HQ	Headquarters
HWM	Hazardous Waste Management
ISRI	Institute of Scrap Recycling Industries, Inc.
MACOM	Major Command
MIDAS	Munitions Items Disposition Action System

ACROYNMS (CONTINUED)

MLI	Munitions List Item
MOU	Memorandum of Understanding
MRIC	Munitions Rule Implementation Council
MWR	Morale, Welfare and Recreation
ND	Not Detected
NSN	National Stock Number
OB	Open Burn
OD	Open Detonation
ODW	Ordnance-Derived Waste
OE	Ordnance and Explosives
OSWER	Office of Solid Waste and Emergency Response
PEP	Propellants, Explosives, and Pyrotechnics
QRP	Qualified Recycling Program
Radian	Radian International
RCRA	Resource Conservation and Recovery Act
SA	Small Arms
SAAS	Standard Army Ammunition System
SCL	Standard Classification List
SLI	Strategic List Item
STLC	Soluble Threshold Limit Concentration
SVOC	Semivolatile Organic Compound
TAMIS	Training Ammunition Management Information System
TAMS	Training Ammunition Management System
TAR	Toxics Along for the Ride
TC	Toxicity Characteristic
TCLP	Toxicity Characteristic Leaching Procedure
TNT	2,4,6-Trinitrotoluene

ACROYNMS (CONTINUED)

TRADOC	Training and Doctrine Command
TTLC	Total Threshold Limit Concentration
UHC	Underlying Hazardous Constituent
USACHPPM	U.S. Army Center for Health Promotion and Preventative Medicine
UXO	Unexploded Ordnance
WARS	Worldwide Ammunition Reporting System

EXECUTIVE SUMMARY

The Headquarters U. S. Department of Army (HQDA) is working to promote a consistent approach to the management of range residues being removed from its training ranges. In support of HQDA, the U.S. Army Environmental Center, working with the U.S. Army Engineer District, Mobile, has taken the first step toward meeting this objective. This report provides an inventory of solid wastes generated from the use of munitions on Army ranges, and an extensive regulatory analysis for metallic range scrap through the examination of the Resource Conservation and Recovery Act (RCRA).

Accomplishment of the HQDA objective will require additional actions, including the development of item-specific waste profiles and best management practices for the inventory.

The range scrap inventory and regulatory analysis provide the basis for a systematic approach to the development of item-specific profiles. Item profiles will be created using existing information and, if necessary, through laboratory analysis. Best management practices for the scrap inventory will be developed in accordance with item profiles and in consideration of other regulatory requirements and scrap metal industry standards.

Completion of the study will assist generators of range residue to manage those items in a consistent manner and in accordance with applicable RCRA requirements.

1.0 INTRODUCTION

Radian International (Radian) was tasked to conduct an inventory and characterization of solid waste on ranges for the Army Environmental Center (AEC) through U.S. Army Corps of Engineers, Mobile District, Contract Number DACA01-96-D-0015, Task Order 0059.

1.1 Background

During the development of the Munitions Rule Implementation Plan, the Munitions Rule Implementation Council (MRIC) recognized the emerging issues regarding the requirements for management of recyclable range scrap metal to comply with the Military Munitions Rule and existing RCRA requirements. In March 1998, MRIC requested that the DoD Hazardous Waste Management (HWM) Subcommittee to determine whether DoD should undertake a waste characterization (hazardous or nonhazardous) of recyclable residue resulting from range operations. The DoD HWM Subcommittee assigned a working group to review the RCRA issues and to determine the requirements for a waste determination of recyclable range scrap metal.

The DoD HWM Subcommittee initially determined that DoD can either (1) take advantage of a RCRA exclusion for "excluded scrap metal" (in those few states that have adopted this provision) from the definition of a regulatory "solid waste" or (2) use process knowledge to declare scrap metal resulting from range operations as hazardous waste and take advantage of the exemption for "scrap metal" from the bulk of RCRA Subtitle C requirements. However, other related issues were raised that are not directly addressed by this approach, such as:

- Does the RCRA exclusion for "excluded scrap metal" and/or the exemption for "scrap metal" apply to residual constituents (e.g., explosive residue) that may be present on the scrap metal?
- By assuming all range scrap metal is hazardous, these items are potentially subject to overly strict regulatory RCRA interpretations by states and EPA regional offices.

- Are additional management procedures needed to ensure that these items will meet the definition of "excluded scrap metal" and "scrap metal"?
- Are additional management procedures needed to prevent release of hazardous constituents, which may be present on the scrap metal items, and to minimize concerns?

While DoD may take advantage of the exclusion for "excluded scrap metal" and the exemption for "scrap metal," the DoD HWM Subcommittee concluded that characterization and a regulatory framework are needed to:

- Address the unique characteristics of specific items (no "one size fits all"),
- Provide a consistent management approach for each item, and
- Provide the best benefit relative to regulatory position for addressing concerns.

In addition to compiling data to characterize those items that require a hazardous waste determination, sampling and analysis of range residues would:

- Support DoD decision-making on appropriate management practices;
- Avoid subjecting items to overly strict regulatory interpretations;
- Identify underlying hazardous constituents (UHCs);
- Minimize on-site RCRA corrective action liability associated with mismanaged items;
- Minimize long-term Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) liability;
- Provide assurance to down stream processors; and
- Provide a source of data for range evaluation and potential remedial actions.

To address the issues discussed above, AEC is conducting this Range Scrap Study to develop the regulatory framework for management of range residues, to compile data to characterize those items that require a waste characterization, and to recommend BMPs for managing these items in accordance with RCRA. Section 1.2 discusses the scope of this study and report.

1.2 Project Requirements

The purpose of this project is to assist the HQ DA and the AEC with identification and characterization of solid waste and range residue (range scrap) generated by military personnel from the intended use (firing and training) of munitions and other training PEP items at training ranges. The primary objective of this project is to perform a comprehensive inventory of the items utilized in support of army training and mission activities on ranges, characterize these items in accordance with RCRA, and develop environmental BMPs for these items, including all aspects from handling to final disposition.

This project is being executed in a phased approach to provide AEC/HQ DA with:

Phase I

- Development of a regulatory framework for managing range scrap;
- Creation of an inventory of solid waste and residual material generated during training exercises;

Phase II

- Development of a sampling and analysis plan for the waste characterization of residual material;
- Performance of sampling and analysis on select items and preparation of a waste profile sheet on every item utilizing process knowledge and/or analytical data; and

Phase III

- Development of management guidance in the form of BMPs for the munitions items in the inventory, consistent with the waste profiles developed in the characterization phase.

This report presents the regulatory framework for managing range scrap and the inventory of solid waste and residual material as required in Phase I. The activities completed to support preparation of this report are listed below and discussed in the following sections.

- Data search and review of regulatory guidance, inventory data, and characterization data.
- Development of regulatory framework.

- Development of an inventory database for training munitions and range scrap. The inventory of range scrap collected at the point of issue and firing point has been fully delineated. However, the inventory of range scrap collected from downrange is preliminary and will be addressed at a later date to supplement this effort.
- Site visits to two Army installations to observe waste management practices and validate the inventory.

1.3 Organization of Report

As mentioned previously, this document presents the results of Phase I, regulatory framework and inventory. Accordingly, this report includes the following sections:

- **Section 1** provides an introduction and description of the project.
- **Section 2** summarizes the data search and review conducted to support the regulatory framework and inventory.
- **Section 3** presents the regulatory framework developed for determining RCRA applicability to range scrap management activities.
- **Section 4** describes how the inventory database was developed and provides a summary of the inventory.
- **Section 5** provides a summary of existing range scrap characterization data.
- **Section 6** includes major findings resulting from the site visits.
- **Section 7** discusses the data gaps associated with the inventory and existing characterization data.

The following appendices support these sections:

- **Appendix A** contains the supplemental reports generated by the inventory database.
- **Appendix B** lists the data sources used to support the regulatory framework and inventory.

2.0 DATA SEARCH AND REVIEW

A comprehensive data search and review was conducted during Phase I of this project. The data search was performed for four primary areas:

- Regulatory compliance – EPA guidance, RCRA-related documents, and DoD documents were reviewed to support the regulatory analysis presented in Section 3 of this report;
- Inventory data – DoD databases, munitions tracking systems, Army manuals, and residue turn-in documentation were reviewed to build the inventory of munitions items and range scrap (Section 4);
- Characterization data – Testing results from the sampling and analysis conducted on range scrap items by various DoD agencies was compiled for use in determining the characterization requirements for Phase II of this project; and
- Waste management practices – Various DoD manuals, policy, instructions, regulations, and documents pertaining to management of range scrap were complied for use in evaluating the need for additional BMPs (Phase III).

Appendix B contains a comprehensive listing and description of the data sources compiled and reviewed to date. Characterization data and waste management documents will continue to be reviewed during execution of Phases II and III of this project.

3.0 REGULATORY FRAMEWORK

As described in Section 1, the Range Scrap Study includes a task for conducting a regulatory analysis of the status of range residues under RCRA and developing a recommended management framework.[1] Figure 3-1 depicts a recommended RCRA regulatory framework for characterization and management of range residues, the elements of which are described in this report.[2]

3.1 Overview

3.1.1 Recommendations

The most favorable position that can be advanced by DoD is that metallic range residues destined for recycling by melting for metals' recovery are excluded from the definition of "solid waste" as "excluded processed scrap metal" [40 CFR 261.4(a)(13)] and, therefore, cannot be hazardous waste subject to Subtitle C controls. Section 3.3.3 describes the five decision factors that led EPA to finalize the exclusion; the most significant of which is that "processing" of the scrap metal occur.

It is to DoD's benefit to document and institutionalize all the processing activities required for render safe, demilitarization, and QRP purposes (i.e., for nonenvironmental purposes), regardless of whether they are done by DoD personnel or qualified contractors, since these activities directly support the RCRA regulatory exclusion for "processed scrap metal." These practices include, but are not limited to, the following examples:

[1] This report uses the term "range scrap" to describe the pending AEC study, even though "scrap" is a regulatorily-defined term that may not apply to all range items. The terms "metallic range residue" and "range items" are also used throughout to refer to "range scrap."

[2] This analysis is based on federal law, regulations, and guidance and, therefore, contains the caveat that individual states may have more stringent requirements.

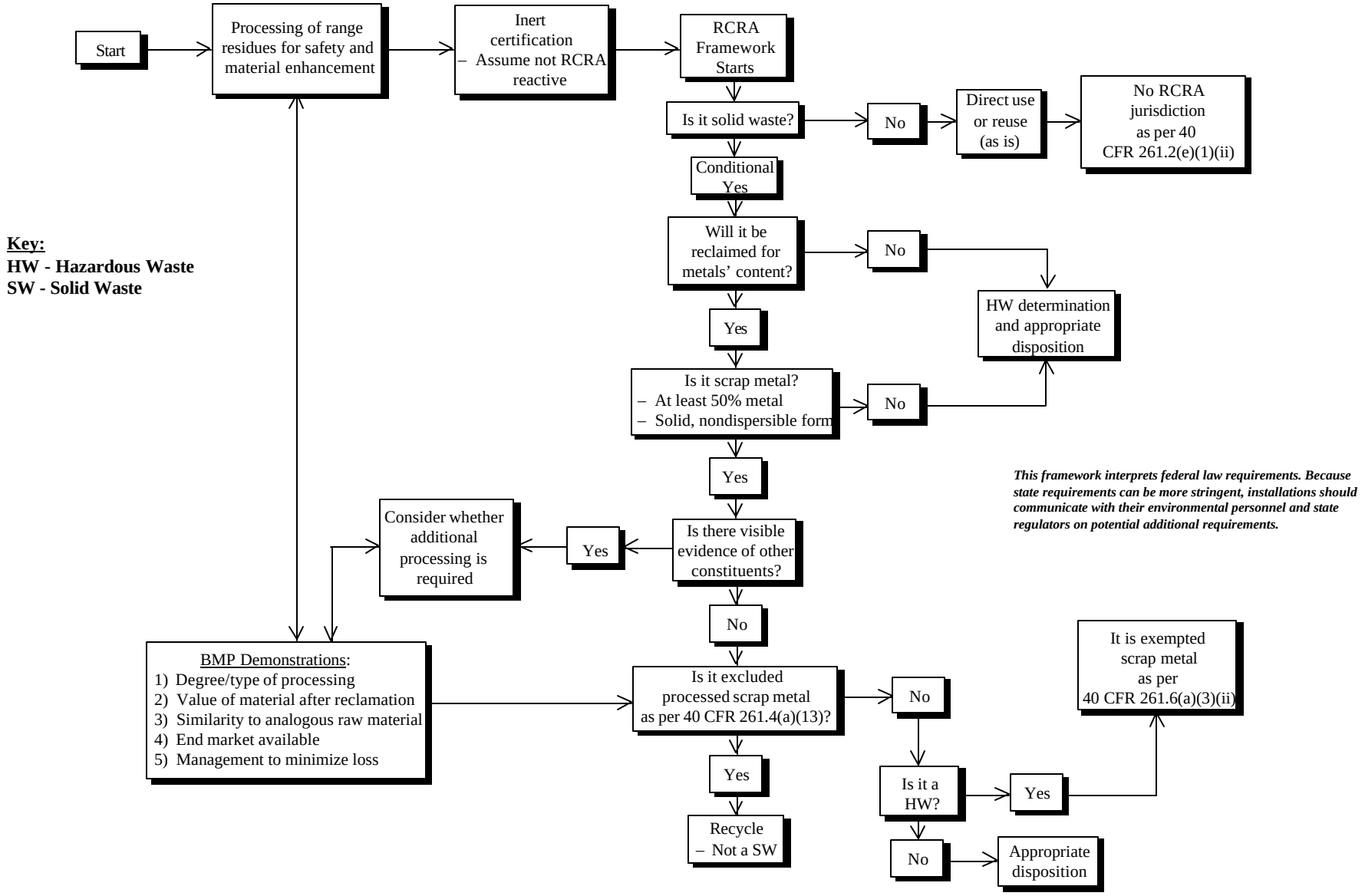

Figure 3-1. Regulatory Framework for Range Residue Management

- Sorting and segregating expended small arms cartridge casings (ESACCs) and other field items (conducted by training units) by metal type and caliber.
- Sorting and segregating field-returned items at ASPs.
- Demilitarizing brass, removing plastic components from items [like sabot petals and high explosive anti-tank (HEAT) round collars], and mechanically separating the aluminum and magnesium components of HEAT round collars.
- Demilitarization procedures implemented for safety reasons and for material handling reasons (i.e., to obliterate any unique military features) and the ammunitions, explosives, and dangerous article Ammunitions, Explosives, and Other Dangerous Articles (AEDA) residue disposal process implemented for safety reasons.

Another regulatory approach is the RCRA *recycled scrap metal exemption* at 40 CFR 261.6(a)(3)(ii). This exemption is less favorable than the exclusion referred to above because it provides that scrap metal is a "solid waste" (so RCRA jurisdiction applies). However, at this time, recycled scrap metal is exempted from RCRA's Subtitle C requirements.

As discussed in this report, there remains a question as to whether metallic range residues that feature other constituents (explosives' residues or deposits, for example) are encompassed by the processed scrap metal exclusion or the scrap metal exemption. Currently, there is no clear regulatory answer to this issue. However, based on language from the excluded processed scrap metal rulemaking, a case can be made that these other constituents are not "distinct components" that invalidate the exclusion or exemption. Regardless, EPA will still be concerned about the potential for human health and environmental risks associated with these constituents under the general approach that it takes to recycling (see Section 3.2).

Determining the regulatory status of materials that are destined for recycling is one of the most complex and confusing aspects of the RCRA program. Unless an exception or exclusion applies, EPA considers its Subtitle C jurisdiction to extend to hazardous materials that are recycled. In EPA's view, the key question is what hazardous materials are deserving of RCRA Subtitle C cradle to grave controls? The answer is based on both what the material is and how it is actually managed. Even for a particular material that will be recycled (such as a metallic ammunition box), there is no "one size fits all" answer since the RCRA status of a particular item can vary depending on the method of recycling (the box reused as is for

ammunition storage escapes RCRA jurisdiction as a direct use item, while the same military item that is demilitarized to be sold for melting is excluded "processed scrap metal").

Section 3.4 of this report discusses the importance of developing and implementing BMPs as a part of the Range Scrap Study. In addition to providing needed guidance to field personnel, these BMPs are sound risk management approaches to:

- Document and standardize the "processing" undertaken on metallic range residues to qualify for the RCRA scrap metal exclusion and
- Address potential "gray" areas in the recycling rules, such as the presence of other constituents on some items or categories of metallic range residues, by providing a management process that minimizes the potential for harm to human health and the environment.

3.1.2 Other Benefits of the Range Scrap Study

The Range Scrap Study is designed to acquire information to support DoD decision-making on appropriate management practices, particularly to support the position that metallic range residues are excluded "processed scrap metal." However, the information that will be developed will also be useful for other purposes, including:

- *Identification of UHCs.* For those range residues that are hazardous wastes that cannot be recycled (such as some smoke pots) and that, therefore, are subject to the RCRA land disposal restrictions. As a generator, DoD must identify UHCs to the treatment or disposal facility to ensure proper treatment before land disposal or incineration.
- *Minimization of long-term CERCLA liability.* DoD maintains CERCLA liability for range residues that are managed as hazardous wastes. To the extent that these materials have been adequately characterized and subject to appropriate management controls (at the front end), this liability may be minimized.
- *Assurance to downstream processors*. Currently, secondary smelting or furnace operations that input scrap metal are not subject to RCRA regulation because the scrap metal itself is not a "hazardous waste."[3] One of their biggest regulatory risks is that "suspect" scrap metal input could mean that EPA will apply the RCRA permitting and technical standards at 40 CFR 266 (industrial

[3]Smelters and furnaces that process hazardous waste (vs. excluded/exempt scrap metal) for metal recovery may be exempt from RCRA pursuant to 40 CFR 266.100(c) as long as certain demonstrations are made.

furnaces that process hazardous waste). Again, having a controlled and thorough characterization scheme at the generator end should minimize these concerns, both to industry as well as to EPA.

3.1.3 Organization

Following this overview, the remainder of this section addresses:

- A brief historical and current perspective on how recycling has been regulated under RCRA (Section 3.2);
- The scope of range residues considered in this evaluation and RCRA regulatory issues and proposed answers (Section 3.3); and
- An outline for developing BMPs within the context of the regulatory framework (Section 3.4).

3.2 Recycling Under RCRA

EPA proposed the initial set of RCRA recycling rules on 4 April 1983 (48 Federal Register 14472 *et seq.*) and finalized these rules on 4 January 1985 (50 Federal Register 614 *et seq.).* These initial set of rules still remain in effect in large part, although individual rulemakings (e.g., the 1997 excluded scrap metal rule) have clarified the scope of the program to individual and industry-specific items.

In the preamble to the 1983 proposed rule, EPA very clearly asserted its RCRA Subtitle C authority over hazardous materials that are destined for recycling. The agency stated that the U.S. Congress' mandate for cradle to grave control extended to hazardous materials being recycled because they can pose the same risks to human health and the environment when improperly managed. Of greatest concern to the agency were (1) wastes recycled in a manner analogous to disposal (e.g., land application) or incineration (e.g., burning); (2) over accumulation of materials before recycling and unsafe transport; and (3) the lack of a guaranteed end market. These concerns continue to be of utmost importance to the agency.

EPA added a category of recyclable material in the 1985 final rule—scrap metal—though it exempted this material from any Subtitle C controls [this exemption remains

codified at 40 CFR 261.1(a)(3)(ii)]. Two aspects of this action deserve discussion. One is that only *hazardous* scrap metal is subject to the rules. EPA presented no data in the rulemaking on whether and what types of scrap metals exhibited metals' concentrations in excess of the Extraction Procedure, now Toxicity Characteristic (TC), regulatory concentrations.[4] DoD may classify such items as characteristically hazardous through process knowledge. However, to the extent that metallic range residues are not hazardous, RCRA Subtitle C does not apply to post-recovery management of these materials.

The second significant aspect of the 1985 rulemaking as it pertains to scrap metal relates to the precise definitions that are used. "Scrap metal" is defined to include bits and pieces of metal parts that when worn or superfluous *can be recycled* [40 CFR 261.1(c)(6)]. The term "recycled" includes material that is used, reused, or *reclaimed* [40 CFR 261.1(c)(7)]. Scrap metal is not used or reused within the definition of these terms [see 40 CFR 261.1(c)(5)] but is encompassed within the definition of reclaimed at 40 CFR 261.1(c)(4): "a material is reclaimed if it is processed to recover a usable product or if it is regenerated." In the preamble to the 1985 final rule, EPA stated that the recycling use for scrap metal is for *metal recovery* in secondary smelting operations and that it is the recovery of these resources from the scrap that constitutes *reclamation* (50 Federal Register 614, 624, 4 January 1985).

A third aspect of the 1985 rulemaking that deserves discussion was adoption of the solid waste exemption at 40 CFR 261.2(e)(1)(ii). This subsection essentially provides that materials that are used or reused as an effective substitute for a commercial product (without needing to be reclaimed) are not solid wastes and, therefore, are not subject to the RCRA Subtitle C program. This exemption is of interest to the extent that there may be post-recovery markets for metallic range residues that do not encompass melting (i.e., some direct use items such as brass casings and metal ammunition boxes). To this extent, management of these items would not be subject to RCRA jurisdiction.

The implications of this review of the history of RCRA recycling rulemaking are that (1) scrap metal that is directly used or reused is not RCRA regulated pursuant to 40 CFR

[4] EPA stated in the preamble that "Preliminary results of Agency studies indicate that most scrap metal is not hazardous, although some types exhibit EP toxicity" (50 Federal Register 649, fn. 41, 4 January 1985).

261.2(e)(1)(ii) and (2) scrap metal that is melted but contains nonmetal components or metal components that do not contribute material value to the end user may not be considered by the agency as being legitimately reclaimed for material recovery and, therefore, may not be entitled to the exclusion or exemption. The second consideration must be addressed in a range residue regulatory strategy given the potential for other constituents to be present on or in metallic range residues. Section 3.3 addresses this issue.

3.3 Scope of Evaluation and RCRA Regulatory Issues

The Munitions Rule identifies when munitions become a waste under RCRA and provides for the safe storage and transport of the waste. Under the Munitions Rule, unused munitions become a waste when abandoned; removed from storage for the purpose of being disposed of, burned, incinerated, or treated prior to disposal; deteriorated or damaged beyond repair, recycling, or reuse; or declared a waste by an authorized military official. Unused munitions treated or disposed of on the range are classified as a RCRA waste. Used or fired munitions (including range residues), which are the focus of this study, become a waste upon removal from the range for purposes of storage, reclamation, treatment, or disposal. Munitions waste formerly buried are subject to RCRA when recovered.

The range residues considered in this regulatory evaluation are those that will be generated at the firing point or on training and maneuver areas, which are subsequently recovered at the firing line or from downrange. These residues include:

- Small arms (SA) range residues (primarily spent ammunition and cartridge casings) and
- Training range residues. Training ordnance, including projectiles, missiles, rockets, bombs, grenades, flares, signals, smokes, and teargas. Can be recovered in pieces or in substantially whole parts as unexploded ordnance (UXO) (and then deactivated) or as expended ordnance.

Other types of range residues that will be generated include the following:

- Ammunition/ordnance-derived material. Nonexplosive metal items found at SA and training ranges such as bandoleers, metal links and clips, ammunition boxes, drag fins from aerial bombs, and lifting lugs. May also include

nonmetal items, such as cardboard and Styrofoam packaging material, cardboard, and wood boxes.

- Firing range targets. Includes rolling stock (vehicles), plywood, tires, concrete blocks, and soil berms.

This evaluation focuses on metallic residues described above, but the management framework presented in Figure 3-1 addresses all types of range residues for the sake of completeness.

RCRA characterization concerns with respect to SA and training range residues are generally:

- Metal constituents that remain as residue on ESACCs, in unfired items that are recovered, or on other range items [e.g., some ESACCs have tested TC hazardous for lead due to the presence of lead in the remaining ammunition primer] and
- Explosives' residues on metal fragments and debris from expended ordnance. Explosives can be present in amounts that cause concerns about ignitability and reactivity. In addition, 2,4-dinitrotoluene is on the TC list (RCRA waste code D003) with a regulatory concentration threshold of 0.13 mg/L. (Residues that are solid cannot be corrosive since this RCRA characteristic only applies to liquid and aqueous waste.)

The following subsections discuss the RCRA regulatory issues related to management of range scrap, as well as how the proposed regulatory framework (Figure 3-1) resolves these issues. The order of discussion is as follows:

- Are metallic range residues a "solid waste"? (no if they are excluded "processed scrap metal"; otherwise, yes);
- Are metallic range residues "scrap metal"? (yes if they are not "spent material");
- Are metallic range residues excluded "processed scrap metal"? (yes; otherwise they are "exempted scrap metal");
- What are the implications of the scrap metal exemption? (metallic range residues are a "solid waste" but are not subject to any Subtitle C controls at this time); and
- Does the presence of "other constituents" on metallic range residues affect the RCRA exclusion or exemption?

3.3.1 Are Metallic Range Residues a "Solid Waste"?

Summary Answer: Metallic range residues are not a RCRA "solid waste" if they meet the definition of excluded "processed scrap metal" (discussed in Section 3.3.3). Otherwise, they are RCRA "solid wastes."

For wastes to be subject to RCRA Subtitle C controls, they must first be "solid wastes." The statutory definition of "solid waste" includes "…other discarded material, including solid, liquid, semisolid, or contained gaseous materials resulting from industrial, operations,…and from community activities…" This broad interpretation has left EPA much discretion in regulatorily defining the term.

On 12 May 1997, EPA amended the definition of solid waste to exclude from RCRA jurisdiction "processed scrap metal, unprocessed home scrap metal, and unprocessed prompt scrap metal." However, EPA has not found sufficient data to justify an exclusion for "unprocessed obsolete scrap metal" at this time. Obsolete scrap metal consists of worn out metal or a metal product that has outlived its original use, such as automobile hulks, railroad cars, aluminum beverage cans, steel beams from torn down buildings, and household appliances.

Home and prompt scrap are associated with specific industries and are not, therefore, further discussed in this evaluation. This exclusion is obviously the most attractive for metallic range residues since it would allow management, from generation to end use, solely under DoD and industry procedures and policies.

A discussion on the definition of "scrap metal" and "processed scrap metal" as they apply to range scrap is provided next.

3.3.2 Are Metallic Range Residues "Scrap Metal"?

Summary Answer: As long as metallic range residues are at least 50% metal and are in solid (nondispersible) form they are "scrap metal" and not "spent material" (spent material is potentially subject to Subtitle C controls).

An initial issue is whether metallic range residues meet the definition of scrap metal and then processed scrap metal. EPA noted in the preamble to the final military munitions rule that the issue of the RCRA regulatory status of recycled munitions material "is not unique to the military" (62 Federal Register 6633, 12 February 1997). Therefore, the issue of what EPA interprets as scrap metal can be analyzed in terms of Office of Solid Waste and Emergency Response (OSWER) interpretation of and guidance on these terms in the context of many different types of industries. Much of this guidance distinguishes between scrap metal and spent material, which is an important distinction because spent material remains within Subtitle C regulation.

Spent material is any material that has been used and, as a result of contamination, can no longer serve the purpose for which it was produced without processing [40 CFR 261.1(c)(1)]. Contamination can include an impurity, factor, or circumstance that causes the material to be taken out of service for reprocessing [OSWER Directive 9441.1994(07)]. Historically, EPA has considered materials such as spent solvents, spent acids, spent caustics, spent batteries, and spent activated carbon as spent material [48 Federal Register 14476, 4 April 1983; OSWER Directive 9441.1994(07)]. While the agency's interpretation of the term "contamination" is arguably broad enough to include range residues, a key distinction is that it is not the original product itself that is spent in this instance. The other examples (e.g., acids, carbon) were products that have been used and can no longer be used for process cleaning or filtering and which, *in their original state*, need to be reprocessed (e.g., regeneration of spent activated carbon) to be used again (e.g., for process filtering as activated carbon). In the instant case, the material is a *residue* not in its original product state and it will not be reprocessed to produce the same product used for the same purpose (i.e., useable munitions).

Scrap metal is bits and pieces of metal parts, or metal pieces that may be combined together with bolts or soldering that, when worn or superfluous, can be recycled [40 CFR 261.1(c)(6)]. EPA guidance is that the material *must have a metal content of at least 50%* [OSWER Directive 9441.1990(09a)] and that it be in *solid, nondispersible form* (61 Federal Register 2362, 25 January 1996; small fines not included). Metallic range residues appear to most closely approximate bits and pieces of metal parts that are worn (from the intended use of the original product). An EPA memo agrees that metal fragments from fired munitions can be

classified as "scrap metal" rather than "spent material."[5] EPA has similarly held zinc bar, nickel plate, and cadmium plate (metal portions) of spent batteries [OSWER Directive 9441.1986(79)] and lead foil used in dental X-ray packages [OSWER Directive 9441.1993(05)] as scrap metal.[6]

Based on the foregoing, it would appear that range items, which are solid, metallic, and in nondispersible form, are more like scrap metal than spent materials.

3.3.3 Are Metallic Range Residues Excluded "Processed Scrap Metal"?

Summary Answer: Yes, metallic range residues meet the definition of excluded "processed scrap metal," although documentation of "processing" activities must be conducted. Otherwise, metallic range residue meets the definition of "exempted scrap metal."

In January 1996, EPA proposed to amend the definition of solid waste to exclude processed scrap metal being recycled from RCRA jurisdiction. This rule was finalized at 40 CFR 261.4(a)(13) on 12 May 1997. According to EPA, "processed scrap metal being recycled is distinct from other secondary materials defined as wastes when recycled due to established markets for the material's utilization, inherent positive economic value of the material, the physical form of the material, and absence of damage incidents attributable to the material, and is therefore sufficiently product-like that maintaining RCRA regulatory jurisdiction over this material is not necessary" (62 Federal Register 26011, 12 May 1997).

"Processed scrap metal" is defined at 40 CFR 261.1(c)(10) as "…scrap metal which has been *manually or physically altered to either separate it into distinct materials to enhance economic value or to improve the handling of materials*" (emphasis added). The category of processed scrap metal includes scrap metal that has been "baled, shredded, sheared,

[5] EPA OSWER, letter from EPA Headquarters (Jeffery Hannapel) to EPA Region V (Duncan Campbell), 17 March 1997. See also 62 Federal Register at 6631, column 2, where the Munitions Rule refers to the scrap metal exemption.

[6] On the other hand, chopline residues, which are generated from processing scrap wire, were considered by EPA as spent material because they primarily consist of plastic and are recovered for polyvinyl chloride, even though 5% of the residues consist of copper that can also be recovered [OSWER Directive 9441.1996(10)]. EPA deferred to individual state determinations when faced with the question of whether brass particles generated from the belting and buffering of brass castings are scrap metal [OSWER Directive 9441.1993(15)]; however, the agency may have deferred on this point because the particles may be similar to fines, which have not traditionally been considered nondispersible under the scrap metal interpretations. Note that the definition of "processed scrap metal" adopted 12 May 1997 does include fines and drosses, but only if they have been agglomerated.

chopped, crushed, flattened, cut, melted, or *separated by metal type (i.e., sorted), …" regardless of who does the processing* (generator, an intermediate handler, or the ultimate recycler) (emphasis added). [7] *Metallic* r*ange scrap metal items that are processed in the manner cited above meet the definition of "excluded processed scrap metal."*

EPA cited five decision factors in the proposed rule (61 Federal Register 2362 *et seq.*, 25 January 1996) that led it to conclude that processed scrap metal should be allowed to exit the RCRA program. DoD should be able to demonstrate that management practices and business incentives for recycling of metallic range items are similarly present with respect to each of the factors outlined below. These factors must be given consideration during the remainder of the Range Scrap Study and development of BMPs. Section 3.4 outlines some initial approaches and considerations for developing BMPs to ensure that range scrap items are managed within the regulatory framework.

The first factor is *the degree of processing the material has undergone and the degree of further processing that is required.* The agency is interested in the extent to which the scrap metal has been *separated*, melted, or *otherwise processed* to add value or *improve handling qualities.* An example is removing nonmetallic components (e.g., fluff and plastics), which may be dispersible (easily separated from the metal and, thus, had the potential to be "lost" to the environment) and which do not contribute value for metals' recovery.

It is to DoD's benefit to document and institutionalize all the processing activities required for render safe, demilitarization, and QRP purposes (i.e., for "nonenvironmental" purposes, as well as to remove the RCRA explosive characteristic), regardless of whether they are done by DoD personnel or qualified contractors, since these activities directly support the RCRA regulatory exclusion for "processed scrap metal." These practices include, but are not limited to, the following examples:

- Sorting and segregating ESACCs and other field items (conducted by training units) by metal type and caliber.
- Sorting and segregating field-returned items at ASPs.

[7] 62 Federal Register 26018.

- Deforming brass, removing plastic components from items (like sabot petals and HEAT round collars), and mechanically separating the aluminum and magnesium components of HEAT round collars. These are example activities conducted by Morale, Welfare, and Recreation (MWR) (or other responsible organization) under a QRP.
- Demilitarization procedures implemented for safety reasons and for material handling reasons (i.e., to obliterate any unique military features) and the AEDA residue disposal process implemented for safety reasons.

The second factor is *the value of the material after it has been reclaimed*. According to EPA, processed scrap metal is typically traded nationally and internationally in established markets for positive economic value (i.e., the processor is paid by the purchaser for the metal) and there are market specifications for purity and physical form. There should be no issue regarding the fact that metallic range residue, as "scrap metal," has established recycling markets. In addition, there are material specifications for scrap metal adopted by the Institute of Scrap Recycling Industries, Inc. (ISRI) (Scrap Specifications Circular 1998, consisting of Guidelines for Nonferrous Scrap: NF-98 and Guidelines for Ferrous Scrap: FS-98) applicable to generators and intermediate handlers.

The third factor is *the degree to which the reclaimed material is like an analogous raw material.* According to EPA, processed scrap metal is analogous in composition to raw metal concentrates and intermediates. Electric arc furnaces use processed scrap iron and steel as input, while the integrated steel industry (a competitor) uses basic oxygen furnaces that input iron derived from iron ore. This factor is further discussed in Section 3.3.5 with respect to the presence of other constituents on some range scrap.

The fourth factor is *the extent to which an end market for the reclaimed material is guaranteed.* EPA wants to be sure that processed scrap metal that is recycled is a viable substitute for raw material feedstocks that are finite and nonrenewable, such as ores. This factor is similar to factor three in that, ultimately, the end users are the test: do they or will they, in fact, accept range metallic residues directly or through intermediaries for processing for metals' recovery?

The fifth factor is *the extent to which a material is managed to minimize loss.* EPA notes that solid, nondispersible scrap metal (1) has little potential for release and (2) is

typically managed to prevent loss because it has economic value. The primary environmental incidents associated with metal recycling relate to the handling of distinct components, such as battery removal, breaking, and disposal facilities. For this reason, EPA excluded such components from the definition of "scrap metal" (see Section 3.3.5).

The agency did not include unprocessed obsolete scrap metal in the final exclusion and cited as examples "scrap which is composed of worn out metal or a metal product that has out-lived it (sic) original use, such as automobile hulks, railroad cars, aluminum beverage cans, steel beams from torn down buildings, and household appliances." [The status of unprocessed obsolete scrap metal is that it remains exempted at this time from the Subtitle C standards pursuant to 40 CFR 261.6(a)(3)(ii).] These items are different from metallic range residue in that metallic range residue is not a worn-out metal or metal product that has outlived its original use. It is instead the remnant of a product that was used and that was partially or almost wholly consumed in the typical process of use. Further, it is likely that EPA was hesitant to exclude these types of items from RCRA entirely because of the diversity and sheer magnitude of the number of generators (many of whom are households or small businesses) who may not have a ready mechanism to provide these items to a recycling broker or end user. Thus, there is more potential for human health and environmental harm than is the case with industrial and DoD scrap that have the knowledge and resources to ensure appropriate management controls.

3.3.4 What Does the Scrap Metal Exemption Mean?

Summary Answer: While the processed scrap metal exclusion allows metallic range residue to completely exit RCRA, the scrap metal exemption regulates the residue as a "solid waste" which, if hazardous, is subject to the Subtitle C program. However, at this time, recycled scrap metal is exempted from Subtitle C requirements.

If metallic range residue cannot meet the excluded processed scrap metal definition, it is a "solid waste" and potentially a hazardous waste subject to Subtitle C regulation. However, at this time, 40 CFR 261.6(a)(3)(ii) provides that none of the RCRA requirements of 40 CFR Parts 262 through 266 or Parts 268, 270, or 124 apply to generators or processors of

exempt scrap metal. Therefore, there are no technical, recordkeeping, or reporting requirements under federal RCRA law.

3.3.5 Could the Presence of Other Constituents on Metallic Range Residue Affect the Processed Scrap Metal Exclusion (Section 3.3.3) or the Scrap Metal Exemption (Section 3.3.4)?

Summary Answer: Even after a metallic range residue is certified as inert, some items may feature visible evidence of other constituents. Other constituents are not distinct components (which are not entitled to the scrap metal exclusion) as defined by EPA. The scrap metal recycling industry trade association has adopted qualitative guidelines on what constitutes "clean" scrap. These guidelines should be used to establish BMP criteria for specific items or categories of items: (1) which need additional processing for environmental reasons or (2) for which a decision can be made to manage those items as a waste due to the impracticality of further processing.

DoD management methods that are environmentally- and safety-sound will support arguments that metallic range items should be excluded from hazardous waste controls (Section 3.3.3). Many practices already in place as a part of the mission of the services (e.g., field training unit turn-ins, ASP and QRP sorting and segregation, QRP physical processing, and UXO/demilitarization practices) will support the RCRA exclusion argument.

Range residues that have undergone the process of inspection and certification that they are inert (i.e., do not present an explosives' safety hazard pursuant to DoD procedures) are assumed by DoD to not display the RCRA characteristic of reactivity. Based on reported field experience, some range residues can be certified as inert under DoD procedures and yet show visible evidence of other constituents (e.g., show visible traces of remaining primer in ESACCs). The presence of other constituents may cause a sample of the entire range residue item (or the constituent itself) to test TC hazardous for metals (lead) or for 2,4-dinitrotoluene. (It is less likely that other constituents would render the residue RCRA ignitable because of their solid form plus the fact that they would have been subjected to the explosives' safety inspection and evaluation process.) Alternatively, the other constituents may not be RCRA characteristically hazardous, but could be 40 CFR 261, Appendix VIII constituents or contaminants under state programs (Note: most military explosives like RDX and PETN,

organo-metallic compounds, and organic and inorganic nitrates, nitro compounds, and nitramines are not Appendix VIII constituents).

Two questions are raised by the visible presence of other constituents:

- What impact does this have on the hazardous waste determination process?
- What impact does this have on the ability to claim the RCRA scrap metal exclusion or exemption?

If metallic range residue is excluded scrap metal, the RCRA requirement for generators to make a hazard determination on the material (40 CFR 262.11) does not apply. Therefore, the presence of other constituents would not be a regulatory concern for excluded scrap metal from a characterization perspective. In the case of exempted scrap metal, either process knowledge information or testing must be applied for the entire material (scrap metal and "other constituents") to make a hazardous waste determination. However, the more pressing issue is whether the scrap item is entitled to the exclusion/exemption in the first place *because* of the other constituents.

In the final rulemaking on the processed scrap metal exclusion, EPA indicated that processed scrap metal does not include any "distinct component" separated from unprocessed or partially processed scrap metal that, of itself, does not meet the current definition of scrap metal. Specific examples of distinct components cited by the agency are batteries, capacitors, or other liquid-bearing metal articles; fluff or other nonmetal residuals; liquid metals such as mercury or metal-bearing liquids such as spent caustics and acids; and process secondary materials such as slags, drosses, ashes, and sludges that have a physical form dissimilar to scrap metal. A threshold issue, therefore, is whether other constituents that may be visibly present on some metallic range residues are "distinct components," which cause the entire item to lose the exclusion (and exemption).

EPA has stated that distinct components of scrap metal are not entitled to the exclusion, but the examples provided are manufactured subcomponents of the original article or product (e.g., batteries) that retain their own identity, remain intact even after use, and are relatively easy to remove or separate from the metal. There are also historic incidents of

environmental damage associated with the processing of these items (e.g., battery breaking facilities, polychlorinated biphenyl contamination of fluff at metal shredding facilities). Other constituents on metallic range residues are not distinct components in the same sense, particularly from the standpoint that they have been consumed in substantial whole or part in the typical process of use (i.e., do not retain their original manufactured identity or physical integrity) and may not be easily separable from the metallic component of the range residue. Therefore, this analysis assumes that these constituents do not constitute "distinct components."

One of the factors that EPA cited in adopting the processed scrap metal exclusion was the fact that recycled scrap metal is analogous in composition to raw metal concentrates and intermediates. Even though metallic range residues might feature other constituents that are inorganic and that might not contribute to materials' recovery in the recycling process (like lead), ores undoubtedly contain the same or similar inorganics since they are naturally present in the subsurface environment from which they are mined. [8]

The presence of organics in other constituents on metallic range residue could be considered as causing "dissimilarities in composition" to both raw metals and scrap metal, thereby raising concerns. However, as a practical matter, industrial scrap, which is a major source of recycled scrap metal, undoubtedly features residues of organics-containing machining and hydraulic oils, as well as solvents.

Resolution of the issue as to whether other constituents (particularly organics) jeopardize the exclusion/exemption may turn more on matters of *degree (i.e., how much)* than *kind*. ISRI's recycled scrap metal specifications provide that scrap be "clean," defined as:

> "…free of dirt (and, for ferrous metals, free of nonferrous metals), or foreign material of any kind, and excessive rust and corrosion. However, the terms (sic) 'free of dirt, ferrous metals, or foreign material of any kind' are not intended to preclude the accidental inclusion of negligible amounts where it can be shown that this amount is unavoidable in the customary preparation and handling of the particular grade involved."
>
> ISRI, Guidelines for Ferrous Scrap: FS-98, pg. 16

[8] In fact, EPA has recognized this fact, noting that lead and cadmium (which are not recycled during some smelting because they do not partition primarily to the product) are present in some virgin ore concentrates (54 Federal Register 43732, 26 October 1989).

Data collected during Phase I of the Range Scrap Study should be targeted to include the specific types of metallic range residues that exhibit other constituents and, at minimum, a qualitative assessment of the amount (e.g., less than 10% of the surface area of the residue, more than 50% of the surface area of the residue) should be documented in the data collection efforts. The ISRI qualitative guidelines should be used in the BMPs to establish (1) some type of field visual screening criteria for the items of concern and (2) as needed based on the criteria, a field decision made as to whether additional processing for *environmental reasons* is warranted, cost-effective, and feasible. Based on ISRI's recognition that some negligible amounts of dirt or foreign materials are unavoidable in customary handling, DoD should be able to internally establish some item- or category-specific thresholds for what constitutes negligible amounts that unavoidably remain even after the UXO/demilitarization processes. It is unlikely, however, that any item that tests TC hazardous for organics (2,4-dinitrotoluene) would be considered as having negligible or insignificant amounts of organics.

3.4 Outline of Recommended BMPs Within the Regulatory Framework

The five decision factors (discussed in Section 3.3.3) that led to EPA's exclusion of processed scrap metal must be given consideration during the remainder of the Range Scrap Study and development of BMPs. Some initial approaches and considerations for developing BMPs to ensure that range scrap items are managed within the regulatory framework are outlined below.

- ***Processing activities***. Factor 1 of EPA's decision criteria for the processed scrap metal exclusion (the need to show that metallic range residue has been subjected to manual or physical processing to add value or improve handling qualities) is the most critical to address in the BMPs. DoD already processes metallic range residue as a part of its mission to train units, manage items that pose explosives' safety hazards, and recover and recycle items with material value. Many of these practices involve visual inspection, sorting, and separation; however, some physical practices for demilitarization purposes (e.g., deforming) are also conducted. Although these activities are conducted primarily for nonenvironmental reasons as a part of the mission of the services, they add value to the range scrap and improve material handling qualities. These practices should be documented and institutionalized in BMPs to support DoD's claim to the RCRA "processed scrap metal" exclusion. A key component of this institutionalization is to ensure that these procedures are standardized, as applicable, and consistently followed within and between the services, as applicable.

Some categories of metallic range residues show visible evidence of other constituents even after the "inert certification" process. For these items, the BMPs should establish an additional screening stage (beyond the initial field sorting/separation and UXO/demilitarization processes) that would allow a field decision to be made relatively easily as to whether additional processing needs to be done for environmental reasons (factor 3 of EPA's decision criteria) or whether the item should be managed as a waste due to the infeasibility and/or impracticability of additional processing.

- ***On-site storage and management***. On-site management practices need to reflect the economic value of the residues, including potential time limits on accumulation periods (factor 5 of EPA's decision criteria for excluded processed scrap metal). From an environmental standpoint, it is to the benefit of installations to show that residue storage and handling areas are encompassed within installation storm water runoff protection programs that include monitoring of runoff for constituents of concern. In some locations, and depending on the nature and volumes of the residues, it may be prudent to establish pads and/or rain protection covers for on-site management. Where possible, range residues should be handled in containers (drums, rolloffs) that are covered (lid, tarp) when not in use.
- ***Demonstrated knowledge of intermediate and end markets***. EPA's RCRA exclusion of processed scrap metal was based, in large part, on its economic value (factors 2 and 4). There are identifiable and guaranteed markets for scrap metal, as well as material specifications. No BMP needs to be developed to address these decision factors. However, a tracking mechanism should be established to ensure that DoD remains apprised and aware of any scrap metal recycling industry changes in material specifications or recycling practices that would affect its ability to supply scrap metal to the market.

4.0 RANGE SCRAP INVENTORY

This section discusses the completed inventory of range scrap generated from the use of munitions and other training PEP items. The inventory is limited to munitions used by TRADOC and FORSCOM. This data set is assumed to represent an acceptable percentage of the munitions used on Army training ranges. The range scrap portion of the inventory includes a comprehensive list of items generated during intended use of each military munitions item. This inventory will be used to identify range scrap items for characterization, which are generated at the firing point and downrange. However, the study is limited at this time to characterizing items generated at the firing point. Downrange items will be addressed at a later date to supplement this effort.

4.1 Inventory Development

The military uses a number of databases to track munitions, which were utilized to develop the inventory database. Within the DA, these are primarily managed by the Army Materiel Command and its subordinates. The primary sources of data utilized for developing the inventory were the Munitions Items Disposition Action System (MIDAS), the Training Ammunition Management System (TAMS), the Training Ammunition Management Information System (TAMIS), the Standard Army Ammunition System (SAAS), and the Ammunition Book Complete (ABC). Each of these is described in the following sections.

The DA manages all munitions using the Worldwide Ammunition Reporting System Modernized (WARS MOD). WARS MOD provides data on wholesale munitions owned by the military services and acts as the primary Class V database. The proponent agency for WARS MOD is the IOC, who provides direction and supervision to each of the Major Command (MACOMs) and also coordinates revisions to WARS, SAAS, and SAAS-MOD. WARS MOD data are used for requisitions edit, distribution planning, the missile distribution plan, testing programs, readiness studies, sustainment studies, calculation of the arm ammunition budget, army total asset liability, army category 1 missile registry, and joint total asset liability.

4.1.1 Munitions Items Disposition Action System

The MIDAS Program was established to identify alternatives to open burn (OB)/open detonation (OD) and provide a central source of demilitarization and disposal information for unwanted munition items. Munitions characterization includes research of technical data packages, engineering drawings, specifications, standards, and other sources to determine all components and constituents of a munition. This information is entered into relational databases that link the components and constituents in a hierarchical listing. Characterization is the key in determining the best demilitarization and/or disposal alternatives for specific munitions (i.e., OB, OD, incineration, resource recovery and recycling, or new technology development). The features of the MIDAS database are:

- Relational database tables of munitions, components, parts, materials (inert and PEP), and bulk items.
- Pull-down menus and search functions permit viewing and printing of hierarchical listing of all these elements with related part numbers, material compositions, compounds, specifications, and weights for a selected munition.
- Munition images. Cutaway views are easily viewed to gain an appreciation for the munition's relative size and configuration.
- Weight estimation. To overcome missing part or surface coating weights in engineering drawings, a standard system for estimating weights was incorporated into MIDAS.
- Packaging Module. Characterizes exterior and inner packaging for munitions. Includes dimensions, weights, specifications, and materials for recovery or disposal planning.

Standard MIDAS reports that were used to help determine residues and wastes include:

- Detailed Structure Report,
- PEP Structure Report,
- Primary Component and Parts Report, and
- Packaging Report.

As of 18 May 1998, 3,522 munitions (of approximately 20,000) have been accepted in the central library, with many more in various stages of completion or review. In

addition, more than 9,000 components, 28,000 parts, and 1,600 PEP formulations are also characterized in the MIDAS libraries. Table 4-1 lists the current MIDAS classes. These MIDAS classes are also used in the range scrap inventory to group the expended munitions.

Table 4-1

MIDAS Classes

MIDAS Code	Description	Definition
CD	Dyes	Munitions that use dyes for marking, including projectiles up to 6 in.
CP	White phosphorous	Munitions containing white phosphorous, including cartridges and projectiles up to 155mm, smoke bombs, and rockets.
CR	Riot control	Munitions containing CS, CR, or CN for use in riot control, including cartridges and projectiles up to 105mm, grenades, and in pure capsule form.
CS	Smokes, HC, colored, FS, RP	Munitions used for signaling, including grenades, flares, and smoke pots. Many of the munitions contain red phosphorous.
DU	Depleted uranium	Munitions using a depleted uranium or tungsten carbide core, including SABOT and API rounds.
FI	Incendiary, thermite	Munitions designed to burn at high temperatures to achieve desired affects, includes thermite grenades, fire producing explosives, and 66mm rockets. The primary fuel sources are iron oxide and aluminum powder; some munitions use Triethylaluminum TPA.
FP	Pyrotechnics	Pyrotechnic compositions are mixtures of compounds such as fuel and oxidizing compounds that are designed to emit smoke and/or light. The fuels are usually metal powders, such as aluminum, manganese, titanium, or zirconium powder. Oxidizers may consist of metal nitrates, ammonium, metal perchlorates, chlorates, and peroxides. Examples include signal flares, smoke grenades, and other illumination devices. Many of the simulators (e.g., grenade, whistling, trip flare) are considered pyrotechnics.
HA	High Explosive (HE) components, charge devices	HEs generate large quantities of gaseous reaction products as a result of detonation. The most common HEs are TNT, RDX, Tritonol, HMX, and various combinations of these compounds. The HA category represents secondary components to a munition that contain HE such as boosters, rocket motor ignition cartridges, charges for practice hand grenades, expelling charges, and supplemental charges.
HB	HE bombs	HE munitions that include Air Force 500-, 750-, 1000-, 2000-, and 3000-lb general purpose bombs. Primary filler for these bombs is either H-6 or Tritonal.
HC	HE cartridges	Medium size munitions and cartridges from 30mm to 165mm that use HE to achieve their affect. Various types of munitions include pure HE rounds, HE incendiary, HEAT, TP-T, HE plastic, and HPERS.
HD	HE "D"	Munition subcomponents that use HE "D" (ammonium picrate), including 3- to 16-in. projectiles.
HE	Bulk HE	Munition sources where the HE is maintained in bulk form and not cast in to a specific shape or size.
HG	HE grenades	Grenades (e.g., fragmentation) where HE is the primary filler component.
HH	HE depth charges, underwater munitions	Depth charges and underwater munitions that use HE as their primary filler.

Table 4-1

(Continued)

MIDAS Code	Description	Definition
HI	HE ICM/CBU and submunitions	Submunitions found in cluster bombs and other containerized delivery systems and that are made from HE. Examples include Air Force CBU dispensing systems, M28 MLRS rockets, M87 Volcano mine dispensing systems, and 105mm APERS and 155mm ADAM and RAAM projectiles.
HM	Missiles	Surface to air guided missile systems, such as the MGM-51C Shillelagh.
HP	HE projectiles and warheads	Projectiles and warheads that use HE and that are attached prior to firing to the delivery platform (e.g., projectile, bomb, rocket, missile). These may be attached to inert munitions, such as a BDU-33.
HR	HE rockets	Rockets, including warheads, whose warhead contains HE. In this category, the warhead is considered an integral part of the rocket and is not attached before firing. Two example munitions are the 2.75-in. and the 60mm AT M72A2 rockets.
HT	Torpedoes	Torpedoes that use HE as their primary filler, usually HBX.
HX	Demolition material	Includes all demolition materials, including blasting caps, cratering charges, detonation cord, time fuse, flexible linear shaped charge cord, and bulk explosive blocks. The primary energetics used are composition C-4, composition B-3, and TNT.
HZ	HE land mines	Land mines, including both anti-personnel and anti-tank. Majority of mines are composed of combinations of Tetryl, RDX, and TNT.
I	Inert	Includes munitions components that are inert and do not contain energetics, such as dummy and blank cartridges and simulators of projectiles, bombs, and CBU/ICMs.
LR	Large rocket motor	Category includes rocket motors used on large intercontinental ballistic missiles and other strategic-type rockets. Includes motors found on space launch vehicles.
N	No family	Special purpose chemical warfare munitions, including projectiles, rockets, bombs, and mines. Primary filler in each is a chemical agent (e.g., GB, VX, H, HD, or HT).
PB	Bulk propellants and black powder	Includes bulk propellants. Also includes munitions where black powder is the primary energetic. For most munitions, this category is applied to one of the subassemblies to describe the bulk propellant used.
PC	Propellant charges and increments	Energetics used specifically for field artillery and naval gunnery where the projectile is fired downrange by a propellant charge/increment bag.
PD	Propellant munitions and components	Energetics, such as ammonium perchlorate, that is used specifically as propellant for rocket stages. Example munitions include JATO motors, the MK66 2.75-in. rocket motor, and blanks for large caliber (greater than 6 in.) projectiles.
SA	Small caliber ammunition	Includes all small caliber ammunition through 20mm with some 30mm cartridges.
SC	Incinerable munitions and components	Cartridge activated devices and propellant activated devices with very small explosive weights (less than 8 oz). The majority of these items are primers that are either black powder based or use lead stephynate or lead azide to aid in charge initiation. These items are usually a subassembly to initiate a larger munition and include boosters, ignition and delay assemblies, percussion primers and detonators, SMDC and line transfer charges, and demolition firing devices (e.g., M1A1).
SF	Fuzes	Munitions that are used as fuzes to detonate larger explosives, including bombs, rockets, mines, smoke pots, and projectiles.
TM	Tactical missiles	Munitions that are used in a tactical theater, such as the Stinger missile, Dragon missile, and Air-to-Air Missiles (e.g., AMRAAM).

The primary explosive constituents contained in the munitions may also be grouped. This grouping was prepared by Radian and is referred to as a constituent family. Table 4-2 presents a cross-reference between constituent families and applicable MIDAS classes. During Phase II of this project, the information contained in Table 4-2 will aid in developing characterization strategies for range scrap.

4.1.2 Training Ammunition Management System

TAMS provides unit-level authorization quantities for drawing ammunition. Authorizations are based on actual training ammunition requirements within budget and supply availability. Details concerning requirements and authorizations are in AR 5-13. Ammunition requirements for basic loads are determined in accordance with FORSCOM Regulation 700-3. Designated basic load stocks are not to be consumed in training.

4.1.3 Training Ammunition Management Information System

TAMIS is a relational database system that provides allocation and authorization data for training ammunition only. Updating is the responsibility of the installation. The database consists of an authorization file, a cost file, and an expenditure file. The authorization file contains authorization by HQ DA to MACOMs and subauthorizations by MACOMs to installations. The expenditure file reflects ammunition consumed in training by a unit, installation, and/or command. The collection of expenditure data establishes a baseline that allows DA to make bulk training ammunition authorizations to the MACOM.

TAMIS reports data by unit, quantity of rounds, type ammunition, costs, and training event (unit level). It provides a means of managing training ammunition by developing and validating unit level requirements, managing training ammunition authorizations, and providing commanders at all usage levels a means of reviewing and evaluating ammunition expenditures against their training yearly training forecasts.

Table 4-2

Constituent Family Descriptions and Applicable MIDAS Classes

Environ-mental Code	Constituent Family	Constituent Family Description	Typical Energetics Within the Constituent Family	Applicable MIDAS Classes
PEC	Primary explosives compounds	Low detonation rate explosives based on lead, mercury, and similar heavy metals. Power is generated by the release of electrons from crystal imperfections during ignition. The rate of burn is controlled to ensure that excessive pressure does not develop. Crystal imperfections serve as shallow electron traps and release electrons during conduction both at elevated temperature (thermal excitation) and through intense flame reaction (photoexcitation).	Mercury fulminate, lead azide, DDNP, lead stephynate, tetracene, lead thiocynate	HA, HZ, SC, SF
NAM	Nitramines	Compounds prepared by N-type nitration where a nitrogroup is attached to a nitrogen atom of the compound being nitrated. These cyclic nitramines are used in explosives and propellants as an energetic source of gases.	HMX, RDX, EDDN (Haleite), tetryl (pryolite, tetralite)	HA, HC, HE, HI, HP, HR, HT, HX, HZ, LR, SA, SF
NAR	Nitroaromatics	Nitroaromatics are compounds prepared by C-type nitration in which a nitrogroup is attached to a nitrogen atom of the compound being nitrated.	TATB, TNT	HB, HC, HE, HG, HR, HT, HX, HZ, LR
ANE	Aliphatic nitrate esters	Compounds prepared by O-type nitration where a nitrogroup is attached to a nitrogen atom of the compound being nitrated. These organic-based explosives are fast burning and generate large amounts of gas byproducts.	BTN, NC, NG, PETN, TEGN, TMETN, DEGN	HR, HX, PB, PD, SC, SF
NMB	Nitramine blends	Nitramine blends consist of the nitramine mixed with plasticizers (Composition C) or desensitizers (Composition A) to create explosives that are less sensitive, demonstrate better workability, and detonate at a lower rate than a pure nitramine.	Composition A, Composition C	HE, HI, HX
NMR	Nitroaromatic and nitramine blends	Nitroaromatic/nitramine blends create a nitrogen-rich atmosphere and generate very large blast effects. They have readily available supplies of oxygen and nitrogen and are capable of producing a higher bresance than a pure version of either compound. The blends are generally less sensitive than either a pure nitroaromatic or nitramine and are used primarily in fuzes and HE cartridges.	Composition B, ednatols, octols, tetrytols, HBX, torpex, minol	HB, HD, HE, HG, HP, HR, HX, HZ, LR, SA, SF
ANR	Aliphatic nitrate ester and nitroaromatic blends	Blends of the aliphatic nitrate ester (e.g., PETN) with the nitroaromatic (e.g., TNT) create a HE with an increased blast strength, fragmentation strength, and heat of combustion and provide more charge weight per volume than pure TNT. These blends are primarily used in detonators and boosters requiring high detonation rates and are melt-loaded.	Pentolite	PD

Table 4-2

(Continued)

Environ-mental Code	Constituent Family	Constituent Family Description	Typical Energetics Within the Constituent Family	Applicable MIDAS Classes
ANM	Aliphatic nitrate ester and nitramine blends	Aliphatic nitrate ester/nitramine blends consist of a thermosetting plastic binder (e.g., polyurethane) filled with powdered explosives, oxidants, and nitramine fuels (e.g., RDX or ammonium perchlorate). Oxidant fuels, such as powdered aluminum, are not commonly added since the inherent properties of the nitramine usually meet the design requirements for the explosives. They are primarily used in fuzes and HE cartridges.	PBX	HE, HR, HT, LR
NRB	Nitroaromatic blends	Nitroaromatic blends consist of the nitroaromatic used with aluminum flakes or aluminum pictrate to create explosives that are less sensitive than TNT, capable of being cast, and detonate at approximately the same rate as a pure nitroaromatic. The optimum percentage of aluminum is between 18 and 20%.	Picratol, tritonal	HB, HD
ANB	Ammonium nitrate blends	Ammonium nitrate, the primary inorganic HE, reacts with the TNT, creating a larger exothermic reaction and resulting in higher heat generation, greater expansion of gases, and greater blast effect.	Amatol (TNT/AN), ammonal (TNT/AN/ aluminum), water gel/slurry explosives, minol (TNT/AN/aluminum), anatex (TNT/RDX/AN), DBX (TNT/AN/aluminum), fuel-air bombs (AN/fuel oil)	HH, FI, FP
		Incorporation of aluminum to ammonium nitrate/TNT mixtures causes: • Increased sensitivity to impact, friction, and rifle bullet impact. • Increased temperatures of detonation (1,700°C to 3,900°C). • Increased power up to 20%. • Increased total volume of gas evolved during detonation (sometimes). • Decreased detonation velocity and brisance. In fuel-air bombs, the ammonium nitrate increases the heat of detonation by almost three-fold.	Amatol (TNT/AN), ammonal (TNT/AN/ aluminum), water gel/slurry explosives, minol (TNT/AN/aluminum), anatex (TNT/RDX/AN), DBX (TNT/AN/aluminum), fuel-air bombs (AN/fuel oil)	

Table 4-2

(Continued)

Environ-mental Code	Constituent Family	Constituent Family Description	Typical Energetics Within the Constituent Family	Applicable MIDAS Classes
SBP	Single base propellant	Nitrocellulose is the principle energetic in single base propellants. The propellants are characterized by a low flame temperature and low energy content. Except in rare cases, nitroglycerin and other explosives are not found in these propellants.	M-series propellants (M1, M6, M10, and IMR)	HI, PB, PC, SA
DBP	Double base propellant	Nitrocellulose is gelantized by nitroglycerine in double base propellants. This results in higher energetic strength and increased ballistic potential and flame temperature. Other aliphatic nitrate esters may be used (e.g., DEGN); however, this is uncommon. In double base propellants, the nitroglycerine acts as a strong oxygen source. Ball propellants have a deterrent coating (e.g., dibutylphthalate) to reduce the burn rate of the propellant.	Ball propellants M-series propellants (M2, M5, M8, and M18)	PB, PC, PD, SA
TBP	Triple base propellant	Nitroguanidine, as a nitrogen source, is added to the nitroglycerine and nitrocellulose in triple base propellants. This results in increased energy content without raised flame temperature and substantially reduced concentrations of combustibles (hydrogen and carbon monoxide) in the product gas.	M-series propellants (M30 and M31)	PB, PC, SA, SC
CP	Composite propellant	Composite propellants are suspensions of crystalline oxidizers (e.g., ammonium or potassium perchlorate) and metallic fuels in a resin binder. The oxidizers are a dense oxygen source and contribute the most to the burning characteristics of composite propellants. Numerous cross-linking chemicals are used as binders, catalysts, and processing aids.	Rocket motors	HR
HPB	High particulate loading (burning)	Incendiaries are characterized by high heats of oxidation, component metals visible in the sodium spectrum, and a ratio greater than one of oxide to metal volume. Illumination and signal devices are a result of thermal radiation generated by oxidation of excited metals. Sodium nitrate is usually used as the oxidant due to its sensitivity to the human eye. The only exception is in infrared devices that use constituents that peak in the infrared spectrum rather than the sodium spectrum.	Tracers and fumers; smokes with phosphorous compounds, zinc chloride, or metallic phosphides; smokes with ammonium nitrate/chloride and oil; incendiaries, flares, and signals; napalm; and delays	CS, FP, SA, SF

Table 4-2

(Continued)

Environ-mental Code	Constituent Family	Constituent Family Description	Typical Energetics Within the Constituent Family	Applicable MIDAS Classes
HPE	High particulate loading (explosive)	Explosives that are pulverized/atomized and then vaporized or where a preground solid is dispersed by the explosion of a bursting charge. Photoflash and thermite munitions are included since detonation occurs almost instantaneously after initiation and deflagration.	Smokes with metallic chlorides, thermite, photoflash, fuzes	CS, CP, FI, FP
BP	Black powder	A low order detonation agent used primarily as an initiator for artillery propellant charges and for blank SA ammunition. Compositions consist of three formulations using varying percentages of potassium nitrate, sodium nitrate, charcoal, coal, and sulfur.	Blanks, ignitors (artillery)	FP, I, PD, SC, SA
IM	Ignition mixtures	17 formulations consisting of an oxidizer (e.g., barium peroxide or potassium perchlorate) or heavy metal (e.g., zirconium) combined with binders (e.g., sugar and charcoal). Accelerants (e.g., powdered aluminum) may be used to quicken initiation.	First fire, ignition or starters (intermediates between the primary ignitor and main charge)	PD, SC, SF
NA	Not applicable	Inert and other nonexplosive component items.		I
UNK	Unknown	Components with inadequate information to make an estimate of constituent family.		

AN	Ammonium nitrate
BTN	Butanetriol trinitrate
CP	Composite propellant
CS	Smokes, HE cartridges
DBX	Depth Bomb Explosive
DDNP	Diazodinitrophenol
DEGN	Diethylenegylcol dinitrate
EDDN	Ethylenediamine dinitrate
FI	Incendiary/Thermite (MIDAS Family)
FP	Pyrotechnic/Illumination/Nonfrag/Tracers (MIDAS Family)
HA	HE Components/Devices (MIDAS Family)
HB	HE Bombs (MIDAS Family)
HBX	High Blast Explosive
HC	HE, Cartridges (MIDAS Family)
HD	Bulk Explosive "D" (MIDAS Family)
HE	Bulk HEs (MIDAS Family)
HG	HE Grenades (MIDAS Family)
HH	HE Depth Charges and Underwater Mines (MIDAS Family)
HI	HEs Cluster Bomb Units/Improved Conventional Munitions (MIDAS Family)
HMX	Cyclotetramethylenetetranitramine
HP	HE Projectiles (MIDAS Family)
HR	HE Rockets (MIDAS Family)
HT	HE Torpedoes (MIDAS Family)
HX	Demolition Materials (MIDAS Family)
HZ	HE Land Mines (MIDAS Family)
I	Inert (MIDAS Family)
LR	Large Rocket Motors (MIDAS Family)
NC	Nitrocellulose
NG	Nitroglycerin
PB	Bulk Propellants and Black Powder (MIDAS Family)
PBX	Plast bonded explosive
PC	Propellant Charges and Increments (MIDAS Family)
PD	Propellant Devices (MIDAS Family)
PETN	Pentaerythritol tEtranitrate
RDX	Cyclotrimethylenetrinitramine
SA	Small Caliber Ammunition (MIDAS Family)
SC	Incinerable Munitions/Components (MIDAS Family)
SF	Fuzes (MIDAS Family)
TATB	Triaminio-trinitrobenzene
TEGN	Triethylene glycoldinitrate
TMETN	Trimetholethane trinitrate
TNT	Trinitrotoluene

TAMIS currently consists of three separate programs for use at different command levels. Level I combines brigade/battalion/separate company unit identification codes in groupings by installation. Level II consolidates all installations within specific MACOMs into a Summary Report. Level III reports all consolidated MACOM reports into a DA level report.

FY 1997 summary reports for FORSCOM and TRADOC were used to develop a listing of munition types used on Army training ranges.

4.1.4 Standard Army Ammunition System

SAAS provides a standard ammunition management tool capable of maintaining and evaluating historical data of consumption of conventional ammunition, guided missiles, large rockets, and related component and packaging materials. SAAS currently consists of three programs (SAAS-1/3, SAAS-4, and SAAS-DAO) that allow for the management of ammunition between supply points, theater/corps storage areas, and interfacing agencies (e.g., National Inventory Control Point). The function of SAAS is to provide the logistics community a means to meet Class V logistics requirements across the Army. At the installation level, SAAS-4 provides daily storage operations.

In FY 1997, the Army fielded SAAS-Mod, an upgraded program that eliminates the three previous versions of the program. The functions of SAAS-Mod that provide data for downrange munitions management include:

- Maintaining the current status of all ammunition within an installation's ASP;
- Maintaining and evaluating historical data of consumption of ammunition;
- Supporting ad hoc queries, including data imported and exported to other systems (e.g., TAMS and TAMIS); and
- Supporting Class V logistics estimates based on weapons systems.

SAAS-Mod also incorporates one module and two utilities that will greatly enhance the ability of range managers to track residues (range scrap/solid waste), but only those items that are required to be reconciled by the ASP. Based on the long-term goal of forecasting uprange and downrange residues, SAAS-Mod is able to use the Ammunition Training module to identify by unit requirements, authorizations, forecasts, and turn-ins for training ammunition.

The ASP utilities include procedures for maintaining turn-in residues and residue reconciliation.

- **Maintain Turn-in Residue Procedures**: Generates a listing, by National Stock Number (NSN), of associated residue for each issue of ammunition. In SAAS, the system identifies each residue item by posting a flag in the ammunition item description. Only those items identified as residue can be associated with the issue NSN for the munition. When the ASP issues the munition, the system generates a turn-in document for any associated residue and this is provided to the requisitioning unit.
- **Residue Reconciliation:** When the system processes an issue for training ammunition, it establishes a turn-in suspense date for return of all live ammunition and residue. When the system establishes the date, it creates two reconciliation documents, one for live ammunition and one for residue. When the unit returns the live ammunition and residue, the system updates these documents. This utility can be used to allow the ASP to determine the amount of potential residue left downrange.

SAAS reports from the installations visited for this project were used to help build a listing of residue associated with specific munition items. The SAAS reports were also reviewed to validate the information in the TAMIS summary reports.

4.1.5 Ammunition Book Complete

The ABC provides a summary of logistics and planning quantities for cataloging munitions. For each munition, the following information is provided: physical description of the munition, net explosive weight, packaging material and quantity, packaging size, and shipping data required for overland and air transport. This reference was also used to help build a comprehensive listing of residue associated with specific munition items.

4.2 Inventory Database

A relational database was developed based on the information described in Section 4.1 to provide a detailed inventory of range scrap. The database categorizes packing materials, quantity of range scrap, and military munitions usage by both TRADOC and FORSCOM for FY 1997. The database consists of four data entry tables: Nomenclature Table, Characterization Table, Usage Table, and Reference Table (see discussion in Section 4.1.2). Inputted data are sorted into four standard reports: Range Scrap Inventory Summary Report, Range Scrap Summary by Type Report, Summary of Munitions Usage by MACOM, and

Reference Listing (see discussion in Section 4.1.4). The following sections summarize the tables, queries, and standard reports associated with the inventory database.

4.2.1 Database Input Tables

The four tables in the inventory database used for entering and storing data related to military munitions usage and residue are described below.

1. **Nomenclature Table**: Contains listing of the DoDACs, MIDAS code, and official DoD nomenclature for the military munition. This table is the primary table that the remaining tables (Characterization and Usage) are linked to. Since each DoDAC may have multiple NSNs, a single most common NSN was chosen to represent all munitions within that DoDAC. This is considered acceptable since different NSNs typically represent only a slight difference in the product. The chosen NSN is listed in the table as a reference in case it is determined that other characterization (packaging) lists are more appropriate.
2. **Characterization Table**: Contains the listing of typical packing materials for a specific DoDAC. Each DoDAC is broken down to the basic level of issue provided to a unit by an installation's ASP. The basic level of issue assumes that an installation will not receive any shipment packaged at a lesser or greater quantity level than provided in the table. For example, 8-in. artillery shells are packaged six each to a pallet, while mines are usually shipped in smaller orders (wooden boxes) instead of an entire pallet of mines. A quantity (quantity per unit of issue) summary is provided for all items considered part of the basic shipping package (e.g., pallets, shipping plugs, and shell for artillery rounds). This table also identifies where the scrap item is collected from (i.e., point of issue, firing point, downrange, training/maneuver area, or consumed in process).
3. **Usage Table**: Contains a summary of munitions usage (authorized versus expended) by fiscal year by MACOM (FORSCOM and TRADOC only).
4. **Reference Table**: Contains a summary of all primary references used to generate the inventory and compile the database. Each reference item is given a numeric number that corresponds to references in the nomenclature, characterization, and usage tables. The references contain the official document title as it would appear in the bibliography of the report and also a detailed summary of the reference, where it was obtained, and why it is used.

4.2.2 Database Queries

Queries of the database were designed to support the standard output reports and to provide clarification of trends within the inventory. The database is designed to allow the user to define additional queries to aid in characterization of waste streams, quantification of total waste generation, and development of trends within the area of waste management.

4.2.3 Database Report Types

Four standard reports are defined for the database: Range Scrap Inventory Summary Report, Range Scrap Summary by Type Report, Summary of Munitions Usage by MACOM, and Reference Listing. A detailed summary of these reports is provided below.

- **Range Scrap Inventory Report:** Presents a summary, by DoDAC, of each military munitions item, all associated packing materials and components, location of scrap item (firing point, downrange, maneuver area, etc.), and the quantity (quantity per unit of issue) of each material found in the basic load shipped to an ASP.
- **Range Scrap Summary by Type Report:** Presents a summary of the packing materials and components generated by all military munitions used by TRADOC and FORSCOM. Each component listing provides a count of the number of DoDACs that have the item as a component. For example, 29 DoDACs (munition types) have the component "Bag, Barrier, Waterproof."
- **Summary of Munitions Usage by MACOM:** Presents a summary by DoDAC of the authorized and expended quantity of military munitions used by each MACOM for FY 1997.
- **Reference Listing:** Presents a listing of all primary references used to generate the relational database.

The Range Scrap Inventory Report is provided in Section 4.3. Appendix A contains the three additional reports: Range Scrap Summary by Type Report, Summary of Munitions by MACOM, and Reference Listing. It is expected that additional reports will be created as the characterization and waste management issues are identified and addressed.

4.3 Range Scrap (Firing Point) Inventory

The primary purpose of developing the inventory is to aid in determining which range scrap items require characterization and/or additional waste management considerations. The regulatory framework depicted in Figure 3-1 will be used to evaluate each item in the inventory.

Section 4.3.1 provides a comprehensive listing of materials generated during the use of military munition items on Army training ranges. Section 4.3.2 provides a reduced listing of materials by removing items that are easily determined to be nonhazardous by process knowledge, as well as items that are found downrange (downrange items will be addressed at a later date to supplement this effort). Section 5 summarizes the existing characterization data compiled for the range scrap listed in Section 4.3.2.

4.3.1 Comprehensive Inventory

Table 4-3 presents the comprehensive listing of materials generated during the use of military munition items on Army training ranges. The comprehensive inventory provides a summary, by DoDAC, of each military munitions item, all associated packing materials and components, location of scrap item, and the quantity per unit of issue of each material found in the basic load shipped to an ASP. Based on the data provided by TRADOC and FORSCOM, 262 military munitions were identified in use and over 207.6 millions rounds were fired or used downrange in FY 1997. The total authorization for FY 1997 was over 270.5 million rounds. The inventory provides DoDAC for each corresponding munitions item (262 DoDACs). The DoDAC for a munitions item consists of the first four digits of the NSN followed by the corresponding DoD Identification Code.

To relate the inventory to the MIDAS database, each munitions item or DoDAC was provided with either its currently assigned MIDAS reference code or assigned a code based on its estimated reference once MIDAS is completed. By categorizing the inventory data by MIDAS codes, the types of items most frequently used on Army training ranges are easily

Table 4-3

Range Scrap Inventory Summary Report

(Based on the TAMIS data provided by TRADOC and FORSCOM for FY 1997)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
1305A010	CTG 10 GA SHOTGUN BLANK	FP	BOX, PAPERBOARD	10
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, 10 GA SHOTGUN PAPER	500
		DR	CTG, 10 GA BLANK	500
1305A011	CTG 12 GA SHOTGUN BUCKSHOT	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, PAPERBOARD	25
		FP	CASE, CTG, FIRED, BRASS AND PAPER/PLASTIC	500
		DR	CTG, 12 GA BUCKSHOT M19	500
1305A014	CTG 10 GA SHOTGUN #11	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, PAPERBOARD	25
		FP	CASE, CTG, FIRED, BRASS AND PAPER/PLASTIC	500
		DR	CTG, 12 GA SHOTGUN BUCKSHOT M19	500
1305A017	CTG 12 GA SHOTGUN #9 BUCKSHOT	FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, PAPERBOARD	25
		FP	CASE, CTG, FIRED, BRASS AND PLASTIC	500
		DR	CTG, 12 GA SHOTGUN PLATIC CORE NO. 9 CHILLED SHOT	500
1305A059	CTG 5.56MM BALL M855	FP	BANDOLEER, CLOTH, M3	12
		FP	BOX, CARDBOARD	64
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	1680
		FP	CLIP, METAL	168
		DR	CTG, 5.56MM BALL M855	1680
		FP	FILLER, METAL, F/M16	24
1305A062	CTG 5.56MM BALL M855 LNKD	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	800
		DR	CTG, 5.56MM BALL M855 LNKD	800
		FP	LINK, CTG METALLIC BELT, M27	800
1305A063	CTG 5.56MM TR M856	FP	BANDOLEER, CLOTH, M3	12
		FP	BOX, CARDBOARD	64
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	1680
		FP	CLIP, METAL	168
		DR	CTG, 5.56MM TR M856	1680
		FP	FILLER, METAL, F/M16	12
1305A064	CTG 5.56MM BALL TR 4/1 M855, M856	FP	BANDOLEER, CLOTH, M4	4
		FP	BOX, METAL, PA108	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED BRASS	800
		DR	CTG, 5.56MM BALL TR 4/1 M855, M856	800
		FP	LINK, CTG PLASTIC	800
1305A065	CTG 5.56MM PLASTIC M862	FP	BOX, CARDBOARD	40
		FP	BOX, PLASTIC	50
		FP	BOX, WOOD	1
		FP	CASE, CTG, FIRED, BRASS	2000
		DR	CTG, 5.56MM PLASTIC M862	2000
1305A068	CTG 5.56MM TR M196	FP	BANDOLEER, CLOTH, M3	12
		FP	BOX, CARDBOARD	82
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	1640
		FP	CLIP, METAL	164
		DR	CTG, 5.56MM TR M196	1640
		FP	FILLER, METAL, F/M16	24
1305A071	CTG 5.56MM BALL M193	FP	BANDOLEER, CLOTH, M3	14
		FP	BOX, CARDBOARD	28

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	1680
		FP	CLIP, METAL	168
		DR	CTG, 5.56MM BALL M193	1680
		FP	FILLER, METAL, F/M16	28
1305A075	CTG 5.56MM BLK M200 LNKD	FP	BANDOLEER, CLOTH, M3	2
		FP	BOX, METAL, PA108	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	1600
		DR	CTG, 5.56MM BLK M220 LNKD	1600
		FP	LINK, CTG METALLIC BELT, M27	1600
		FP	MAGAZINE, AMMUNITION	8
1305A080	CTG 5.56MM BLK M200	FP	BOX, CARDBOARD	57
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	2280
		DR	CTG, 5.56MM BLK M200	2280
1305A091	CTG CAL .22 LR BALL MATCH GRADE	FP	BOX, CARDBOARD	10
		FP	BOX, CARDBOARD	100
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, STYROFOAM	100
		FP	CASE, CTG, FIRED, BRASS	5000
		DR	CTG, CAL .22 LR BALL MATCH GRADE	5000
1305A093	CTG CAL .22 LR BALL	FP	BOX, CARDBOARD	100
		FP	BOX, CARDBOARD	10
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, STYROFOAM	100
		FP	CASE, CTG, FIRED, BRASS	5000
		DR	CTG, CAL .22 LR BALL	5000
1305A106	CTG CAL .22 LR BALL	FP	BOX, CARDBOARD	10
		FP	BOX, CARDBOARD	100
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, STYROFOAM	100
		FP	CASE, CTG, FIRED, BRASS	5000
		DR	CTG, CAL .22 LR BALL	5000
1305A111	CTG 7.62MM BLK M82 LNKD M13	FP	BANDOLEER, CLOTH, M4	8
		FP	BOX, CARDBOARD	8
		FP	BOX, METAL, M19A1	4
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	800
		DR	CTG, 7.62MM BLK M82 LNKD M13	800
		FP	LINK, CTG METALLIC BELT, M13	800
1305A112	CTG 7.62MM BLK M82 LNKD	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, CARDBOARD	20
		FP	CASE, CTG, FIRED, BRASS	1200
		DR	CTG, 7.62MM BLK M82 LNKD	1200
1305A130	CTG 7.62MM NATO BALL M80	FP	BANDOLEER, CLOTH, M1	12
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	840
		FP	CLIP, METAL	84
		DR	CTG, 7.62MM NATO BALL M80	840
1305A131	CTG 7.62MM 4 BALL M59/M80/1 TR M62	FP	BANDOLEER, CLOTH, M4	6
		FP	BOX, METAL, M2A1	2
		FP	CARTON, CARDBOARD	6
		FP	CASE, CTG, FIRED, BRASS	600
		DR	CTG, 7.62MM 4 BALL M59/M80/1 TR M62	600
		FP	LINK, CTG METALLIC BELT, M13	600
1305A136	CTG 7.62MM NATO SPEC BALL M118	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, FIBERBOARD	23

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
		FP	CASE, CTG, FIRED, BRASS	920
		DR	CTG, 7.62MM NATO SPEC BALL M118	920
1305A143	CTG 7.62MM NATO BALL M80 LNKD	FP	BANDOLEER, CLOTH, M4	8
		FP	BOX, METAL, M19A1	4
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, CARDBOARD	8
		FP	CASE, CTG, FIRED, BRASS	800
		DR	CTG, 7.62MM NATO BALL M80 LNKD	800
		FP	LINK, CTG METALLIC BELT, M13	800
1305A151	CTG 7.62MM 4 BALL M80/1 TR M62 OHF	FP	BANDOLEER, CLOTH, M4	8
		FP	BOX, METAL, M19A1	4
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, CARDBOARD	8
		FP	CASE, CTG, FIRED, BRASS	800
		DR	CTG, 7.62MM 4 BALL M80/1 TR M62 OHF	800
		FP	LINK, CTG METALLIC BELT, M13	800
1305A165	CTG 7.62MM 4 BALL M80/1 TR M62 LNKD M13	FP	BOX, METAL, M548	1
		FP	CASE, CTG, FIRED, BRASS	1500
		DR	CTG, 7.62MM 4 BALL M80/1 TR M62 LNKD M13	1500
		FP	LINK, CTG METALLIC BELT, M13	1500
1305A171	CTG 7.62MM MATCH M852	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, FIBERBOARD	23
		FP	CASE, CTG, FIRED, BRASS	920
		DR	CTG, 7.62MM MATCH M852	920
1305A182	CTG CAL .30 CARB BALL M1	FP	BOX, FIBERBOARD	16
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED BRASS	800
		DR	CTG, CAL .30 BALL M1	800
1305A212	CTG CAL .30 BALL M2	FP	BOX, FIBERBOARD	16
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED BRASS	800
		DR	CTG, CAL .30 BALL M2	800
1305A222	CTG CAL .30 BLK M1909		NO INFORMATION FOUND TO DATE	0
1305A246	CTG CAL .30 MATCH M72	FP	BANDOLEER, CLOTH	4
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, CARDBOARD	4
		FP	CASE, CTG, FIRED, BRASS	160
		DR	CTG, CAL .30 MATCH M72	160
1305A247	CTG CAL .30 MATCH M72	FP	BANDOLEER, CLOTH	4
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, CARDBOARD	4
		FP	CASE, CTG, FIRED, BRASS	160
		DR	CTG, CAL .30 MATCH M72	160
1305A358	CTG 9MM PRAC AT-4 M287	FP	BAG, BARRIER WATERPROOF	12
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, CARDBOARD	60
		FP	CASE, CTG, FIRED, BRASS	3000
		DR	CTG, 9MM PRAC AT-4 M287	3000
1305A363	CTG 9MM BALL M882	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, STYROFOAM	40
		FP	CASE, CTG, FIRED, BRASS	2000
		DR	CTG, 9MM BALL M882	2000
1305A365	CTG 14.5MM ARTY TRNG M181A1	FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, CARDBOARD	50
		FP	CASE, CTG, FIRED, BRASS	500
		DR	CTG, 14.5MM ARTY TRNG M181A1	500
1305A366	CTG 14.5MM ARTY TRNG M182A1	FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, CARDBOARD	50

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
		FP	CASE, CTG, FIRED, AL ALLOY	500
		DR	CTG, 14.5MM ARTY TRNG M182A1	500
1305A367	CTG 14.5MM ARTY TRNG M183A1	FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, CARDBOARD	50
		FP	CASE, CTG, FIRED, AL ALLOY	500
		DR	CTG, 14.5MM ARTY TRNG M183A1	500
1305A403	.38 BLNK (SENTRY DUB)		NO INFORMATION FOUND TO DATE	0
1305A475	CTG CAL .45 BALL M1911	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, CARDBOARD	20
		FP	CASE, CTG, FIRED, BRASS	2000
		DR	CTG, CAL .45 BALL M1911	2000
		FP	FILLER MATERIAL POLYSTYRENE	20
1305A483	CTG CAL .45 BALL MATCH M1911	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, CARDBOARD	20
		FP	CASE, CTG, FIRED, BRASS	2000
		DR	CTG, CAL .45 BALL MATCH M1911	2000
1305A520	CTG CAL .50 4 BALL M33/1 TR M17 LNKD M15A2	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	170
		DR	CTG, CAL .50 4 BALL M33/1 TR M17	170
		FP	LINK, CTG METALLIC BELT, M15A2	170
1305A540	CTG CAL .50 4 API M8/1 TR M17 LNKD	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	200
		DR	CTG, CAL .50 4 API M8/1 TR M17 LNKD	200
		FP	LINK, CTG METALLIC BELT, M9	200
1305A552	CTG CAL .50 BALL M33	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	240
		DR	CTG, CAL .50 BALL M33	240
1305A555	CTG CAL .50 BALL M33 LNKD	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	200
		DR	CTG, CAL .50 4 BALL M33	200
		FP	LINK, CTG METALLIC BELT, M9	200
1305A557	CTG CAL .50 4 BALL M33/1 TR M17 LNKD M9	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	200
		DR	CTG, CAL .50 4 BALL M33/1 TR M17	200
		FP	LINK, CTG METALLIC BELT, M9	200
1305A559	CTG CAL .50 4 BLNK M1A	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	200
		DR	CTG, CAL .50 4 BLNK M1A	200
		FP	LINK, CTG METALLIC BELT, M2	200
1305A570	CTG CAL .50 TR M17	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	240
		DR	CTG, CAL .50 TR M17	240
1305A572	CTG CAL .50 TR M17	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, STEEL	200
		DR	CTG, CAL .50 TR M17	200
		FP	LINK, CTG METALLIC BELT, M9 OR M2	200
1305A576	CTG CAL .50 4 API M8/1 API-T M20 LNKD	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, STEEL	200
		DR	CTG, CAL .50 4 API M8/1 API-T M20	200
		FP	LINK, CTG METALLIC BELT, M2	200
1305A585	CTG CAL .50 API-T M20 LNKD	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	200

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
		DR	CTG, CAL .50 API-T M20	200
		FP	LINK, CTG METALLIC BELT, M9	200
1305A598	CTG CAL .50 BLK M1A1 LNKD	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, STEEL	200
		DR	CTG, CAL .50 BLK M1A1	200
		FP	LINK, CTG METALLIC BELT, M9	200
1305A599	CTG CAL .50 BLK M1A1 LNKD	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, BRASS	170
		DR	CTG, CAL .50 BLK M1A1	170
		FP	LINK, CTG METALLIC BELT, M15A2	170
1305A602	CTG CAL .50 PR PL 4/1	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, STEEL	200
		DR	CTG, CAL .50 PR PL 4/1	200
		FP	LINK, CTG METALLIC BELT, M9	200
1305A896	CTG 20MM 4 TP M55A2/1 TP-T M220 LNKD M14A2	FP	BOX, METAL, M548	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, STEEL	100
		DR	CTG, 20MM 4 TP M55A2/1 TP-T M220	100
		FP	LINK, CTG METALLIC BELT, M14A2	100
1305A940	CTG 25MM TPDS-T M910	FP	BOX, METAL, M621	1
		FP	CASE, CTG, FIRED AL ALLOY	30
		DR	CTG, 25MM TPDS-T M910	30
		FP	LINK, CTG METALLIC BELT, M28	30
		DR	SABOT, BASE NLON/ALUMINUM	30
		FP	SEPARATORS, PLASTIC	2
1305A965	CTG 25.4MM DECOY M839	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, AL ALLOY	240
		DR	CTG, 25.4MM DECOY M839	240
1305A976	CTG 25MM TP-T M793	FP	BAG, BARRIER WATERPROOF	1
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, FIBERBOARD	2
		FP	CASE, CTG, FIRED, STEEL	50
		DR	CTG, 25MM TP-T M793	50
1305AA11	CTG 7.62MM M118 LRA	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, FIBERBOARD	23
		FP	CASE, CTG, FIRED, BRASS	920
		DR	CTG, 7.62MM M118 LRA	920
1305B118	CTG 30MM TP M788	FP	BOX, METAL, XM592	1
		FP	CASE, CTG, FIRED AL ALLOY	121
		DR	CTG, 30MM TP M788	121
1305B120	CTG 30MM TP M788 LNKD	FP	BOX, METAL	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED, AL ALLOY	144
		DR	CTG, 30MM TP M788	144
		FP	LINK, CTG METALLIC BELT, M29	144
1310B504	CTG 40MM GRN STAR PARA M661	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED AL ALLOY	44
		DR	CTG, 40MM GRN STAR PARA M661	44
1310B505	CTG 40MM RED STAR PARA M662	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED AL ALLOY	44
		DR	CTG, 40MM RED STAR PARA M662	44
1310B506	CTG 40MM RED SMK M713	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED AL ALLOY	44
		DR	CTG, 40MM RED SMK M713	44
1310B508	CTG 40MM GREEN SMK M715	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
		FP	CASE, CTG, FIRED AL ALLOY	44
		DR	CTG, 40MM GREEN SMK M715	44
1310B509	CTG 40MM YLW SMK M716	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED AL ALLOY	44
		DR	CTG, 40MM YLW SMK M716	44
1310B519	CTG 40MM TP M781	FP	BAG, BARRIER WATERPROOF	1
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, FIBERBOARD	4
		FP	CASING, .38 CAL BRASS AND M212 NYLON	100
		DR	CTG, 40MM TP M781	100
1310B535	CTG 40MM WHT STAR PARA M583A1	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED AL ALLOY	44
		DR	CTG, 40MM WHT STAR PARA M583A1	44
1310B536	CTG 40MM WHT STAR CLUSTER	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED AL ALLOY	44
		DR	CTG, 40MM WHT STAR PARA M583A1	44
1310B542	CTG 40MM HEDP M430 LNKD	FP	BOX, METAL, M548	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED AL ALLOY	48
		DR	CTG, 40MM HEDP M430 LNKD	48
		FP	LINK, CTG METALLIC BELT, M16A2	48
1310B546	CTG 40MM HEDP M433	FP	BANDOLEER, CLOTH	12
		FP	CARTON, FIBERBOARD	12
		FP	CASE, CTG, FIRED AL ALLOY	72
		DR	CTG, 40MM HEDP M433	72
1310B571	CTG 40MM HE M383 LNKD	FP	BAG, BARRIER WATERPROOF	1
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, FIBERBOARD	1
		FP	CASE, CTG, FIRED AL ALLOY	50
		DR	CTG, 40MM HE M383	50
		FP	LINK, CTG METALLIC BELT, M16A2	50
1310B584	CTG 40MM TP M918 LNKD	FP	BAG, BARRIER WATERPROOF	1
		FP	BOX, METAL, M548	1
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED AL ALLOY	48
		DR	CTG, 40MM TP M918	48
		FP	LINK, CTG METALLIC BELT, M16A2	48
1310B592	CTG 40MM TP M918	FP	BAG, BARRIER WATERPROOF	1
		FP	BOX, METAL, M548	1
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CASE, CTG, FIRED AL ALLOY	60
		DR	CTG, 40MM TP M918	60
1310B610	CTG 35MM AND LAU TACTICAL C		NO INFORMATION FOUND TO DATE	0
1310B627	CTG 60MM ILLUM M83A3	FP	BODY TUBING STEEL	9
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, FIBERBOARD, PA44	9
		IP	CTG, 60MM ILLUM M83A3	9
1310B630	CTG 60MM SMK WP M302A1	FP	BODY TUBING STEEL	9
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, FIBERBOARD, M576	9
		IP	CTG, 60MM SMK WP M302A1	9
1310B632	CTG 60MM HE M49A4	FP	BODY TUBING STEEL	12
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, FIBERBOARD, M576	12
		DR	CTG, 60MM HE M49A4	12
1310B642	CTG 60MM HE M720	FP	BOX, METAL, PA70	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, FIBERBOARD, PA78	16
		DR	CTG, 60MM HE M720	16
1310B646	CTG 60MM SMK WP M722 W/PD FUZE	FP	BOX, METAL, PA70	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
		FP	CARTON, FIBERBOARD, PA78	16
		IP	CTG 60MM SMK WP M722 W/PD FUZE	16
1315C045	81MM REFUB KIT F/MB		NO INFORMATION FOUND TO DATE	0
1315C226	CTG 81MM ILLUM M301A3 W/ FUZE	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M252A3	3
		IP	CTG, 81MM ILLUM M301A3 W/ FUZE	3
		FP	STOP, PACKING	2
1315C236	CTG 81MM HE M374A3	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M252A3	3
		DR	CTG, 81MM HE M374A3	3
		FP	PLUG, CLOSING	2
		FP	STOP, PACKING	2
1315C256	CTG 81MM HE M374A2 W/PD FUZE	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M252A3 OR M252A4	3
		DR	CTG, 81MM HE M374A2 W/PD FUZE	3
		FP	STOP, PACKING	3
1315C276	CTG 81MM SMK WP M375A2 W/PD FUZE	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M252A3 OR M252A4	3
		IP	CTG, 81MM SMK WP M375A2 W/PD FUZE	3
		FP	STOP, PACKING	3
1315C279	CHG PROP M90A1 CHG A & B	IP	CHARGE, PROPELLING M90A1 (193 GR EA X 2)	
1315C282	CTG 90MM HEAT M371A1	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M252A3 OR M252A4	2
		FP	CASE, CTG, FIRED AL ALLOY	2
		DR	CTG, 90MM HEAT M371A1	2
1315C379	CTG, 120MM HE XM934	FP	BOX, METAL, PA154	1
		FP	CARTON, FIBERBOARD, PA153	2
		FP	CASE, CTG, FIRED, STEEL	2
		FP	CASING, LINER, CLOTH	2
		DR	CTG, 120MM HE XM934	2
1315C410	CTG 90MM CAN ANTIPERS M590	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M252A3 OR M252A4	6
		FP	CASE, CTG, FIRED AL ALLOY	6
		DR	CTG, 90MM CAN ANTIPERS M590	6
1315C440	CTG 105MM BLK M395	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M34 SERIES	10
		FP	CASE, CTG, FIRED, COPPER (STEEEL/BRASS ALT)	10
		FP	CASING, LINER, CLOTH	2
		DR	CTG, 105MM BLK M395	10
1315C445	CTG 105MM HE M1 W/O FUZE	FP	BOX, WOOD, M105A2	1
		FP	CARTON, FIBERBOARD, PA153	2
		FP	CASE, CTG, FIRED, STEEL	2
		FP	CASING, LINER, CLOTH	2
		DR	CTG, 105MM HE M1 W/O FUZE	2
1315C449	CTG 105MM ILLUM M314A2	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M105 SERIES	2
		FP	CASE, CTG, FIRED, BRASS (STEEL ALT)	2
		FP	CASING, LINER, CLOTH	2
		IP	CTG, 105MM ILLUM M314A3	2
		FP	STOP, PACKING	1
1315C452	CTG 105MM SMK HC BE M84 W/ FUZE	FP	BOX, WOOD, M105A2	1
		FP	CARTON, FIBERBOARD, PA153	2
		FP	CASE, CTG, FIRED, STEEL	2
		FP	CASING, LINER, CLOTH	2
		DR	CTG, 105MM SMK HC BE M84 W/ FUZE	2
1315C454	CTG 105MM SMK WP M60 W/ PD FUZE	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M105 SERIES	2
		FP	CASE, CTG, FIRED, BRASS (STEEL ALT)	2
		FP	CASING, LINER, CLOTH	2
		IP	CTG, 105MM SMK WP M60 W/ PD FUZE	2
		FP	STOP, PACKING	1
1315C473	CTG 105MM HE M760	FP	BOX, WOOD, M105A3	1
		FP	CARTON, FIBERBOARD, PA153	2
		FP	CASE, CTG, FIRED, STEEL	2

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
		FP	CASING, LINER, CLOTH	2
		DR	CTG, 105MM HE M760	2
1315C479	CTG 105MM SMK HC M84A1	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	2
		FP	CASE, CTG, FIRED, STEEL	2
		FP	CASING, LINER, CLOTH	2
		DR	CTG, 105MM SMK HC M84A1	2
		FP	STOP, PACKING	1
1315C511	CTG 105MM TP-T M490	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M435	2
		FP	CASE, CTG, FIRED, STEEL	2
		FP	CASING, LINER, CLOTH	2
		DR	CTG, 105MM TP-T M490	2
1315C520	CTG 105MM TPDS-T M724A1	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M105 SERIES	2
		FP	CASE, CTG, FIRED, STEEL (BRASS ALT)	2
		FP	CASING, LINER, CLOTH	2
		DR	CTG, 105MM TPDS-T M724A1	2
		DR	SABOT, BASE NLON/ALUMINUM	2
1315C542	CTG 105MM SMK HC M84A1	FP	BOX, WOOD, M105A3	1
		FP	CARTON, FIBERBOARD, PA153	2
		FP	CASE, CTG, FIRED, STEEL	2
		FP	CASING, LINER, CLOTH	2
		DR	CTG, 105MM SMK HC M84A1	2
1315C623	CTG 120MM HE XM934	FP	BOX, METAL, PA154	2
		FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, PA153	2
		FP	CASE, CTG, FIRED, STEEL	2
		FP	CASING, LINER, CLOTH	2
		DR	CTG, 120MM HE XM934	2
1315C650	CTG 106MM HEAT M344A1	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M316	2
		FP	CASE, CTG, FIRED, STEEL	2
		FP	CASING, LINER, CLOTH	2
		DR	CTG, 106MM HEAT M344A1	2
1315C651	CTG 106MM HEP-T M346A1	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M314 OR M316	2
		FP	CASE, CTG, FIRED, STEEL	2
		FP	CASING, LINER, CLOTH	2
		DR	CTG, 106MM HEP-T M346A1	2
1315C660	CTG 106MM APERS-T M581 W/FUZE	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M564	2
		FP	CASE, CTG, FIRED, STEEL	2
		FP	CASING, LINER, CLOTH	2
		DR	CTG, 106MM APERS-T M581 W/FUZE	2
1315C697	CTG 4.2IN HE M329A2 W/O FUZE	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, PA46	2
		FP	CASE, CTG, FIRED AL ALLOY	2
		DR	CTG, 4.2IN HE M329A2 W/O FUZE	2
1315C706	CTG 4.2IN ILLUM M335A2 W/FUZE MT M565	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M251 SERIES	2
		FP	CASE, CTG, FIRED AL ALLOY	2
		FP	CONTAINER, EXTENSION	2
		IP	CTG, 4.2IN ILLUM M335A2 W/FUZE MT M565	2
		FP	DISC, METAL F/FIBER CONTAINER	2
		FP	HOLDER, PROPELLANT	2
		FP	PIN, F/OBTURATING MECHANISM	2
		FP	PLUG, CLOSING, METAL	2
		FP	STOP, PACKING	2
1315C784	CTG 120MM TP-T M831	FP	BOX, METAL, PA116	30
		FP	CASE, CTG, FIRED, STEEL	30
		DR	CTG, 120MM TP-T M831	30
		FP	PALLET, WOOD	1

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
1315C785	CTG 120MM TPCSDS-T M865	FP	BOX, METAL, PA116	30
		FP	CASE, CTG, FIRED, STEEL	30
		DR	CTG, 120MM TPCSDS-T M865	30
		FP	PALLET, WOOD	1
		DR	SABOT, BASE NLON/ALUMINUM	30
1315C787	CTG, 120MM HEAT MP-T M830	FP	BOX, METAL, PA116	30
		FP	CASE, CTG, FIRED, PAPER	30
		DR	CTG, 120MM HEAT MP-T M830	30
		FP	PALLET, WOOD	1
1315C788	CTG 120MM, MORTAR HE M57	FP	BOX, METAL, PA154	1
		FP	CARTON, FIBERBOARD, PA153	2
		FP	CASE, CTG, FIRED, STEEL	2
		FP	CASING, LINER, CLOTH	2
		DR	CTG 120MM, MORTAR HE M57	2
1315C790	CTG 120MM ILLUM M91		NO INFORMATION FOUND TO DATE	0
1315C868	CTG 81MM HE M821 W/FUZE M734	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	3
		FP	CASE, CTG, FIRED, STEEL	3
		DR	CTG, 81MM HE M821 W/FUZE M734	3
1315C869	CTG 81MM HE M889 W/FUZE M935	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	3
		FP	CASE, CTG, FIRED, STEEL	3
		DR	CTG 81MM HE M889 W/FUZE M935	3
1315C870	CTG 81MM SMK RP M819	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	3
		FP	CASE, CTG, FIRED, STEEL	3
		DR	CTG, 81MM SMK RP M819	3
1315C871	CTG 81MM ILLUM M853A1	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	3
		FP	CASE, CTG, FIRED AL ALLOY	3
		IP	CTG, 81MM ILLUM M853A1	3
1315C876	CTG 81MM TP-SR M880 W/ PD FUZE	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	8
		FP	CASE, CTG, FIRED AL ALLOY	8
		DR	CTG, 81MM TP-SR M880 W/ PD FUZE	8
1320C995	ROCKET, AT-4. 84MM HE M136	FP	BOX, WOOD	1
		DR	ROCKET, AT-4. 84MM HE M136	1
1320D505	PROJ 155MM ILLUM M485E1	FP	GROMMET, METAL	8
		FP	GROMMET, TYPE 1 (PLASTIC)	8
		FP	PALLET ASSEMBLY (TOP AND BOTTOM)	1
		FP	PLUG, LIFTING	8
		IP	PROJECTILE, 155MM, ILLUM M485E1	8
1320D510	PROJECTILE 155MM HE CPHD	FP	GROMMET, METAL	6
		FP	GROMMET, TYPE 1 (PLASTIC)	6
		FP	PALLET ASSEMBLY (TOP AND BOTTOM)	1
		FP	PLUG, LIFTING	6
		IP	PROJECTILE, 155MM, SMK WP M825	6
1320D513	PROJ 155MM PRAC M804	FP	GROMMET, METAL	8
		FP	GROMMET, TYPE 1 (PLASTIC)	8
		FP	PALLET ASSEMBLY (TOP AND BOTTOM)	1
		FP	PLUG, LIFTING	8
		DR	PROJECTILE, 155MM PRAC M804	8
1320D528	PROJ 155MM SMK WP M825	FP	GROMMET, METAL	8
		FP	GROMMET, TYPE 1 (PLASTIC)	8
		FP	PALLET ASSEMBLY (TOP AND BOTTOM)	1
		FP	PLUG, LIFTING	8
		IP	PROJECTILE, 155MM, SMK WP M825	8
1320D533	CHG PROP 155MM M119	FP	BAG, CLOTH	30
		FP	BOX, METAL, PA37A1	30
		IP	CHG PROP 155MM M119 (21LB)	30
		FP	PALLET, WOOD, SPECIALIZED	1
1320D540	CHG PROP 155MM GB M3	FP	BOX, METAL, M14	84
		IP	CHARGE, PROPELLING 155MM M3A1 (5 LB NEW EA)	168

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
		FP	GASKET, RUBBER M14	84
		FP	PALLET, WOOD	1
1320D541	CHG PROP 155MM WB M4A1	FP	BOX, METAL, M13	25
		IP	CHARGE, PROPELLING 155MM M4A1 (13 LB NEW EA)	25
		FP	GASKET, RUBBER M13	25
		FP	PALLET, WOOD	1
1320D544	PROJ 155MM HE M107	FP	GROMMET, METAL	8
		FP	GROMMET, TYPE 1 (PLASTIC)	8
		FP	PALLET ASSEMBLY (TOP AND BOTTOM)	1
		FP	PLUG, LIFTING	8
		DR	PROJECTILE, 155MM HE M107 STEEL	8
1320D550	PROJ 155MM SMK WP M110A1	FP	GROMMET, METAL	8
		FP	GROMMET, TYPE 1 (PLASTIC)	8
		FP	PALLET ASSEMBLY (TOP AND BOTTOM)	1
		FP	PLUG, LIFTING	8
		IP	PROJECTILE, 155MM, SMK WP M110A1	8
1320D570	CTG 165MM HEP M123A1 (COMP) A3	FP	BOX, FIBERBOARD	1
		FP	BOX, WOOD	1
		FP	CASING, CTG, FIRED STEEL	1
		DR	CTG, 165MM HEP M123A1	1
1320D579	PROJ 155MM HE RA M549	FP	GROMMET, METAL	8
		FP	GROMMET, TYPE 1 (PLASTIC)	8
		FP	PALLET ASSEMBLY (TOP AND BOTTOM)	1
		FP	PLUG, LIFTING	8
		DR	PROJECTILE, 155MM HE RA M549	8
1320D590	CTG 165MM TP M623	FP	BOX, FIBERBOARD	1
		FP	BOX, WOOD	1
		FP	CASING, CTG, FIRED STEEL	1
		DR	CTG, 165MM HEP M123A1	1
1320D680	PROJ 8IN HE M106 W/O FUZE	FP	GROMMET, METAL	6
		FP	GROMMET, TYPE 1 (PLASTIC)	6
		FP	PALLET ASSEMBLY (TOP AND BOTTOM)	1
		FP	PLUG, LIFTING	6
		DR	PROJECTILE, 8IN HE M106 STEEL	6
1330G815	GREN LNCHR SMK SCREENING RP UK L8A3	FP	BOX, METAL, M2A1	144
		FP	CARTON, FIBERBOARD	576
		FP	GRENADE, HAND AND LAUNCHER SMK SCRN L8A3	576
		FP	PALLET, WOOD	1
		FP	PULL RING, GRENADE, EXPENDED	576
		FP	SAFETY LEVER	576
1330G826	GREN & LAUNCHER SMK IR M76	FP	BOX, METAL, M2A1	8
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		FP	CARTON, FIBERBOARD	8
		FP	GRENADE, HAND AND LAUNCHER SMK IR M76	64
		FP	PULL RING, GRENADE, EXPENDED	64
		FP	SAFETY LEVER	64
1330G841	CTG 5.56MM GREN RIFLE M195		NO INFORMATION FOUND TO DATE	0
1330G878	FUZE GREN HAND PR M228	FP	BAG, BARRIER WATERPROOF	8
		FP	BODY FUZE, HAND GRENADE, EXPENDED M228	200
		FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	8
		FP	FUZE, HAND GRENADE, PRACTICE	200
		FP	PULL RING, GRENADE, EXPENDED	200
		FP	SAFETY LEVER	200
1330G881	GREN HAND FRAG M67	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	30
		IP	GRENADE, HAND, FRAGMENTATION M67	30
		FP	PULL RING, GRENADE W/ SAFETY PIN	30
		FP	SAFETY LEVER	30
1330G900	GREN HAND INCND TH3 AN-M14	FP	BOX, METAL, M415A1	24
		FP	CARTON, FIBERBOARD	720

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
		FP	GRENADE, HAND, INCINDIARY TH3 AN-M14	720
		FP	PALLET, WOOD	1
		FP	PULL RING, GRENADE W/ SAFETY PIN	720
		FP	SAFETY LEVER	720
1330G922	GREN HAND RIOT CS M47 W/FUZE M227	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	20
		IP	GRENADE, HAND, RIOT CS M47	20
		FP	PULL RING, GRENADE W/ SAFETY PIN	20
		FP	SAFETY LEVER	20
1330G930	GREN HAND SMK HC AN-M8	FP	BOX, WOOD	53
		FP	CARTON, FIBERBOARD	848
		TMA	GRENADE, HAND SMK HC AN-N8	848
		FP	PALLET, WOOD	1
		FP	PULL RING, GRENADE W/ SAFETY PIN	848
		FP	SAFETY LEVER	848
1330G932	GREN HAND SMK RED M48 W/M227 FUZE	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	20
		TMA	GRENADE, HAND, SMK RED M48	20
		FP	PULL RING, GRENADE W/ SAFETY PIN	20
		FP	SAFETY LEVER	20
1330G940	GREN HAND SMK GRN M18	FP	BOX, WOOD	53
		FP	CARTON, FIBERBOARD	848
		TMA	GRENADE, HAND SMK GRN M18	848
		FP	PALLET, WOOD	1
		FP	PULL RING, GRENADE W/ SAFETY PIN	848
		FP	SAFETY LEVER	848
1330G945	GREN HAND SMK YLW M18	FP	BOX, WOOD	53
		FP	CARTON, FIBERBOARD	848
		TMA	GRENADE, HAND SMK YLW M18	848
		FP	PALLET, WOOD	1
		FP	PULL RING, GRENADE W/ SAFETY PIN	848
		FP	SAFETY LEVER	848
1330G950	GREN HAND SMK RED M18	FP	BOX, WOOD	53
		FP	CARTON, FIBERBOARD	848
		TMA	GRENADE, HAND RED M18	848
		FP	PALLET, WOOD	1
		FP	PULL RING, GRENADE W/ SAFETY PIN	848
		FP	SAFETY LEVER	848
1330G955	GREN HAND SMK VIO M18	FP	BOX, WOOD	53
		FP	CARTON, FIBERBOARD	848
		TMA	GRENADE, HAND SMK VIO M18	848
		FP	PALLET, WOOD	1
		FP	PULL RING, GRENADE W/ SAFETY PIN	848
		FP	SAFETY LEVER	848
1330G963	GREN HAND RIOT CS M7A3	FP	BOX, METAL	53
		FP	GRENADE, HAND AND LAUNCHER	64
		TMA	GRENADE, HAND RIOT CS M7A3	848
		FP	PALLET, WOOD	1
		FP	PULL RING, GRENADE W/ SAFETY PIN	848
		FP	SAFETY LEVER	848
1330G978	GREN LAU SMK SIMULANT SCREENING M82	FP	BOX, WOOD	64
		FP	CARTON, FIBERBOARD	384
		TMA	GRENADE, HAND AND LAUNCHER SMK SCRN M82	384
		FP	PALLET, WOOD	1
		FP	PULL RING, GRENADE, EXPENDED	384
		FP	SAFETY LEVER	384
1330G982	GREN HAND SMK HC PRAC AN-M8	FP	BOX, WOOD	53
		FP	CARTON, FIBERBOARD	848
		TMA	GRENADE, HAND SMK HC PRAC AN-N8	848
		FP	PALLET, WOOD	1
		FP	PULL RING, GRENADE W/ SAFETY PIN	848
		FP	SAFETY LEVER	848

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Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
1340H108	RCKT POD 298MM PRAC M28 MLRS	FP	ROCKET POD, MLRS, 298MM PRACTICE	1
		DR	ROCKET, MLRS, 298MM PRACTICE	6
1340H163	RCKT HE 2.75IN W/WHD M151 & FUZE M423	FP	BOX, WOOD, PA30	1
		DR	RCKT, HE 2.75IN W/WHD M151 & FUZE M423	4
		DR	RCKT, MOTOR MK66 MOD 1 (W/ ROCKET)	4
1340H459	RCKT APERS 2.75IN W/WHD WDU 4A/A	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	4
		DR	RCKT APERS 2.75IN W/WHD WDU 4A/A	4
		DR	RCKT, MOTOR MK40 MOD 3 (W/ ROCKET)	4
1340H464	RCKT HE 2.75IN W/WHD M261 & FUZE M439	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	4
		DR	RCKT, HE 2.75IN W/WHD M261 & FUZE M439	4
		DR	RCKT, MOTOR MK66 MOD 1 (W/ ROCKET)	4
1340H557	RCKT HE 66MM AT M72/M72A3	FP	ASSEMBLY, STRAP F/ CARTON	3
		FP	BAG, BARRIER WATERPROOF	3
		FP	BOX, CARDBOARD	5
		FP	BOX, WOOD, WIREBOUND W/ENDS	3
		FP	LAUNCHER, ROCKET, M72A2, EXPENDED	15
		FP	PRIMER BLOCK, EXPENDED	15
		DR	ROCKET, LAW 66MM M72A3	15
		FP	SADDLE, FRONT, WOOD	3
		FP	SADDLE, REAR, WOOD	3
1340H708	RCKT PRAC 35MM SUBCAL M73	FP	BOX, WOOD, WIREBOUND W/ENDS	6
		FP	CARTON, FIBERBOARD	18
		FP	CLIP, SAFETY	540
		FP	PALLET, WOOD	1
		FP	PRIMER BLOCK, EXPENDED	540
		DR	ROCKET, PRACTICE 35MM SUBCALIBER	540
1340H974	RCKT PRAC 2.75IN W/WHD M267 & FUZE M439	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	4
		DR	RCKT PRAC 2.75IN W/WHD M267 & FUZE M439	4
		DR	RCKT, MOTOR MK66 MOD 1 (W/ ROCKET)	4
1340H975	RCKT PRAC SMK 2.75IN W/WHD M274	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	4
		DR	RCKT PRAC 2.75IN W/WHD M267 & FUZE M439	4
		DR	RCKT, MOTOR MK66 MOD 3 (W/ ROCKET)	4
1340J143	MTR RKT 5 IN (MICLIC)	FP	BOX, WOOD, WATERPROOF	8
		FP	CABLE ASSEMBLY STEEL	8
		FP	PALLET, WOOD, SPECIALIZED	1
		DR	ROCKET, MOTOR 5IN AL ALLOY	8
1345K002	ACT AT MINE MI	DR	ACTIVATOR, AT PRAC M1 STEEL	3240
		FP	BOX, METAL	3240
		FP	BOX, WOOD	18
		FP	PALLET, WOOD	1
1345K010	BRSTR INCEND FIELD M4	FP	BOX, WOOD	1
		IP	BURSTER, INCENDIARY M4	20
		FP	CONTAINER, METAL	20
1345K022	DISP & MINE GRND M131	IP	CASE, MOPMS, MULTI COMP	6
		FP	PALLET, WOOD	1
1345K030	PRIMER IGNITER FUZE M10A1	FP	BOX, WOOD	1
		FP	PRIMER, FUZE IGNITOR M10A1 AL ALLOY	300
1345K040	CHG SPOTTING F/MINE AP PRAC M8	FP	BOX, WOOD	1
		FP	CHARGE, SPOTTING AP PRAC M8 STEEL AND BRASS	300
1345K042	CANISTER MINE PRAC M88	FP	BOX, WOOD	1
		FP	CANISTER ASSEMBLY AL ALLOY AND S.STEEL COMP.	2
1345K051	FUZE MINE AT PRAC M604	FP	BAG, BARRIER WATERPROOF	27
		FP	BOX, WOOD	27
		FP	CONTAINER, METAL	4860
		TMA	FUZE, MINE AT PRAC M604 TIN ALLOY (STEEL ALT)	4860
		FP	PALLET, WOOD	1

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
1345K055	FUZE MINE COMB M10A1	FP	BAG, BARRIER WATERPROOF	53
		FP	BOX, WOOD	53
		FP	CARTON, FIBERBOARD	954
		TMA	FUZE, MINE AT M10A1 TIN ALLOY (AL ALLOY ALT)	9540
		FP	PALLET, WOOD	1
1345K058	FUZE MINE M605	FP	BOX, METAL, M19A1	4
		FP	BOX, WOOD	1
		IP	FUZE, MINE M605 TIN ALLOY (AL ALLOY ALT)	240
1345K068	ADAPTER & FUZE M624	IP	ADAPTER & FUZE M624	12
		FP	BOX, METAL, M19A1	4
		FP	BOX, WOOD	1
1345K092	MINE APERS M16A1 OR M16A2	FP	BOX, METAL	4
		FP	BOX, WOOD	1
		IP	MINE, APERS M16A1 OR M16A2	4
		FP	SPOOL, TRIP WIRE STEEL	16
		FP	WRENCH, ARMING M25 STEEL	4
1345K143	MINE APERS M18A1 W/ACCESSORIES	FP	BANDOLEER, CLOTH, M7	192
		FP	BLASTING DEVICE, M576	192
		FP	BOX, WOOD	32
		DR	CAP, BLASTING, M46	384
		IP	MINE, AP M18A1	192
		FP	PALLET, WOOD	1
		FP	TEST SET ELECTRICAL, M40	32
1345K180	MINE AT HEAVY M15	DR	ACTIVATOR, M1	30
		DR	ASSEMBLY, AT MINE STEEL	30
		FP	BOX, METAL F/ ACTIVATOR	30
		FP	BOX, METAL F/ FUZE	30
		FP	BOX, WOOD	30
		IP	FUZE, M603	30
		IP	MINE, AT HEAVY M15	30
		FP	PALLET, WOOD	1
		FP	WRENCH, ARMING M20	30
1345K181	MINE AT HEAVY M21	FP	BAG, BARRIER WATERPROOF	24
		FP	BOOSTER, M1204	48
		FP	BOX, WOOD, WIREBOUND W/ENDS	12
		IP	FUZE, M607	48
		IP	MINE, AT HE HEAVY M21	48
		FP	PALLET, WOOD	1
		FP	WRENCH, ARMING M26	24
1345K250	MINE AT HEAVY M19 NON METALLIC	DR	ACTIVATOR, M2	48
		FP	BAG, BARRIER WATERPROOF	24
		FP	BOX, WOOD	24
		IP	FUZE, M606	48
		IP	MINE, AT HEAVY M19	48
		FP	PALLET, WOOD	1
		FP	WRENCH, ARMING	24
1365K765	RIOT CNTRL AGENT CS	FP	BOX, METAL	1
		IP	RIOT CONTROL AGENT, CS CAPSULE	50
1365K768	CHEMICAL AGENT, CS-1	FP	BOX, WOOD	1
		FP	CONTAINER, FIBERBOARD (8LB LIQUID)	5
1365K866	SMK POT HC 30LB ABC-M5	FP	BOX, WOOD	1
		TMA	SMOKE POT, M5 GROUND TYPE	1
1365K867	SMK POT FLOATING TYPE HC M4A2	FP	BOX, WOOD	1
		TMA	SMOKE POT, M4A2, FLOATING TYPE	1
1365K917	THICKENING COMPND M4	FP	BOX, WOOD	1
		TMA	PAIL, THICKENING COMPUND M4	16
1370L116	KIT FLARE PERS DIST	FP	BAG, BARRIER WATERPROOF	4
		FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD, M185	4
		FP	PROJECTOR, XM20	240
		TMA	SIGNAL KIT, PERSONAL DISTRESS, RED XM185	840
1370L119	SIG KIT FOLIAGE PENE		NO INFORMATION FOUND TO DATE	0
	STAR M195	FP	BOX, WOOD	1

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Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
1370L185	RCKT POD 298MM PRAC M28 MLRS	FP	ROCKET POD, MLRS, 298MM PRACTICE	1
		DR	ROCKET, MLRS, 298MM PRACTICE	6
1370L305	SIGNAL ILLUM GRND PARA GRN	TMA	ASSEMBLY, CONTAINER STAINLESS STEEL	36
1370L306	SIGNAL ILLUM GRND M158	TMA	ASSEMBLY, CONTAINER STAINLESS STEEL	36
		FP	BOX, WOOD	1
1370L307	SIGNAL ILLUM GRND M159	TMA	ASSEMBLY, CONTAINER STAINLESS STEEL	36
		FP	BOX, WOOD	1
1370L311	SIGNAL ILLUM GRND RED STAR PARA M126	TMA	ASSEMBLY, CONTAINER STAINLESS STEEL	36
		FP	BOX, WOOD	1
1370L312	SIGNAL ILLUM GRND M127	TMA	ASSEMBLY, CONTAINER STAINLESS STEEL	36
		FP	BOX, WOOD	1
1370L314	SIGNAL ILLUM GRND M125A1	TMA	ASSEMBLY, CONTAINER STAINLESS STEEL	36
		FP	BOX, WOOD	1
1370L366	SIMULATOR PROJ AIR BURST M74A1	TMA	BOX, WOOD	1
		FP	CONTAINER, FIBERBOARD	10
		FP	SIMULATOR, PROJ AIR BURST M74A1	80
1370L367	ATWESS (MILES)	FP	BOX, WOOD	1
		FP	CARTON, CARDBOARD	24
		DR	CTG, PRACTICE TANK SIMULATOR	240
1370L410	FLARE ACFT COUNTERMEASURE M206	FP	CASING, CTG, AL ALLOY	1
		IP	FLARE, ACFT COUNTERMEASURE, M206	1
1370L477	FLARE, IR TRK MK33	TMA	BOX, METAL, M2A1	2
		FP	BOX, WOOD	1
		DR	CTG, FLARE MK 33 STEEL	50
1370L495	FLARE SURF TRIP M49	FP	BAG, BARRIER WATERPROOF	1
		FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	32
		TMA	COIL STEEL AND ROOFING NAILS (2)	32
		TMA	CTG, FLARE, TRIP M49 STEEL	32
		TMA	MOUNTING BRACKET ASSEMBLY, STEEL	32
1370L508	FUSEE SIGNAL WARNS RR RED	TMA	ASSEMBLY, CONTAINER PAPER	40
		FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	4
		FP	STRIKER CAP	40
1370L554	SEA FLARE RED MK25		NO INFORMATION FOUND TO DATE	0
1370L592	TOW BLAST SIMULATOR		NO INFORMATION FOUND TO DATE	0
1370L594	SIMULATOR PROJ GRND BURST M115A2	FP	BAG, BARRIER WATERPROOF	25
		FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	25
		TMA	SIMULATOR, PROJECTILE GRND BURST M115A2	25
1370L595	SIMULATOR PROJ AIRBURST LIQ	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	30
		TMA	SIMULATOR, PROJECTILE AIRBURST LIQUID	30
1370L596	SIMULATOR FLASH ARTY M110	TMA	ASSEMBLY, SIMULATOR M110 PLASTIC	30
		FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	30
1370L598	SIMULATOR BOOBY TRAP FLASH M117	TMA	ASSEMBLY, SIMULATOR M117 PAPER	2700
		FP	BAG, BARRIER WATERPROOF	54
		FP	BOX, WOOD	18
		FP	PALLET, WOOD	1
1370L599	SIMULATOR BOOBY TRAP ILLUM M118	TMA	ASSEMBLY, SIMULATOR M118 PAPER	2700
		FP	BAG, BARRIER WATERPROOF	54
		FP	BOX, WOOD	18
		FP	PALLET, WOOD	1
1370L600	SIMULATOR BOOBY TRAP M119 WHISTLE	TMA	ASSEMBLY, SIMULATOR M119 PAPER	2700
		FP	BAG, BARRIER WATERPROOF	54
		FP	BOX, WOOD	18
		FP	PALLET, WOOD	1
1370L601	SIMULATOR HAND GREN M116A1	TMA	ASSEMBLY, SIMULATOR M116A1 PAPER	2700
		FP	BAG, BARRIER WATERPROOF	54
		FP	BOX, WOOD	18
		FP	PALLET, WOOD	1

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Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
1370L602	SIMULATOR FLASH ARTY M21	TMA	ASSEMBLY, SIMULATOR M21 PAPER POLYETHYLENE PLASTIC	1944
		FP	BAG, BARRIER WATERPROOF	216
		FP	BOX, WOOD	12
		FP	CARTON, FIBERBOARD	216
		FP	PALLET, WOOD	1
1370L709	SIMULATOR TGT-HIT XM26	FP	BOX, CARDBOARD	9
		FP	BOX, WOOD	1
		FP	SIMULATOR, TGT-HIT XM26	162
1370L715	SIMULATOR AT GGM MS XM27	FP	BOX, WOOD	1
		FP	SIMULATOR, AT GGM MS XM27	12
1370L720	SIM TGT KILL XM26	FP	BOX, FIBERBOARD	2
		FP	BOX, WOOD	1
		FP	SIMULATOR, TGT-HIT XM26	60
1375M023	CHG DEMO M112	FP	ASSEMBLY, POLYESTER/PLASTIC	30
		FP	BOX, WOOD	1
		IP	CHARGE, DEMOLITION BLOCK 1-1/4LB C-4	30
1375M024	CHG DEMO M118	FP	BOX, WOOD, WIREBOUND W/ENDS	1
		IP	CHARGE, DEMO BLOCK 2LB PETN CELLOPHANE MYLAR	20
1375M028	DEMO KIT BANGALORE TORPEDO M1A2	FP	BOX, WOOD, M1A2	1
		IP	DEMOLITION KIT, BANGELORE TORPEDO M1A1	1
1375M030	CHG DEMO BLOCK TNT 1/4 LB	FP	ASSEMBLY, POLYETHYLENE WRAPPER	50
		FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	200
		IP	CHARGE, DEMOLITION BLOCK 1/4LB TNT	200
1375M032	CHG DEMO BLOCK TNT 1LB	FP	ASSEMBLY, POLYETHYLENE WRAPPER	50
		FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	50
		IP	CHARGE, DEMOLITION BLOCK 1LB TNT	50
1375M039	CHG DEMO 40LB CRATERING	FP	BAG, BARRIER WATERPROOF	1
		FP	BOX, WOOD	1
		IP	CHARGE, DEMOLITION BLOCK 40LB CRATERING	1
1375M060	CHARGE DEMO ROLL	FP	BAG, BARRIER WATERPROOF	4
		FP	BOX, WOOD	1
		IP	CHARGE, DEMOLITION BLOCK 25LB H-6	4
		FP	CONTAINER, PLASTIC	4
1375M130	CAP BLASTING ELECTRIC M6	FP	BAG, BARRIER WATERPROOF	10
		FP	BOX, WOOD	1
		IP	CAP, BLASTING NONELEC W/ WIRE (12 FT) M7	900
		FP	CARTON, FIBERBOARD	10
1375M131	CAP BLASTING NONELEC M7	FP	BAG, BARRIER WATERPROOF	50
		FP	BOX, PAPERBOARD	50
		FP	BOX, WOOD	1
		IP	CAP, BLASTING	500
		FP	CARTON, FIBERBOARD	10
1375M241	DESTRUCTOR HE UNIVERSAL M10	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	50
		IP	CTG, DESTRUCTOR, HE UNIVERSAL M10 STEEL AND BRASS	50
1375M327	COUPLING BASE W/PRIMER	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	50
		DR	CTG, COUPLING BASE W/ PRIMER M27 TIN ALLOY	500
1375M420	CHG DEMO SHAPED M2A3 15LB	FP	ASSEMBLY, CHARGE MOLDED FIBER	3
		FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	3
		IP	CHARGE, DEMOLITION SHAPED 15LB M2A3	3
1375M421	CHG DEMO SHAPED 40 L	FP	ASSEMBLY, CHARGE STEEL	1
		FP	BOX, WOOD	1
		IP	CHARGE, DEMOLITION SHAPED 40LB M3	1

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
1375M456	CORD DET REINFORCED	FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	3
		IP	CORD, DETONATING REINFORCED PLASTIC 3000 FT	3
		FP	SPOOL	3
1375M591	MILITARY DYNAMITE M1	DR	ADAPTER, PRIMING, M144	12
		FP	BOX, WOOD	1
		IP	CHARGE, DEMOLITION DYNAMITE M1	48
		DR	CTG, PAPER (MANILLIA PAPER)	48
1375M626	FIRING DEVICE DEMO M1A1	FP	BOX, WOOD	1
		FP	CARTON, CARDBOARD	10
		FP	FIRING DEVICE DEMOLITION M1A1	350
1375M627	FIRING DEVICE PRESSURE RELEASE M5	FP	ASSEMBLY, FIRING DEVICE DEMOLITION M5 STEEL	19
		FP	BOX, WOOD	1
		FP	CARTON, PAPERBOARD	19
1375M670	FUSE BLASTING TIME M700 4000 FT	FP	BOX, METAL	8
		FP	BOX, WOOD	1
		IP	FUZE, BLASTING TIME M700 PLASTIC/YARN 100 FT EA	400
1375M757	CHG DEMO M183	FP	BOX, WOOD	1
		FP	CARRYING CASE, CLOTH M185	2
		IP	CHARGE, ASSEMBLY DEMOLITION M183	2
1375M766	IGN TIME BLASTING M60	FP	BOX, PLASTIC	60
		FP	BOX, WOOD	1
		FP	IGNITER, TIME BLASTING FUZE, M2	300
1375M832	CHG DEMO SHPD MK74-1	FP	BOX, WOOD	1
		DR	CHARGE, ASSEMBLY PLASTIC, PHENOLIC OR.COPPER	4
		IP	CHARGE, DEMOLITION SHAPED MK74-1	4
1375M833	CHG DEMO PRAC SHPD	FP	BOX, WOOD	1
		DR	CHARGE, ASSEMBLY PLASTIC, PHENOLIC OR.COPPER	4
		IP	CHARGE, DEMOLITION SHAPED	4
1375M913	LINE CHG (MICLIC)	TMA	CHARGE, LINK C-4 (MICLIC)	1
		FP	PALLET, COVER, METAL	1
		FP	PALLET, METAL	1
1375M914	LINE CHARGE INERT MI	TMA	CHARGE, LINE INERT (MICLIC)	1
		FP	PALLET, COVER, METAL	1
		FP	PALLET, METAL	1
1375M965	CHG, DEMO CRATERING, M180	FP	BOX, WOOD	1
		IP	CHG, DEMO CRATERING, M180	1
1375MD73	CTG IMPULSE M796	FP	BOX, FIBERBOARD	1
		FP	BOX, METAL	6
		FP	CASE, CTG FIRED AL ALLOY	360
		DR	CTG, IMPULSE M796	360
1375ML03	FIRING DEVICE DEMO, M142	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD	1
		FP	CONTAINER, FIBERBOARD	38
1375ML04	CUTTER HE MK23-0	FP	BOX, METAL, M2A1	1
		DR	CHARGE, CUTTER	6
1375ML05	CHG CUTTER HE MK24-0	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD, WIREBOUND W/ENDS	1
		IP	CHG CUTTER HE MK24-0	4
1375ML09	CHG DEMO FLSC 20 GR	FP	BAG, BARRIER WATERPROOF	1
		FP	BOX, WOOD	1
		IP	FLSC CHARGE CONTAINER LEAD ANTIMONY	6
1375ML15	CHG DEMO FLSC	FP	BAG, BARRIER WATERPROOF	1
		FP	BOX, WOOD	3
		IP	CHG, DEMO FLSC	3
1375ML45	HOLDER CAP BLASTING M9	FP	CLAMPING DEVICE, PLASTIC (F/SHOCK TUBE)	1
1375ML47	CAP BLASTING NONELEC M11	FP	BOX, WOOD	1
		FP	CARTON, CARDBOARD	6
		IP	DETONATOR AL	60

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
		IP	SHOCK TUBE 30 FT SURLYN COVERED POLYETHYLENE	60
1375MN02	CAP BLASTING NONELEC M12	FP	BOX, WOOD	1
		FP	CARTON, CARDBOARD	6
		IP	DETONATOR AL	48
		IP	SHOCK TUBE 500 FT SURLYN COVERED POLYETHYLENE	48
		FP	SPOOL, METAL	48
1375MN03	CAP BLASTING NONELEC M13	FP	BOX, WOOD	1
		FP	CARTON, CARDBOARD	6
		IP	DETONATOR AL	24
		IP	SHOCK TUBE 1000 FT SURLYN COVERED POLYETHYLENE	24
		FP	SPOOL, METAL	24
1375MN06	CAP BLASTING NONELEC DELAY M14	FP	BOX, WOOD	1
		IP	DETONATOR AL WITH 7.5 FT TIME FUSE CLOTH/PLASTIC	60
1375MN07	CAP BLASTING NONELEC DELAY M15	FP	BOX, WOOD	1
		FP	CARTON, CARDBOARD	4
		IP	DETONATOR AL WITH 70 FT TIME FUSE SHOCK TUBE	120
1375MN08	IGNITER TIME BLASTING FUSE M81	FP	BAG, BARRIER WATERPROOF	6
		FP	BOX, WOOD	1
		FP	CARTON, PAPERBOARD	6
		FP	IGNITER DEVICE PLASTIC	300
1375MN11	FD DTD M147 48/BX		NO INFORMATION FOUND TO DATE	0
1375MN35	CAP BLASTING NONELEC M12	FP	BOX, WOOD	1
		FP	CARTON, CARDBOARD	6
		IP	DETONATOR AL	48
		IP	SHOCK TUBE 500 FT SURLYN COVERED POLYETHYLENE	48
		FP	SPOOL, METAL	48
1375MN36	CAP BLASTING NONELECT M11	FP	BOX, WOOD	1
		FP	CARTON, CARDBOARD	6
		IP	DETONATOR AL	60
		IP	SHOCK TUBE 30 FT SURLYN COVERED POLYETHYLENE	60
1375MN37	CAP BLASTING NONELEC DELAY M14	FP	BOX, WOOD	1
		IP	DETONATOR AL WITH 7.5 FT TIME FUSE CLOTH/PLASTIC	60
1375MN38	CAP BLASTING NONELEC DELAY M15	FP	BOX, WOOD	1
		FP	CARTON, CARDBOARD	4
		IP	DETONATOR AL WITH 70 FT TIME FUSE SHOCK TUBE	120
1377M500	CUTTER REEF LINE M21	FP	BAG, BARRIER WATERPROOF	1
		FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	80
		DR	CTG, CUTTER REEF LINE	80
1377M842	FIRING DEVICE DEMO M1 PRES REL	FP	BOX, WOOD	1
		FP	CARTON, CARDBOARD	10
		FP	FIRING DEVICE DEMOLITION M1A1	500
1385M174	CTG CAL .50 BLK ELECT MK209 MOD0		NO INFORMATION FOUND TO DATE	0
1390N278	FUZE MTSQ M564	FP	BOTTOM SUPPORT	1
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD	1
		DR	FUZE, MECHANICAL TIME M564 PLASTIC/STAINLESS STEEL	16
		FP	TOP SUPPORT PLASTIC	1
1390N285	FUZE MTSQ M577	FP	BOTTOM SUPPORT	1
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD	1
		DR	FUZE, MTSQ M577 STAINLESS STEEL	16
		FP	TOP SUPPORT PLASTIC	1

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Table 4-3
(Continued)

DODAC	Nomenclature	Solid Waste Location[a]	Packing Material	Quantity per Unit of Issue
1390N286	FUZE MTSQ M582	FP	BOTTOM SUPPORT	1
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD	1
		DR	FUZE, MTSO M582 STAINLESS STEEL	16
		FP	TOP SUPPORT PLASTIC	1
1390N335	FUZE PD M557	FP	BOTTOM SUPPORT	1
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD	1
		DR	FUZE, PD M557 MULTI MATERIALS	16
		FP	TOP SUPPORT PLASTIC	1
1390N340	FUZE PD M739	FP	BOTTOM SUPPORT	1
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD	1
		DR	FUZE, PD M739 MULTI MATERIALS	16
		FP	TOP SUPPORT PLASTIC	1
1390N402	FUZE PROX M532	FP	BOTTOM SUPPORT	1
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD	1
		DR	FUZE, PROX M532 MULTI MATERIALS	16
		FP	TOP SUPPORT PLASTIC	1
1390N464	FUZE PROX M732	FP	BOTTOM SUPPORT	1
		FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD	1
		DR	FUZE, PROX M732 MULTI MATERIALS	16
		FP	TOP SUPPORT PLASTIC	1
1390N523	PRIMER PERC M82	FP	BAG, BARRIER WATERPROOF	25
		FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	25
		FP	CASE, CTG, FIRED BRASS	500
		FP	PRIMER, PERCUSSION M82	500
1390N525	PRIMER PERC MK2A4	FP	BOX, METAL, M2A1	2
		FP	BOX, WOOD	1
		FP	CARTON, FIBERBOARD	10
		FP	CASE, CTG, FIRED BRASS	500
		FP	PRIMER, PERCUSSION M82	500
1410PB94	TOW HEAT	FP	CRATE, WOOD	1
		DR	GM, TOW, SURF/ATK, BGM-71A-2	1
1410PB96	TOW PRAC (INERT)	FP	CRATE, WOOD	1
		DR	GM, TOW, TP, BTM-71A-2	1
1410PD68	HELLFIRE AGM-114C MI		NO INFORMATION FOUND TO DATE	0
1410PV04	TOW PRACTICE		NO INFORMATION FOUND TO DATE	0
1427PL23	DRAGON HEAT	FP	CRATE, WOOD	1
		DR	GM AND LAUNCHER, DRAGON, M222 HEAT	1
1427PL85	STINGER LAUNCH SIM		NO INFORMATION FOUND TO DATE	0
1427PL90	STINGER	FP	CRATE, WOOD	1
		DR	GM, STINGER, BASIC, MSL RND	1
1427PL93	STINGER	FP	CRATE, WOOD	1
		DR	GM, STINGER, BASIC, WPN RND PARTIAL	1

[a]DR = Downrange, FP = Firing Point, IP = Consumed In Process, TMA = Training and Maneuver Area

Acronyms for Table 4-3:

ACT	Activator	HC		PROJ	Projectile
AL	Aluminum	HE	High Explosive	PROX	Proximity
APERS	Antipersonal	HEAT	High Explosive Antitank	RA	Rocket Assigned
APERS-T	Antipersonal - Tracer	HEDP	High Explosive Dual Purpose	RCKT	Rocket
API	Armor Piercing Incendiary	HEP	High Explosive Plastic	REFUB	Refurbishment
API-T	Armor Piercing Incendiary- Tracer	HEP-T	High Explosive Plastic – Tracer	REL	Release
ARTY	Artillery	IGN	Igniter	RP	Rocket Propelled
AT	Antitank	ILLUM	Illuminated	SCRN	Screen
BE	Base Ejection	INCND	Incendiary	SHPD	Shipped
BLK	Blank	IR	Infrared	SIG	Signal
BRSTER	Burster	LAU	Launcher	SIM	Simulate
CAL	Caliber	LNKD	Linked	SMK	Smoke
CAN	Canister	LR	Long Rifle	SPEC	Special
CARB	Carbine	OHF	Overhead Fire	SUBCAL	Subcaliber
CHG	Charge	MLRS	Multi-Launch Rocket System	TGT	Target

Acronyms for Table 4-3 (Continued):

CS	o-chlorobenzylidenemalononitrile (riot control agent/teargas)	MM	Millimeter	TH3	Thermite
		MP-T	Multipurpose – Tracer	TP	Target Practice
CTG	Cartridge	MS	Multi-Stage	TPCSDS	Target Practice Cartridge Special Discarding Sabot – Tracer
DEMO	Demolition	MT	Mechanical Time	TPDS-T	Target Practice Discarding Sabot – Tracer
DET	Detonation	MTR	Motor	TP-SR	Target Practice – Short Range
DISP	Dispenser	MTSQ	Mechanical Time Super Quick	TP-T	Target Practice – Training
DIST	Distress	PARA	Parachute	TR	Tracer
FLSC	Flexible Linear Shaped Charge	PD	Point Detonating	TRNG	Training
FRAG	Fragmentation	PENE	Penetrator	UK	United Kingdom
GA	Gage	PERC	Percussion	VIO	Violet
GGM	Ground Guided Missile	PERS	Personal	WDU	Warhead Dispensing Unit
GR	Grain	PL	Plastic	WHD	Warhead
GREN	Grenade	PR	Practice	WHT	White
GRN	Green	PRAC	Practice	WP	White Phosphorus
GRND	Ground	PRES	Pressure	YLW	Yellow

determined. Table 4-4 and Figure 4-1 present a summary of this correlation. Figure 4-2 also summarizes this correlation by depicting the quantity of expended rounds within each MIDAS code.

Table 4-4 and Figure 4-1 indicate which type of munition items contain the most variety of items (different DoDACs). SA, demolition material (HX), and pyrotechnics (FP) contain the highest number of different DoDACs, at 61, 36, and 33, respectively. SA items also represent greater than 97% of the total number of expended munitions as depicted in Figure 4-2. In terms of focussing characterization efforts and BMP development, these figures aid in allocating resources and maximizing benefits.

4.3.2 Initial Screening of the Inventory for Characterization

The comprehensive inventory of solid waste materials depicted in Table 4-4 will be filtered/screened to only those items that require hazardous determination by characterization. Items such as packing materials, metal clips, metal links, and downrange scrap (which will be addressed at a later date) may be easily eliminated from the listing. Table 4-5 depicts the range scrap remaining after this initial screening. Table 4-5 also groups together scrap items that have the same basic components/constituents (i.e., Group 2 consists of 1305A059, 130A062, 1305A063, 1305A064, 1305A065, 1305A068, 1305A071, 1305A075, and 1305A080). These items may be characterized as a group.

Table 4-4

Summary of 1997 FORSCOM AND TRADOC Munitions Type (DoDAC) Sorted by MIDAS Code

MIDAS Code	Description	DoDAC Count		
		Assigned	Estimated	Total
CD	Dyes	2	0	2
CP	White phosphorous	8	1	9
CR	Riot control	3	1	4
CS	Smokes, HC, colored, FS, RP	16	4	20
FI	Incendiary, thermite	2	1	3
FP	Pyrotechnics	24	9	33
HA	HE components, charge devices	1	0	1
HC	HE cartridges	17	5	22
HG	HE grenades	1	1	2
HI	HE ICM/CBU and submunitions	1	0	1
HP	HE projectiles and warheads	2	0	2
HR	HE rockets	3	1	4
HR/PD	HE rockets/propellant munitions components	1	0	1
HX	Demolition material	17	19	36
HZ	HE land mines	5	2	7
N	No family	1	1	2
PC	Propellant charges and increments	3	0	3
PD	Propellant munitions and components	10	5	15
SA	Small caliber ammunition	49	12	61
SC	Incinerable munitions and components	9	6	15
SF	Fuzes	11	0	11
SF	Fuzes	0	1	1
TM	Tactical missiles	0	6	6
UKN	Unknown	0	1	1
TOTAL		186	76	262

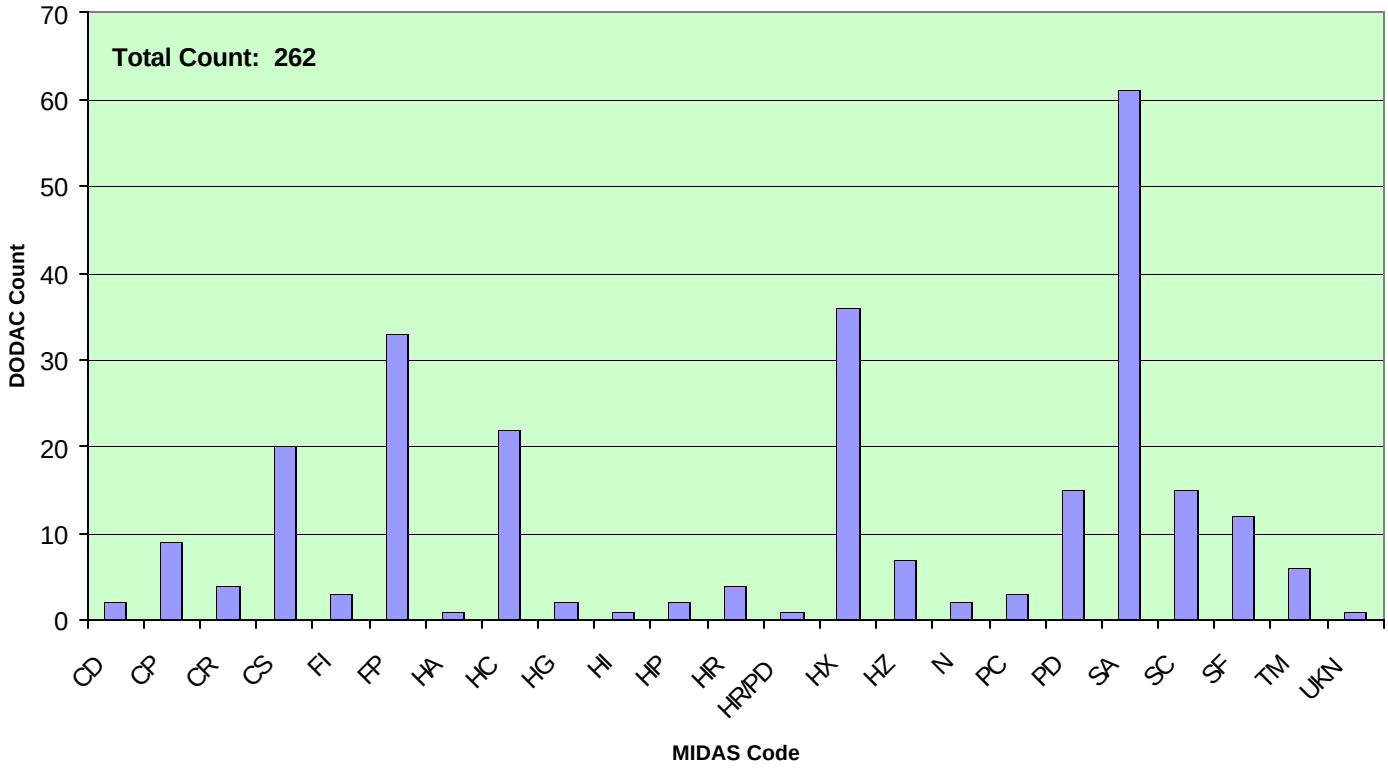

Figure 4-1. Summary of 1997 FORSCOM and TRADOC Munitions Type (DoDAC) Sorted by MIDAS Code

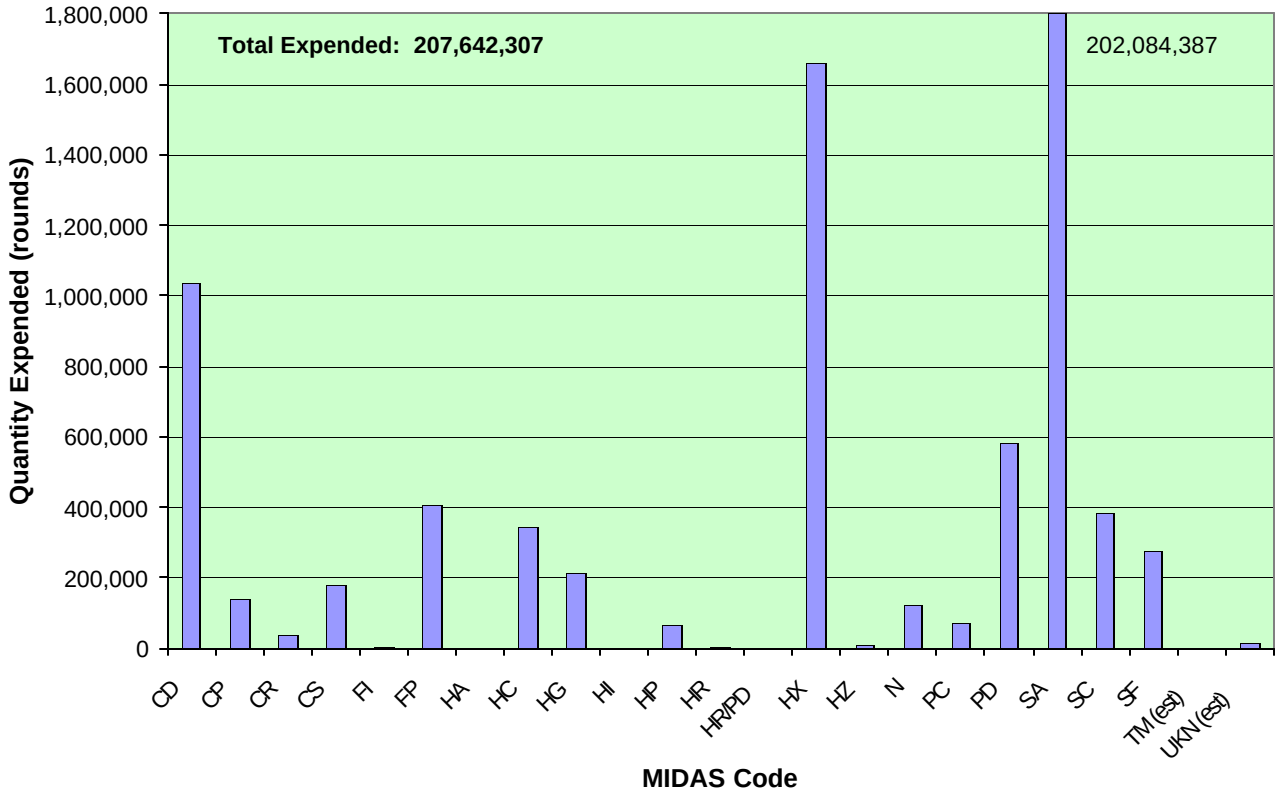

Figure 4-2. Summary of 1997 FORSCOM and TRADOC Munitions Sorted Expenditure by MIDAS Code

Table 4-5

Initial Screening of the Inventory of Solid Waste Materials for Characterization

Group	DoDAC	Nomenclature	Solid Waste Material	Annual Usage (FY 1997)
1	1305A010	CTG 10 GA SHOTGUN BLANK	CASE, CTG, FIRED, 10 GA SHOTGUN PAPER	18,953
	1305A011	CTG 12 GA SHOTGUN BUCKSHOT	CASE, CTG, FIRED, BRASS AND PAPER/PLASTIC	61,435
	1305A014	CTG 10 GA SHOTGUN #11	CASE, CTG, FIRED, BRASS AND PAPER/PLASTIC	1,110
	1305A017	CTG 12 GA SHTOGUN #9 BUCKSHOT	CASE, CTG, FIRED, BRASS AND PLASTIC	54,364
2	1305A059	CTG 5.56MM BALL M855	CASE, CTG, FIRED, BRASS	71,718,610
	1305A062	CTG 5.56MM BALL M855 LNKD	CASE, CTG, FIRED, BRASS	2,048,979
	1305A063	CTG 5.56MM TR M856	CASE, CTG, FIRED, BRASS	2,186,814
	1305A064	CTG 5.56MM BALL TR 4/1 M855, M856	CASE, CTG, FIRED BRASS	11,704,207
	1305A065	CTG 5.56MM PLASTIC M862	CASE, CTG, FIRED, BRASS	45,769
	1305A068	CTG 5.56MM TR M196	CASE, CTG, FIRED, BRASS	515,288
	1305A071	CTG 5.56MM BALL M193	CASE, CTG, FIRED, BRASS	10,678,271
	1305A075	CTG 5.56MM BLK M200 LNKD	CASE, CTG, FIRED, BRASS	39,290,821
	1305A080	CTG 5.56MM BLK M200	CASE, CTG, FIRED, BRASS	641,824
3	1305A091	CTG CAL .22 LR BALL MATCH GRADE	CASE, CTG, FIRED, BRASS	641,824
	1305A093	CTG CAL .22 LR BALL	CASE, CTG, FIRED, BRASS	32,763
	1305A106	CTG CAL .22 LR BALL	CASE, CTG, FIRED, BRASS	2,445,349
4	1305A111	CTG 7.62MM BLK M82 LNKD M13	CASE, CTG, FIRED, BRASS	7,876,873
	1305A112	CTG 7.62MM BLK M82 LNKD	CASE, CTG, FIRED, BRASS	53,816
	1305A130	CTG 7.62MM NATO BALL M80	CASE, CTG, FIRED, BRASS	10,650
	1305A131	CTG 7.62MM 4 BALL M59/M80/1 TR M62	CASE, CTG, FIRED, BRASS	19,840,854
	1305A136	CTG 7.62MM NATO SPEC BALL M118	CASE, CTG, FIRED, BRASS	165,289
	1305A143	CTG 7.62MM NATO BALL M80 LNKD	CASE, CTG, FIRED, BRASS	2,602,674
	1305A151	CTG 7.62MM 4 BALL M80/1 TR M62 OHF	CASE, CTG, FIRED, BRASS	1,468,338
	1305A165	CTG 7.62MM 4 BALL M80/1 TR M62 LNKD M13	CASE, CTG, FIRED, BRASS	1,500
	1305A171	CTG 7.62MM MATCH M852	CASE, CTG, FIRED, BRASS	145,918
	1305AA11	CTG 7.62MM M118 LRA	CASE, CTG, FIRED, BRASS	26,680
5	1305A182	CTG CAL .30 CARB BALL M1	CASE, CTG, FIRED BRASS	409
	1305A212	CTG CAL .30 BALL M2	CASE, CTG, FIRED BRASS	4,125
	1305A246	CTG CAL .30 MATCH M72	CASE, CTG, FIRED, BRASS	2,640
	1305A247	CTG CAL .30 MATCH M72	CASE, CTG, FIRED, BRASS	0
6	1305A358	CTG 9MM PRAC AT-4 M287	CASE, CTG, FIRED, BRASS	706,531
	1305A363	CTG 9MM BALL M882	CASE, CTG, FIRED, BRASS	5,763,400
7	1305A365	CTG 14.5MM ARTY TRNG M181A1	CASE, CTG, FIRED, BRASS	0
	1305A366	CTG 14.5MM ARTY TRNG M182A1	CASE, CTG, FIRED, AL ALLOY	0
	1305A367	CTG 14.5MM ARTY TRNG M183A1	CASE, CTG, FIRED, AL ALLOY	0
8	1305A475	CTG CAL .45 BALL M1911	CASE, CTG, FIRED, BRASS	26,811
9	1305A520	CTG CAL .50 4 BALL M33/1 TR M17 LNKD M15A2	CASE, CTG, FIRED, BRASS	970
	1305A540	CTG CAL .50 4 API M8/1 TR M17 LNKD	CASE, CTG, FIRED, BRASS	120,731
	1305A552	CTG CAL .50 BALL M33	CASE, CTG, FIRED, BRASS	2,180
	1305A555	CTG CAL .50 BALL M33 LNKD	CASE, CTG, FIRED, BRASS	471,382
	1305A557	CTG CAL .50 4 BALL M33/1 TR M17 LNKD M9	CASE, CTG, FIRED, BRASS	5,101,074
	1305A559	CTG CAL .50 4 BLNK M1A	CASE, CTG, FIRED, BRASS	7,920
	1305A570	CTG CAL .50 TR M17	CASE, CTG, FIRED, BRASS	1,367
	1305A572	CTG CAL .50 TR M17	CASE, CTG, FIRED, STEEL	400
	1305A576	CTG CAL .50 4 API M8/1 API-T M20 LNKD	CASE, CTG, FIRED, STEEL	31,403
	1305A585	CTG CAL .50 API-T M20 LNKD	CASE, CTG, FIRED, BRASS	656
	1305A598	CTG CAL .50 BLK M1A1 LNKD	CASE, CTG, FIRED, STEEL	1,177,957
	1305A599	CTG CAL .50 BLK M1A1 LNKD	CASE, CTG, FIRED, BRASS	0
	1305A602	CTG CAL .50 PR PL 4/1	CASE, CTG, FIRED, STEEL	0
10	1305A896	CTG 20MM 4 TP M55A2/1 TP-T M220 LNKD M14A2	CASE, CTG, FIRED, STEEL	45,460
--	1305A940	CTG 25MM TPDS-T M910	CASE, CTG, FIRED AL ALLOY	665,900
--	1305A965	CTG 25.4MM DECOY M839	CASE, CTG, FIRED, AL ALLOY	571
--	1305A976	CTG 25MM TP-T M793	CASE, CTG, FIRED, STEEL	550,480

Table 4-5

(Continued)

Group	DoDAC	Nomenclature	Solid Waste Material	Annual Usage (FY 1997)
11	1305B118	CTG 30MM TP M788	CASE, CTG, FIRED AL ALLOY	415,305
12	1310B504	CTG 40MM GRN STAR PARA M661	CASE, CTG, FIRED AL ALLOY	66
	1310B505	CTG 40MM RED STAR PARA M662	CASE, CTG, FIRED AL ALLOY	0
	1310B506	CTG 40MM RED SMK M713	CASE, CTG, FIRED AL ALLOY	40
	1310B508	CTG 40MM GREEN SMK M715	CASE, CTG, FIRED AL ALLOY	141
	1310B509	CTG 40MM YLW SMK M716	CASE, CTG, FIRED AL ALLOY	172
	1310B519	CTG 40MM TP M781	CASING, .38 CAL BRASS AND M212 NYLON	386,463
	1310B535	CTG 40MM WHT STAR PARA M583A1	CASE, CTG, FIRED AL ALLOY	27,783
	1310B536	CTG 40MM WHT STAR CLUSTER	CASE, CTG, FIRED AL ALLOY	63
	1310B542	CTG 40MM HEDP M430 LNKD	CASE, CTG, FIRED AL ALLOY	19,818
	1310B546	CTG 40MM HEDP M433	CASE, CTG, FIRED AL ALLOY	104,780
	1310B571	CTG 40MM HE M383 LNKD	CASE, CTG, FIRED AL ALLOY	54,371
	1310B584	CTG 40MM TP M918 LNKD	CASE, CTG, FIRED AL ALLOY	650,202
	1310B592	CTG 40MM TP M918	CASE, CTG, FIRED AL ALLOY	0
13	1310B627	CTG 60MM ILLUM M83A3	BODY TUBING STEEL	5,619
			CTG, 60MM ILLUM M83A3	
	1310B630	CTG 60MM SMK WP M302A1	BODY TUBING STEEL	659
			CTG, 60MM SMK WP M302A1	
	1310B632	CTG 60MM HE M49A4	BODY TUBING STEEL	9,156
	1310B646	CTG 60MM SMK WP M722 W/PD FUZE	CTG 60MM SMK WP M722 W/PD FUZE	2,239
	1315C226	CTG 81MM ILLUM M301A3 W/ FUZE	CTG, 81MM ILLUM M301A3 W/ FUZE	6,472
	1315C276	CTG 81MM SMK WP M375A2 W/PD FUZE	CTG, 81MM SMK WP M375A2 W/PD FUZE	6,706
--	1315C379	CTG, 120MM HE XM934	CASE, CTG, FIRED, STEEL	2,329
14	1315C410	CTG 90MM CAN ANTIPERS M590	CASE, CTG, FIRED AL ALLOY	8
15	1315C282	CTG 90MM HEAT M371A1	CASE, CTG, FIRED AL ALLOY	276
	1315C440	CTG 105MM BLK M395	CASE, CTG, FIRED, COPPER (STEEEL/BRASS ALT)	227
	1315C445	CTG 105MM HE M1 W/O FUZE	CASE, CTG, FIRED, STEEL	73,203
	1315C449	CTG 105MM ILLUM M314A2	CASE, CTG, FIRED, BRASS (STEEL ALT)	6,909
			CTG, 105MM ILLUM M314A3	6,909
	1315C452	CTG 105MM SMK HC BE M84 W/ FUZE	CASE, CTG, FIRED, STEEL	11
	1315C454	CTG 105MM SMK WP M60 W/ PD FUZE	CASE, CTG, FIRED, BRASS (STEEL ALT)	1,930
			CTG, 105MM SMK WP M60 W/ PD FUZE	
	1315C473	CTG 105MM HE M760	CASE, CTG, FIRED, STEEL	264
	1315C279	CTG 105MM SMK HC M84A1 W/ FUZE	CASE, CTG, FIRED, STEEL	11
	1315C542	CTG 105MM SMK HC M84A1	CASE, CTG, FIRED, STEEL	281
	1315C479	CTG 105MM SMK HC M84A1	CASE, CTG, FIRED, STEEL	3,072
	1315C650	CTG 106MM HEAT M344A1	CASE, CTG, FIRED, STEEL	82
	1315C651	CTG 106MM HEP-T M346A1	CASE, CTG, FIRED, STEEL	72
	1315C660	CTG 106MM APERS-T M581 W/FUZE	CASE, CTG, FIRED, STEEL	6
16	1315C511	CTG 105MM TP-T M490	CASE, CTG, FIRED, STEEL	335
	1315C520	CTG 105MM TPDS-T M724A1	CASE, CTG, FIRED, STEEL (BRASS ALT)	429
--	1315C623	CTG 120MM HE XM934	CASE, CTG, FIRED, STEEL	2,727
17	1315C697	CTG 4.2IN HE M329A2 W/O FUZE	CASE, CTG, FIRED AL ALLOY	1,173
	1315C706	CTG 4.2IN ILLUM M335A2 W/FUZE MT M565	CASE, CTG, FIRED AL ALLOY	100
			CTG, 4.2IN ILLUM M335A2 W/FUZE MT M565	
--	1315C784	CTG 120MM TP-T M831	CASE, CTG, FIRED, STEEL	40,362
--	1315C785	CTG 120MM TPCSDS-T M865	CASE, CTG, FIRED, STEEL	104,856
--	1315C787	CTG, 120MM HEAT MP-T M830	CASE, CTG, FIRED, PAPER	1,010
18	1315C868	CTG 81MM HE M821 W/FUZE M734	CASE, CTG, FIRED, STEEL	18,180
	1315C869	CTG 81MM HE M889 W/FUZE M935	CASE, CTG, FIRED, STEEL	414
	1315C871	CTG 81MM ILLUM M853A1	CASE, CTG, FIRED AL ALLOY	2,174
			CTG, 81MM ILLUM M853A1	
	1315C876	CTG 81MM TP-SR M880 W/ PD FUZE	CASE, CTG, FIRED AL ALLOY	3,830
19	1320D533	CHG PROP 155MM M119	CHARGE PROPELLING 155MM M119 (21LB)	2,993
	1320D540	CHG PROP 155MM GB M3	CHARGE, PROPELLING 155MM M3A1 (5 LB NEW EA)	68,922
	1320D541	CHG PROP 155MM WB M4A1	CHARGE, PROPELLING 155MM M4A1 (13 LB NEW EA)	65,189

Table 4-5

(Continued)

Group	DoDAC	Nomenclature	Solid Waste Material	Annual Usage (FY 1997)
	1315C279	CHG PROP M90A1 CHG A & B	CHARGE, PROPELLING M90A1 (193 GR EA X 2)	680
20	1330G815	GREN LNCHR SMK SCREENING RP UK L8A3	GRENADE, HAND AND LAUNCHER SMK SCRN L8A3	503
--	1330G878	FUZE GREN HAND PR M228	BODY FUZE, HAND GRENADE, EXPENDED M228	0
			FUZE, HAND GRENADE, PRACTICE	
21	1330G881	GREN HAND FRAG M67	GRENADE, HAND, FRAGMENTATION M67	215,994
	1330G900	GREN HAND INCND TH3 AN-M14	GRENADE, HAND, INCINDIARY TH3 AN-M14	988
22	1330G922	GREN HAND RIOT CS M47 W/FUZE M227	GRENADE, HAND, RIOT CS M47	5
23	1330G930	GREN HAND SMK HC AN-M8	GRENADE, HAND SMK HC AN-N8	46,629
24	1330G932	GREN HAND SMK RED M48 W/M227 FUZE	GRENADE, HAND, SMK RED M48	8
25	1330G940	GREN HAND SMK GRN M18	GRENADE, HAND SMK GRN M18	37,334
	1330G945	GREN HAND SMK YLW M18	GRENADE, HAND SMK YLW M18	38,703
	1330G950	GREN HAND SMK RED M18	GRENADE, HAND RED M18	9,954
26	1330G955	GREN HAND SMK VIO M18	GRENADE, HAND SMK VIO M18	22,997
27	1330G963	GREN HAND RIOT CS M7A3	GRENADE, HAND AND LAUNCHER	10,894
			GRENADE, HAND RIOT CS M7A3	
28	1330G978	GREN LAU SMK SIMULANT SCREENING M82	GRENADE, HAND AND LAUNCHER SMK SCRN M82	430
29	1330G982	GREN HAND SMK HC PRAC AN-M8	GRENADE, HAND SMK HC PRAC AN-N8	14,306
30	1340H108	RCKT POD 298MM PRAC M28 MLRS	ROCKET POD, MLRS, 298MM PRACTICE	24
	1370L185	RCKT POD 298MM PRAC M28 MLRS	ROCKET POD, MLRS, 298MM PRACTICE	42
31	1340H557	RCKT HE 66MM AT M72/M72A3	LAUNCHER, ROCKET, M72A2, EXPENDED	194
			PRIMER BLOCK, EXPENDED	
--	1340H708	RCKT PRAC 35MM SUBCAL M73	PRIMER BLOCK, EXPENDED	19
--	1345K010	BRSTR INCEND FIELD M4	BURSTER, INCENDIARY M4	120
--	1345K030	PRIMER IGNITER FUZE M10A1	PRIMER, FUZE IGNITOR M10A1 AL ALLOY	160
32	1390N523	PRIMER PERC M82	CASE, CTG, FIRED BRASS	151,634
			PRIMER, PERCUSSION M82	
33	1345K040	CHG SPOTTING F/MINE AP PRAC M8	CHARGE, SPOTTING AP PRAC M8 STEEL AND BRASS	160
34	1345K042	CANISTER MINE PRAC M88	CANISTER ASSEMBLY AL ALLOY AND S.STEEL COMP.	424
	1345K051	FUZE MINE AT PRAC M604	FUZE, MINE AT PRAC M604 TIN ALLOY (STEEL ALT)	250
	1345K055	FUZE MINE COMB M10A1	FUZE, MINE AT M10A1 TIN ALLOY (AL ALLOY ALT)	40
	1345K058	FUZE MINE M605	FUZE, MINE M605 TIN ALLOY (AL ALLOY ALT)	0
	1345K143	MINE APERS M18A1 W/ACCESSORIES	MINE, AP M18A1	8,525
	1345K180	MINE AT HEAVY M15	FUZE, M603	676
			MINE, AT HEAVY M15	
	1345K181	MINE AT HEAVY M21	BOOSTER, M1204	565
			FUZE, M607	
			MINE, AT HE HEAVY M21	
	1345K250	MINE AT HEAVY M19 NON METALLIC	FUZE, M606	456
			MINE, AT HEAVY M19	
35	1365K866	SMK POT HC 30LB ABC-M5	SMOKE POT, M5 GROUND TYPE	5,793
36	1365K867	SMK POT FLOATING TYPE HC M4A2	SMOKE POT, M4A2, FLOATING TYPE	78
--	1365K917	THICKENING COMPND M4	PAIL, THICKENING COMPUND M4	568
--	1370L116	KIT FLARE PERS DIST	PROJECTOR, XM20	544
			SIGNAL KIT, PERSONAL DISTRESS, RED XM185	
37	1370L410	FLARE ACFT COUNTERMEASURE M206	CASING, CTG, AL LOY	
			FLARE, ACFT COUNTERMEASURE, M206	
38	1370L495	FLARE SURF TRIP M49	CTG, FLARE, TRIP M49 STEEL	17,038
--	1370L508	FUSEE SIGNAL WARNS RR RED	STRIKER CAP	2,152

Table 4-5

(Continued)

Group	DoDAC	Nomenclature	Solid Waste Material	Annual Usage (FY 1997)
--	1370L595	SIMULATOR PROJ AIRBURST LIQ	SIMULATOR, PROJECTILE AIRBURST LIQUID	16
39	1370L366	SIMULATOR PROJ AIR BURST M74A1	SIMULATOR, PROJ AIR BURST M74A1	27,310
40	1370L594	SIMULATOR PROJ GRND BURST M115A2	SIMULATOR, PROJECTILE GRND BURST M115A2	66,210
	1370L596	SIMULATOR FLASH ART M110	ASSEMBLY, SIMULATOR M110 PLASTIC	3,773
	1370L598	SIMULATOR BOOBY TRAP FLASH M117	ASSEMBLY, SIMULATOR M117 PAPER	16,920
	1370L599	SIMULATOR BOOBY TRAP ILLUM M118	ASSEMBLY, SIMULATOR M118 PAPER	6,695
	1370L600	SIMULATOR BOOBY TRAP M119 WHISTLE	ASSEMBLY, SIMULATOR M119 PAPER	16,166
	1370L601	SIMULATOR HAND GREN M116A1	ASSEMBLY, SIMULATOR M116A1 PAPER	97,741
41	1370L602	SIMULATOR FLASH ARTY M21	ASSEMBLY, SIMULATOR M21 PAPER POLYETHYLENE PLASTIC	228,247
	1370L709	SIMULATOR TGT-HIT XM26	SIMULATOR, TGT-HIT XM26	79
	1370L715	SIMULATOR AT GGM MS XM27	SIMULATOR, AT GGM MS XM27	1,534
	1370L720	SIMULATOR TGT KILL XM26	SIMULATOR, TGT-HIT XM26	79
42	1375M130	CAP BLASTING ELECTRIC M6	CAP, BLASTING NONELEC W/ WIRE (12 FT) M7	12,513
	1375M131	CAP BLASTING NONELEC M7	CAP, BLASTING	16,358
43	1375M627	FIRING DEVICE PRESSURE RELEASE M5	ASSEMBLY, FIRING DEVICE DEMOLITION M5 STEEL	307
	1375M766	IGN TIME BLASTING M60	IGNITER, TIME BLASTING FUZE, M2	17,555
	1375MN08	IGNITER TIME BLASTING FUSE M81	IGNITER DEVICE PLASTIC	37,373
--	1375M913	LINE CRG (MICLIC)	CHARGE, LINK C-4 (MICLIC)	40
--	1375M914	LINE CHARGE INERT MI	CHARGE, LINE INERT (MICLIC)	34
44	1375ML03	FIRING DEVICE DEMO, M142	BOX, METAL, M2A1	1,521
--	1375ML05	CHG CUTTER HE MK24-0	CHG CUTTER HE MK24-0	9
45	1375ML09	CHG DEMO FLSC 20 GR	FLSC CHARGE CONTAINER LEAD ANTIMONY	24
	1375ML15	CHG DEMO FLSC	CHG, DEMO FLSC	308
--	1375ML45	HOLDER CAP BLASTING M9	CLAMPING DEVICE, PLASTIC (F/SHOCK TUBE)	34,447
46	1375ML47	CAP BLASTING NONELEC M11	DETONATOR AL	55,795
			SHOCK TUBE 30 FT SURLYN COVERED POLYETHYLENE	
	1375MN02	CAP BLASTING NONELEC M12	DETONATOR AL	5,053
			SHOCK TUBE 500 FT SURLYN COVERED POLYETHYLENE	
	1375MN03	CAP BLASTING NONELEC M13	DETONATOR AL	3,946
			SHOCK TUBE 1000 FT SURLYN COVERED POLYETHYLENE	
	1375MN06	CAP BLASTING NONELEC DELAY M14	DETONATOR AL WITH 7.5 FT TIME FUSE CLOTH/PLASTIC	25,704
	1375MN07	CAP BLASTING NONELEC DELAY M15	DETONATOR AL WITH 70 FT TIME FUSE SHOCK TUBE	88
	1375MN35	CAP BLASTING NONELEC M12	DETONATOR AL	12
			SHOCK TUBE 500 FT SURLYN COVERED POLYETHYLENE	
	1375MN36	CAP BLASTING NONELECT M11	DETONATOR AL	132
			SHOCK TUBE 30 FT SURLYN COVERED POLYETHYLENE	
	1375MN37	CAP BLASTING NONELEC DELAY M14	DETONATOR AL WITH 7.5 FT TIME FUSE CLOTH/PLASTIC	212
	1375MN38	CAP BLASTING NONELEC DELAY M15	DETONATOR AL WITH 70 FT TIME FUSE SHOCK TUBE	30

Note: If no Group number is assigned (i.e., "--"), no information readily exists to help quantify and classify potential contaminant sources and rationale for sampling. The groupings will be updated as information becomes available.
Overall, the list has been paired from 262 initial entries to 46 potential groupings. Additional grouping is possible based on review of the composition and method of use (e.g., round fired downrange and no casing left at firing point). Many of the munitions included in the main inventory list were excluded based on their known properties and the lack of potential contaminants. For example, 155mm and 8-in. projectiles were excluded since they are steel and strontium and are propelled by a separate charge.

Table 4-5 may be further reduced by eliminating items (or groups of items) for which existing characterization data exist. The existing characterization data summarized in Section 5 will be evaluated against the data quality objectives, which will be developed in the next phase (Phase II) of this project. The MIDAS database and/or other munitions references will be further utilized to determine whether any of the remaining items can be eliminated by process knowledge information contained in these sources for specific scrap items/munitions components.

5.0 EXISTING CHARACTERIZATION DATA

The search for existing characterization data revealed several sources of data related to range scrap items, as well as environmental media (soils, surface water, etc.). The data for range scrap items primarily address expended SA cartridge casings, smoke grenades, and smoke pots. Table 5-1 summarizes the existing characterization data and the items (DoDACs) on the inventory (Table 4-5) to which the data apply.

The sampling and analysis conducted for SA type munitions items is considered acceptable for hazardous waste determination. Review of the Toxicity Characteristic Leaching Procedure (TCLP) results for the SA items indicates that expended cartridge casings less than .50 caliber consistently fail TCLP for lead. The source of lead is apparently from lead styphnate found in the primer. Although the lead styphnate is also found in the primer of the larger caliber rounds, the relative quantity of lead is less because of the greater mass of the casings.

The ash removed from various smoke grenades was also submitted for TCLP analysis for metals. Sampling only the ash residue may be considered appropriate if the residue could become separated from the grenade. Review of the TCLP results indicates that the ash residue from white and high concentration smoke grenades (DoDACs 13306900 and 13306930) are hazardous due to failing TCLP for barium and lead. The colored smoke grenades pass TCLP for metals, except for red (13306950), which failed TCLP for mercury.

The typical smoke pot (DoDAC 1345K866) was sampled in various forms (residue only, canister only, and both residue and canister) and submitted for TCLP analysis for metals and semivolatile compounds. The TCLP results consistently exceeded limits for lead and/or cadmium. However, one sample each was collected from the ash residue of the floating type (DoDAC 1345K867) and training smoke pot (type TA M8) and both passed TCLP for metals. This data indicates an inconsistency in hazardous waste determination among different types of smoke pots and may require additional testing to verify.

Data quality objectives will be developed for characterization in Phase II of this project. The existing characterization data will be further evaluated at that time to determine

whether additional sampling and analysis is required for the affected DoDACs listed in Table 5-1.

Table 5-1
Summary of Existing Characterization Data for Range Scrap

Munitions Item	Affected DoDACs	Study Reference	Sampling Method	Analysis	Significant Results
5.56mm expended cartridge casing	1305A059, 1305A062, 1305A063, 1305A064, 1305A065, 1305A068, 1305A071, 1305A075, 1305A080	6	Submitted entire cartridge for analysis in triplicate	TCLP – Semivolatile Organic Compound (SVOC) TCLP – Metals	All TCLP SVOCs were not detected (ND) All three samples failed **TCLP for Pb**
		2	Submitted entire cartridge (1305A068) for analysis	TCLP – Ba, Cd, Pb TCLP – DNT	Passed TCLP for DNT Failed **TCLP for Pb**
.22 cal expended cartridge casing	1305A091, 1305A093, 1305A106	2	Submitted entire cartridge (1305A091) for analysis	TCLP – Ba, Cd, Pb TCLP – DNT	Passed TCLP for DNT Failed **TCLP for Pb**
7.62mm expended cartridge casing	1305A111, 1305A112, 1305A130, 1305A131, 1305A136, 1305A143, 1305A151, 1305A165, 1305A171	6	Submitted entire cartridge for analysis in triplicate	TCLP – SVOC TCLP – Metals	All TCLP SVOCs were ND All three samples passed TCLP for metals (Pb was marginal at an average of 4.43 mg/L)
		2	Submitted entire cartridge (1305A130) for analysis	TCLP – Ba, Cd, Pb TCLP – DNT	Passed TCLP for DNT Failed **TCLP for Pb**
.30 cal expended cartridge casing	1305A182, 1305A212, 1305A222, 1305A246, 1305A247	2	Submitted entire cartridge (1305A212) for analysis	TCLP – Ba, Cd, Pb TCLP – DNT	Passed TCLP for DNT Failed **TCLP for Pb**
9mm expended cartridge casing	1305A358, 1305A360, 1305A363	6	Submitted entire cartridge for analysis in triplicate	TCLP – SVOC TCLP – Metals	All TCLP SVOCs were ND All three samples failed **TCLP for Pb**
		2	Submitted entire cartridge (1305A130) for analysis	TCLP – Ba, Cd, Pb TCLP – DNT	Passed TCLP for DNT Passed TCLP for the three metals (Pb was marginal at 4.5 mg/L)
.38 cal expended cartridge casing	1305A403, 1305A404	2	Submitted entire cartridge (1305A404) for analysis	TCLP – Ba, Cd, Pb TCLP – DNT	Passed TCLP for DNT Failed **TCLP for Pb**
.45 cal expended cartridge casing	1305A475, 1305A483	2	Submitted entire cartridge (1305A483) for analysis	TCLP – Ba, Cd, Pb TCLP – DNT	Passed TCLP for DNT Failed **TCLP for Pb**
.50 cal expended cartridge casing	1305A520, 1305A540, 1305A549, 1305A552, 1305A555, 1305A557, 1305A559, 1305A570, 1305A572, 1305A576, 1305A585, 1305A598, 1305A599, 1305A602	6	Submitted entire cartridge for analysis in triplicate	TCLP – SVOC TCLP – Metals	All TCLP SVOCs were ND All three samples passed TCLP for metals (Pb average at 2.03 mg/L)
		2	Submitted entire cartridge (1305A549) for analysis	TCLP – Ba, Cd, Pb TCLP – DNT	Passed TCLP for DNT Passed TCLP for the three metals (Pb was marginal at 3.4 mg/L)
20mm expended cartridge casing	1305A896	2	Submitted entire cartridge (1305A896) for analysis	TCLP – Ba, Cd, Pb TCLP – DNT	Passed TCLP for DNT Passed TCLP for all three metals

Table 5-1
(Continued)

Munitions Item	Affected DoDACs	Study Reference	Sampling Method	Analysis	Significant Results
Grenade, hand, incendiary, TH3-AN-M14	1330G900	4	Sampled ash residual	TCLP - Metals	Failed **TCLP for Ba**
Grenade, hand, smoke, HC AN-M8	1330G930	4	Sampled ash residual	TCLP - Metals	Failed **TCLP for Pb**
Grenade – no box (white)	1330G930 (uncertain)	1	Ash residue	TCLP - Inorganics	Passed TCLP for inorganics
Grenade – box (white)	1330G930 (uncertain)	1	Ash residue	TCLP - Inorganics	Failed **TCLP for Pb** at 6.01 mg/L
M18 Smoke grenade, green	1330G940	1	Ash residue	TCLP - Inorganics	Passed TCLP for inorganics
		4	Sampled ash residual	TCLP - Metals	Passed TCLP for metals
M18 Smoke grenade, yellow	1330G945	1	Ash residue	TCLP - Inorganics	Passed TCLP for inorganics
		4	Sampled ash residual	TCLP - Metals	Passed TCLP for metals
M18 Smoke grenade, red	1330G950	1	Ash residue	TCLP - Inorganics	Passed TCLP for inorganics
		4	Sampled ash residual	TCLP - Metals	Failed **TCLP for Hg**
Smoke grenade, Red-PB-44-5	1330G950 (uncertain)	1	Ash residue	TCLP - Inorganics	Passed TCLP for inorganics
M18 Smoke grenade, purple (violet)	1330G955	1	Ash residue	TCLP - Inorganics	Passed TCLP for inorganics
		4	Sampled ash residual	TCLP - Metals	Passed TCLP for metals
M18 Smoke grenade, various colors	1330G940 (green), 1330G945 (yellow), 1330G950 (red), 1330G955 (violet)	3	Sample consolidated from powder of 3 violet, 2 yellow, 4 red, and 4 green M18s	EPA 8330 (mod) – nitrocellulose EPA 300.0B – potassium chlorate	Nitrocellulose – ND (matrix interference noted) Chlorate detected at 723 mg/kg
			2 samples of ash residue collected from various M18s	EPA 3050B/6010B – Total Threshold Limit Concentration (TTLC) for Title 22 Metals (California) EPA 3010A(wet)/6010B Soluble Threshold Limit Concentration (STLC) for Title 22 Metals (California)	All metals below TTLC and STLC limits
Grenade, hand, riot, CS M7A3	1330G963	4	Sampled ash residual	TCLP - Metals	Passed TCLP for metals

Table 5-1
(Continued)

Munitions Item	Affected DoDACs	Study Reference	Sampling Method	Analysis	Significant Results
Smoke pot, HC M5	1345K866	4	Sampled ash residual	Total metals	ND for total metals
		5	Sampled easily removable grayish lower density solid (3 spent pots from Fort Carson)	TCLP – Metals Total SVOCs	ND for SVOCs One sample failed **TCLP for Pb** at 8 mg/L (other 2 at 2.4 and 0.65 mg/L) One sample failed **TCLP for Cd** at 1.6 mg/L
			Sampled brownish, heavier solid fused to internal metal surface (2 spent pots from Fort Carson)	TCLP – Metals Total SVOCs	ND for SVOCs Failed **TCLP for Pb** at 26 and 57 mg/L One sample failed **TCLP for Cd** at 4.5 mg/L
			Sampled whole, metal canister (cut into pieces) with majority of residue stripped off (1 spent pot from Fort Carson)	TCLP – Metals Total SVOCs	ND for SVOCs Failed **TCLP for Cd** at 1.6 mg/L
			Sampled metal canister and fused residue (cut into pieces) – 1 spent pot from Fort Carson	TCLP – Metals Total SVOCs	ND for SVOCs Failed **TCLP for Pb** at 35 mg/L
			Fort Riley sampled M5-HC smoke pot residue	Reactive cyanides and sulfides TCLP - Full	ND for cyanides and sulfides Failed **TCLP for Pb** at 20.1 mg/L
			Fort Knox sampled M5-HC smoke pot residue	TCLP - Metals	Failed **TCLP for Pb** at 13.7 mg/L
			Fort Hood sampled M5-HC smoke pot residue from several pots mixed (duplicate sample taken)	TCLP – Hexachloroethane TCLP - Pb	Passed TCLP for hexachloroethane (ND) Failed **TCLP for Pb** at an average of 9.2 mg/L

Table 5-1
(Continued)

Munitions Item	Affected DoDACs	Study Reference	Sampling Method	Analysis	Significant Results
Smoke pot, floating type, HC M4A2	1345K867	4	Sampled ash residual	TCLP - Metals	Passed TCLP for metals
Smoke pot, TA M8	Unknown	4	Sampled ash residual	TCLP - Metals	Passed TCLP for metals

References:

1. Fort Rucker Smoke Pot Study (Analytical Results Sheet), Sample date 31 March 1998.
2. Memorandum, Robert W. Coyle, Department of Navy, Subject: SA Munitions Evaluation for TCLP, 20 March 1991.
3. Memorandum, Pete Porter, NAS North Island SCE 18E, Subject: Smoke Grenade and Flare Sampling, 15 April 1998.
4. Memorandum, U.S. Army Center for Health Promotion and Preventative Medicine (USACHPPM), Subject: Characterization of Selected Spent Grenades and Smoke Pots, 5 December 1996.
5. Memorandum, Linda L. Baetz, USACHPPM, Subject: Hazardous Waste Study No. 37-7016-97/98, US AEC, Aberdeen Proving Ground, Maryland, July 1997-February 1998.
6. Memorandum, Linda L. Baetz, USACHPPM, Subject: Hazardous Waste Study No. 37-7016-98, Phase 2, US AEC, Aberdeen Proving Ground, Maryland, February-April 1998.

6.0 SITE VISITS

The site visits for this effort were initially intended to provide an inventory of range scrap items by observing waste management activities and reviewing documentation at the selected installations. However, it was determined that this information could be more easily and comprehensively assimilated by using existing Army databases and reference material (refer to Section 4.1). The focus of the site visits then shifted to validating the inventory data assembled at the command level and documenting waste management activities and requirements at the installations.

The project team conducted site visits at two Army installations in August and September 1998. The inventory data presented in Section 5 generally match well with the information reviewed during the site visits. Sections 6.1 and 6.2 summarize the specific observations and findings compiled during the site visits.

6.1 Munitions Issued to Using Units

Munitions are stored, inspected, and maintained at the installation Ammunition Storage area and issued to the using units from a centralized ASP. The following practices were observed at the ASP during the site visits:

- Munitions expenditures are tracked on a Range Facility Management System and/or SAAS IV;
- All munitions fired onto training ranges are issued to the units by the ASP in their original containers and in the quantity requested by the unit;
- Issue of munitions is documented on a DA Form 581, Request for Issue and Turn-In of Ammunition;
- Munitions are transferred to the range by the units being trained where they are re-issued to the individual soldier or crew for expenditure; and
- Munitions not expended are returned to the ASP, also documented on a DA Form 581.

6.2 Waste Management Practices

Waste management practices were observed during the site visits at the firing points, ASP, Defense Reutilization and Marketing Office (DRMO), and QRP. A summary of the waste management practices observed at each of these locations is provided below.

6.2.1 Firing Point

The findings and waste management practices observed at firing points during the two site visits are as follows:

- All issued items (e.g., munitions, containers, and packaging) brought onto the range are generally either fired downrange or taken back to the ASP.
- Examples of scrap generated at the point of fire include links, clips, lifting lugs, expended brass casings, and expended launch tubes.
- Firing lines are typically policed (recovering/collecting residues or scrap) following each order of fire.
- Units returning from the field with their brass, links, and solid waste carefully segregate range scrap (brass, links, solid waste, etc.), as well as perform inspections for live rounds and certify the return items to be free of explosive material.
- Current operating practice at the two installations visited does not include the comprehensive collection or gleaning of munitions residue items forward of the firing line (however, QRP personnel at one of the installations regularly collect firing range scrap from maneuver areas, such as aluminum sabot petals, HEAT round magnesium collars, and miscellaneous ferrous and nonferrous materials known to be inert).

6.2.2 ASP

The ASP is the central point for turn-in of munitions items, such as live rounds, expended cartridge casings, packing material, etc. The observations and waste management practices noted during the site visits are provided below:

- The ASP typically has Standard Operating Procedures for turn-in and waste management.

- ASP officials weigh and inspect items, which must be reconciled, in the presence of the unit. If even a single live round is found, the entire lot is rejected.
- DA Form 581s for live ammunition are processed through SAAS-4 utilizing DA Form 3141, Live Ammunition Turn-In.
- The inspecting personnel may permit the using unit to assist in screening some components, such as brass or links, when constant observation can be provided.
- Once accepted and the unit dismissed, ASP workers re-inspect the items and deposit them into bulk containers for later consignment to the DRMO, QRP, IOC depot, or solid waste landfill.
- Hazardous waste items include smoke grenades and smoke generators, which are over-packed in drums by ASP personnel, labeled by the environmental office, and picked up by DRMO.
- Recyclable items staged at the ASP include expended brass (including aluminum and steel) cartridge casings from 9 to 105mm, 120mm end caps, links, 155mm lifting plugs, various ammunitions boxes (both wooden and metal), and 5.56mm clips.
- Items designated as "automatic returns" by Industrial Operations Command for return to depots include expended AT-4, Light Anti-tank Weapon, and Stinger missile launchers.
- Sanitary solid waste items, such as banding, bandoleers, cardboard and foam spacers and packing material, and wire-bound boxes, are placed in roll-away dumpsters at the ASP.

6.2.3 DRMO

The DRMO provides a sales service for range residue scrap, as well as coordinating HWM. The following observations and waste management practices at the DRMOs were noted during the site visits:

- The DRMO typically has a Memorandum of Understanding (MOU) with the Base Commander, which provides for the disposal processing of range residue scrap. The MOU defines the services to be provided by DRMO and the responsibilities of the base.
- The DRMO typically provides sales service to include submitting a list of property for sale, recommending special conditions, printing and mailing catalogs, conducting sale, providing contract monitoring, depositing sales proceeds, and recordkeeping only.
- All items turned in to the DRMO by the ASP are documented on a DD Form 1348-1a (Turn in Document). This contains the DoD Activity Address Code

(DoDAAC) of the ASP to ensure an audit trail and is the only DoDAAC on the installation turning in this type material. It also includes a signed inert certification stating all items have been inspected and do not contain explosives or other dangerous materials.

- Along with the DD Form 1348-1a, a weight ticket is prepared on each load of scrap property removed, to include DLA Form 1367, Shipment Receipt/Delivery Pass, with radiation check certification inert certificate and DEMIL certificate and when required, declassification certificate.
- Items observed stored at DRMO include SA brass from 25mm steel chain gun casings, 155mm steel shipping tubes, 105mm steel casings, 120mm steel aft caps, 40mm aluminum grenade base assemblies, slap flare aluminum casings, 75mm aluminum casings, hand grenade fuses, steel ammunition links, and various plastic, wooden, and steel ammunition boxes.
- Sales are documented on a Defense Reutilization and Marketing Service (DRMS) Form 1427, Notice of Award, Statement, and Release Document, to record the name of the purchaser, description and quantity of items, and price.
- Waste and scrap are given a Standard Classification List (SCL) Code, such as "D22" for .22 caliber expended brass cartridge cases or "E1M" for mixed steel scrap (empty cartridge cases, practice bombs, etc.). A log is kept to record each sale according to the SCL Code.

6.2.4 QRP

Most installations establish a QRP as an essential part of a cost-effective recycling program. In accordance with DoD Instruction (DoDI) 4715.4, Pollution Prevention, each installation shall have a QRP that shall serve all host and tenant organizations occupying space on the installation. The Combined Services Recycling Working Group also prepared a draft document, *Draft Closing the Solid Waste Circle: The Combined Services Guide for Qualified Recycling Programs* (19 June 1998), which expands on the policies outlined in DoDI 4715.4, Pollution Prevention. Additional clarification of DoD regulations covering recycling through QRPs described in DoDI 4715.4 was also provided in a 15 May 1998 Office of the Under Secretary Defense Memorandum entitled *Recycling of Firing-Range Scrap Consisting of Expended Brass and Mixed Metals Gleaned from Firing Range Clearance Through QRPs*. A summary of observations and waste management practices noted during visits to the QRP facilities at the two installations is provided below:

- The QRP is operated by MWR at both installations.
- The QRP at one installation receives 5.56mm, 7.62mm, and .50 caliber brass at the installation recycling center. These items were previously consigned to DRMO. MWR recently purchased a "deformer," through which all brass items are processed per the requirements of DoDI 4715.4, paragraph F2c(3)(f)1. All brass is certified by trained QRP officials as being free of explosives before being sold. QRP officials at this location do not at this time accept .22 caliber, .38 caliber, and 9mm brass because the manufacturers' casing specifications are unknown and the market value is unclear. These items are consigned through DRMO.
- The QRP at the other location has yet to receive any SA (i.e., 5.56mm, 7.62mm, and .50 caliber) brass from the ASP as authorized by DoDI 4715.4, paragraph F2c(3)(f)1. These items are currently being consigned to and marketed through DRMO. Once the QRP receives its brass "deformer," they can process and market these items for the installation MWR program.
- QRP workers at one location regularly collect firing range scrap from maneuver areas (firing lines are policed by training units as described in Section 6.2.1), consisting of mixed metals gleaned from firing ranges during range clearance operations. These items are also certified. Examples include discarded sabot "petals," HEAT round collars, and miscellaneous ferrous and nonferrous materials known to be inert. QRP officials maintain these items qualify for QRP recycling because they do not require demilitarization and are not Munitions List Item (MLI) or Strategic List Items (SLI) [see also DoDI 4715.4, paragraph F2c(3)(f)1]. The gleaned petals and collars are processed at the recycling center to remove rubber and steel in order to increase their recycling value. The aluminum and magnesium components of the collars are mechanically separated at the recycling center. This also increases their recycling value.
- The QRP at the other location does not collect discarded aluminum sabot petals or HEAT round magnesium collars for resale. The QRP managers are concerned these petals and collars cannot be resold since they originally came from rounds listed as MLIs and Commerce Controlled List Items (formerly SLI) in DoD 4160.21-M-1, the Defense Demilitarization Manual. The project team left the QRP manager a copy of DoDI 4715.4. It authorizes direct sales of "firing-range-expended brass or mixed metals gleaned from firing range cleanup that do not require demilitarization and that are MLI/SLI."

7.0 DATA GAPS

7.1 Inventory

The list of munitions items, as well as corresponding range scrap, contained in the inventory in Section 4 represents training expenditures for TRADOC and FORSCOM only (does not include foreign munitions, research, development, testing, and evaluation items brought onto FORSCOM/TRADOC). However, these two commands are assumed to represent an acceptable percentage of the munitions used on Army training ranges.

Downrange scrap items have not been fully delineated for the munitions items listed in Section 4. The current scope of this study addresses characterization and development of BMPs for range scrap collected at the firing point only. The inventory of range scrap collected from downrange will be completed at a later date and will supplement this effort.

7.2 Characterization of Range Scrap (Firing Point)

The next phase of the Range Scrap (Firing Point) Study is to develop a characterization strategy to address data gaps in the characterization of range scrap collected at the firing point. The regulatory framework (Section 3) developed for managing range scrap will be used to develop data needs and data quality objectives for the firing point range scrap listed in the inventory in Section 4.3.2. Existing characterization data (Section 5) will be used to the extent practicable to satisfy data requirements identified for this project. Remaining data needs for characterization will be addressed through sampling and analysis and Phase II of this project.

Appendix A

SUPPLEMENTAL REPORTS GENERATED BY INVENTORY DATABASE

Range Scrap Summary by Type Report

This database report provides a cross-reference between each type of solid waste material in the inventory and the number of associated munitions items or DoDACs. The most common solid waste materials in the inventory have a higher number of associated DoDACs.

Summary of Munitions Usage for TRADOC and FORSCOM in FY 1997

Reference Report

Appendix B
DATA SOURCES

Appendix B

DATA SOURCES

A comprehensive data search and review was completed during Phase I of this project. The data search was performed for four primary areas: regulatory compliance, inventory data, characterization data, and waste management practices. The following is a comprehensive listing and description of the data sources compiled and reviewed to date.

Regulatory Compliance

1. DoD HWM Subcommittee, Subject: "Determination Regarding Waste Characterization of Recyclable Residues from Range Operations," 26 June 1998

   The DoD HWM Subcommittee suggested that DoD can either take advantage of a new RCRA exemption for "excluded scrap metal" from the definition of a regulatory solid waste in those states that have adopted it or use process knowledge to declare scrap metal resulting from range operations as hazardous waste.

2. Federal Register, Vol. 50, No. 3, Friday, 4 January 1985, Rules and Regulations

   EPA finalizes much of the rule proposed on 4 April 1983 to amend its existing definition of solid waste used in regulations implementing Subtitle C of the RCRA.

3. EPA Office of Solid Waste, Washington, D.C., Letter from Jeffery S. Hannapel, Subject: "Regulatory Status of Lead Shot," 13 March 1997

   EPA Region V requested clarification from the Office of Solid Waste regarding the regulatory status of lead shot (i.e., spent material versus scrap metal). The Office of Solid Waste writes: "Rather than squeeze scrap metal into either the spent material or by-product category, we have placed it in its own category." Based on these regulatory passages, the lead shot portion of the pile would be considered scrap metal, not a spent material.

4. EPA OSWER, EPA530-R-94-016, *Re-engineering RCRA for Recycling: Report and Recommendations of the Definition of Solid Waste Task Force*, November 1994

   In this document, the Task Force discussed EPA's criteria for determining whether an activity is sham recycling and presented the "toxics along for the ride" (TAR) test.

5. Specialty Steel Industry of North America, Steel Manufacturers Association, and American Iron and Steel Institute, *Redefinition of Solid Waste Discussion Document*, 17 May 1995

   The document consists of the steel industry's response to the EPA Re-engineering RCRA for Recycling document. The document argued that TAR testing for the steel industry is inappropriate and proposed focussing on a "legitimacy test" for metal recycling and observing environmentally sound management.

6. Camp Bonneville UXO Activities, Michael Nelson, Memorandum for Record, Subject: "Ordnance and Explosives (OE) Sampling Work Plan," Camp Bonneville, Washington, 22 April 1998

   This memorandum defines a scrap certification process to ensure that the scrap metal does not contain any reactive, corrosive, ignitable, or TC wastes and is suitable for shipment off-site as scrap metal.

7. 40 CFR 260–270 and Part 124

   These documents provide applicable RCRA permitting, procedural, and technical standards.

Inventory Data

1. TAMIS Database

   This information system processes, stores, and retrieves data on authorizations and use of training ammunition. The TAMIS database consists of an authorization file, expenditure file, and a cost file.

2. DA Form 5515, Training Ammunition Control Document

   This form accompanies each sub-issue of munitions and turn-in of unused munitions and munitions residue.

3. DD Form 1348, Turn-In Document

   This form accompanies all transfers of ordnance-derived waste (ODW) from the ASP. The DoDAAC used by ASP is listed on the 1348.

4. SAAS IV

   This is the installation's electronic munitions tracking system, which provides daily storage operations.

5. MIDAS

   Munitions characterization includes research of technical data packages, engineering drawings, specifications, standards, and other sources to determine all components and constituents of a munitions item. The program was established to identify alternatives to OB and OD and provide a central source of demilitarization and disposal information for unwanted munitions items.

6. ABC

   This document provides a summary of logistics and planning quantities for cataloging munitions. For each munitions item, the following is provided: physical description, net explosive weight, packaging material and quantity, packaging size, and shipping data required for overland and air transport.

7. Army Ammunition Data Sheets

   Various Technical Manuals (e.g., TM 43-0001-27, Army Ammunition Data Sheets for Small Caliber Ammunition) contain Army Ammunition Data Sheets for different ammunition types. Some data sheets list components and constituents, as well as packaging materials.

Characterization Data

1. Fort Rucker Smoke Pot Study

   This study contains analytical results of samples collected on 31 March and 19 May 1998. White smoke fails TCLP, but others passed.

2. Nellis Air Force Base (Box Canyon) Remediation

   This data source contains surface soil sampling results for bombing target areas.

3. Sampling/Risk Analysis Report for The Gaillard Cut Panama Canal, Panama

   This data source contains OE site characterization data.

4. U.S. Navy Studies

   Memorandum from Robert W. Coyle dated 20 March 1991, Subject: Small Arms (SA) Munitions Evaluation for TCLP.
   Memorandum from Pete Porter dated 15 April 1998, Subject: Smoke Grenade and Flare Sampling.

5. Jay L. Bishop, Ph.D, Tooele Army Depot, *Detonation Ground Soils, & Explosive-Contaminated Metal Have No Reactivity Characteristic Under RCRA Hazardous Waste Regulations*.

   Metal pieces coated with small amounts (up to 2.2 g) of HE per pound of metal tested unreactive.

6. USACHPPM Studies

   Memorandum from Linda L. Baetz, Subject: Hazardous Waste Study No. 37-7016-98, Phase 2, AEC, Aberdeen Proving Ground, Maryland, February–April 1998.
   Memorandum from Linda L. Baetz dated 5 December 1996, Subject: Characterization of Selected Spent Grenades and Smoke Pots.

7. Cold Regions Research and Engineering Laboratory (Army), Special Report 97-22, *Assessment of Sampling Error Associated with Collection and Analysis of Soil Samples at a Firing Range Contaminated with HMX*, September 1997

   The report addressed the analysis of explosives residues remaining on metallic debris. Extraction performed on a 7-g sample of metallic debris resulted in HMX and TNT at 50 mg/kg and 0.1 mg/kg, respectively.

Waste Management Practices

1. Army Regulation 385-63, MCO P3570.1A. *Safety: Policies and Procedures for Firing Ammunition for Training, Target Practice, and Combat*, 15 November 1983

   This regulation clarifies requirements on ranges for officers in charge and range safety officers, incorporates revised ballistic data affecting surface danger zone diagrams for SA, incorporates new standardized range design for hand grenade ranges, and clarifies combined arms live fire exercises and laser operations.

2. DoD 4160.21-M-1

   The Defense Demilitarization Manual contains MLI/Commerce Control List Item (CCLI)/SLI listings. It specifies the items to be demilitarized, designates the key points to be destroyed, and prescribes methods for accomplishment of demilitarization.

3. DoDI 4715.4, Pollution Prevention, 18 June 1996

   This document authorized QRPs to recycle firing range scrap. The DoDI authorizes installations to directly sell "firing-range-expended brass or mixed metals gleaned from firing range cleanup that do not require demilitarization and that are MLI or SLI" so long as the "expended brass is crushed, shredded, or otherwise destroyed prior to public sale."

4. FORSCOM Environmental Operations Center, FORSCOM Environmental Grapevine, Vol. 2. No. 1, 1996, *Direct Sales of Recyclable Materials*

   FORSCOM received a waiver from DRMS that allows installations to directly sell many recyclable materials that were originally purchased with appropriated funds. Includes ferrous metals and nonferrous metals, which do not require demilitarization. Prohibits sales of MLI/SLI, such as expended/fired brass shell casings and range residue, even if the material has been mutilated or demilitarized. Mentions that a new DoDI, due to be released, is expected to allow each military service component to authorize direct sales of all recyclable materials, including MLI/SLI.

5. Office of the Under Secretary of Defense Memorandum, 15 May 1998, Subject: "Recycling of Firing-Range Scrap Consisting of Expended Brass and Mixed Metals Gleaned from Firing Range Clearance Through QRPs"

   This document provides clarification of DoD regulations covering recycling through QRPs described in DoDI 4715.4. Although not specifically identified as ODW, the memo defined "mixed metals gleaned from firing range clearance" as material that is in a form that is

unrecognizable from its original configuration and does not require further demilitarization, and that is not an MLI or CCLI. The memo requires that all firing range scrap consisting of expended brass and mixed metals gleaned from range clearances be certified as safe by appropriate authority before QRPs accept the material for disposal. Additionally, the memo describes other requirements for processing scrap AEDA through the QRP.

6. *United States Army Overview of Current AEDA Processes/Problems Associated with ODW*

   This document background and overview on management of ODW, including (1) issue of ammunition and ordnance; (2) ODW generation; (3) ODW gleaned from downrange; (4) inspection, collection, processing, and transfer of ODW by the ASP; and (5) processing, certification, and sale by QRP and DRMO.

7. *United States Marine Corps Overview of Current AEDA Processes/Problems Associated with SA*

   This document discusses the management of SA with a focus on safety issues. It also provides recommendations for certification, crushing/shredding/flashing, DRMO activities, and other management issues.

8. *Range Maintenance Project, Fort Irwin, California: Site Specific Work Plan* (CEHNC Contract DACA87-96-D-0021, Task Order 4). Chapter 4, Revision 1, 19 February 1998

   This document describes task for range clearance and provides listing of demilitarization requirements for specific items. A flow diagram is provided for range clearance.

9. DA Pam 710-2-1, Using Unit Supply System (Manual Procedures)

   This document contains procedures for material that is picked up from the firing point and returned to the ASP for turn-in to DRMO, QRP, or possibly put in landfills. Requires that all residue listed munitions items (listed in Tables L-1 through L-12) be returned for reconciliation.

10. DA Form 581, Request for Issue and Turn-In of Ammunition

    This form accompanies each issue of munitions and turn-in of unused munition and munitions residue. This information is transferred to the installation's electronic munitions tracking system, SAAS IV.

11. DA Form 5515, Training Ammunition Control Document

    This form accompanies each sub-issue of munitions and turn-in of unused munitions and munitions residue. This information is transferred to the installation's electronic munitions tracking system, SAAS IV.

12. TRADOC Regulation 700-2, Logistics, Ammunition, 10 March 1989

    This document provides HQ TRADOC policies for requisitioning receipt, issue, storage, movement, surveillance, accountability, and reporting of class V supply items (ammunition and explosives, including chemical ammunition items and excluding nuclear weapons).

13. TRADOC Regulation 350-8, Training, Ammunition, 17 May 1989

    This regulation incorporates guidance and delineates responsibilities under TAMS and identifies principles for training ammunition management.

14. John Dow, Navy Ordnance Environmental Support Office for the Joint Ordnance Commander's Group Environmental Subcommittee Meeting, 7 October 1997

    Analysis to Verify 5X Explosive Decontamination
    Flashing of Firing Range Scrap Metal: A Second Look

15. The Combined Services Recycling Work Group, *Draft Closing the Solid Waste Circle: The Combined Services Guide for Qualified Recycling Programs*, June 19, 1998

    This document prescribes guidance for the preparation, coordination, and oversight for implementing a QRP. The guide expands on the policies outlined in DoDI 4715.4, Pollution Prevention. It applies to the Office of the Secretary of Defense, the Military Services, the Chairman of the Joint Chiefs of Staff, the Defense Agencies, and the DoD Field Activities.

16. DoD Policy to Implement the EPA's Military Munitions Rule, 1 July 1998

    This policy interprets the requirements of the Military Munitions Rule (62 FR 6621, 12 February 1997) and establishes an overarching policy for the management of waste military munitions that is consistent among DoD components.