PROPOSED INSTALLATION AND OPERATION OF THE PINE BLUFF EXPLOSIVE DESTRUCTION SYSTEM (PBEDS) AT PINE BLUFF ARSENAL, ARKANSAS

ENVIRONMENTAL ASSESSMENT

June 2004

U.S. ARMY CHEMICAL MATERIALS AGENCY
ABERDEEN PROVING GROUND, MARYLAND

ORGANIZATION OF THIS ENVIRONMENTAL ASSESSMENT

This Environmental Assessment (EA) evaluates the environmental effects of the Army's proposed action: installation, operation, and—after completion of operations—clean closure and removal of a series of Explosive Destruction System (EDS) units at the Pine Bluff Arsenal in Arkansas for the purpose of destroying the inventory of recovered chemical munitions that is currently stored there. This EA provides information to be considered in making the decision regarding the proposed action and its alternatives.

SECTION 1 **INTRODUCTION** summarizes the purpose of and need for the proposed action and provides relevant background information about the items to be destroyed.

SECTION 2 **PROPOSED ACTION AND ALTERNATIVES** describes the proposed action and the no-action alternative.

SECTION 3 **EXISTING ENVIRONMENT AND POTENTIAL ENVIRONMENTAL CONSEQUENCES** describes the existing environmental resources that could be affected by the proposed action, identifies potential environmental impacts of implementing the proposed action and no-action alternatives, and identifies proposed mitigation measures, as appropriate.

SECTION 4 **CONCLUSIONS** summarizes the findings about the potential environmental impacts for the proposed action and no-action alternative, and makes a recommendation to proceed with a Finding of No Significant Impact.

SECTION 5 **REFERENCES** provides bibliographic information for cited reference materials.

PROPOSED INSTALLATION AND OPERATION OF THE PINE BLUFF EXPLOSIVE DESTRUCTION SYSTEM (PBEDS) AT PINE BLUFF ARSENAL (PBA), ARKANSAS

Lead Agency: Department of the Army; US Army Chemical Materials Agency (CMA)

Title of Proposed Action: Proposed Installation and Operation of the Pine Bluff Explosive Destruction System (PBEDS) at Pine Bluff Arsenal (PBA), Arkansas

Affected Jurisdiction: Jefferson County, Arkansas

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ACRONYMS AND ABBREVIATIONS

$\mu g/m^3$	micrograms per cubic meter
µm	micrometer (one millionth of a meter)
ADEQ	Arkansas Department of Environmental Quality
AR	Army Regulation
ASWCC	Arkansas Soil and Water Conservation Commission
BREA	Bond Road Exclusion Area
CFR	*Code of Federal Regulations*
CG	phosgene
CO	carbon monoxide
CMA	U.S. Army Chemical Materials Agency
CWC	Chemical Weapons Convention
DDESB	Department of Defense Explosive Safety Board
DOD	Department of Defense
EA	environmental assessment
ECBC	Edgewood Chemical Biological Center
EDS	Explosive Destruction System
EPA	U.S. Environmental Protection Agency
FR	*Federal Register*
gal	gallon
gpm	gallons per minute
GTR	German traktor rocket
H	Levinstein mustard agent
HD	distilled sulfur mustard agent
HEPA	high efficiency particulate air (filter)
HN-3	nitrogen mustard agent
HS	sulfur mustard agent
IBPF	Integrated Binary Production Facility
L	lewisite (a chemical warfare agent)
lb	pound(s)
m^3	cubic meter
MEA	monoethanolamine
mm	millimeter (one thousandth of a meter)
NAAQS	National Ambient Air Quality Standards
$NaMnO_4$	sodium permanganate
NaOH	sodium hydroxide
NEPA	National Environmental Policy Act
NO_2	nitrogen dioxide
NO_x	nitrogen oxides

NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council
NSCM	non-stockpile chemical materiel
Pb	lead
PBA	Pine Bluff Arsenal
PBCDF	Pine Bluff Chemical Agent Disposal Facility
PBEDS	Pine Bluff Explosive Destruction System
PBMAS	Pine Bluff Munitions Assessment System
PBNSF	Pine Bluff Non-Stockpile Facility
PDS	personnel decontamination station
$PM_{2.5}$	particulate matter less than or equal to 2.5 micrometers in aerodynamic diameter
PM_{10}	particulate matter less than or equal to 10 micrometers in aerodynamic diameter
PMECW	Program Manager for Elimination of Chemical Weapons
PMNSCM	Product Manager for Non-Stockpile Chemical Materiel
PPE	personal protective ensemble
RCM	recovered chemical munitions
RCRA	Resource Conservation and Recovery Act
SO_2	sulfur dioxide
TNT	trinitrotoluene
TSDF	treatment, storage, and disposal facility
U.S.	United States
VCS	vapor containment structure
VOC	volatile organic compound

1. INTRODUCTION

U.S. public law and an international treaty ratified by the U.S. Congress require the complete destruction of all U.S. chemical weapons and non-stockpile chemical materiel (NSCM), including recovered chemical munitions (RCM). This Environmental Assessment (EA) concerns the destruction of RCM which is currently being stored at the Pine Bluff Arsenal (PBA) in Arkansas. This EA has been prepared in compliance with Council on Environmental Quality regulations for implementing the procedural provisions of the National Environmental Policy Act (NEPA) of 1969 (see 40 CFR Parts 1500–1508) and Army Regulation 200-2 on Environmental Analysis of Army Actions (see 32 CFR Part 651). The background and purpose for the Proposed Action are presented in this section.

1.1 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

Background. Under Public Law 102-484 (October 23, 1992), the U.S. Army is responsible for the centralized management and safe destruction of all Department of Defense (DOD) non-stockpile chemical materiel. Pine Bluff Arsenal—located in Jefferson County, Arkansas, near the city of Pine Bluff (see Figure 1)—has the largest inventory of NSCM in the United States. A portion

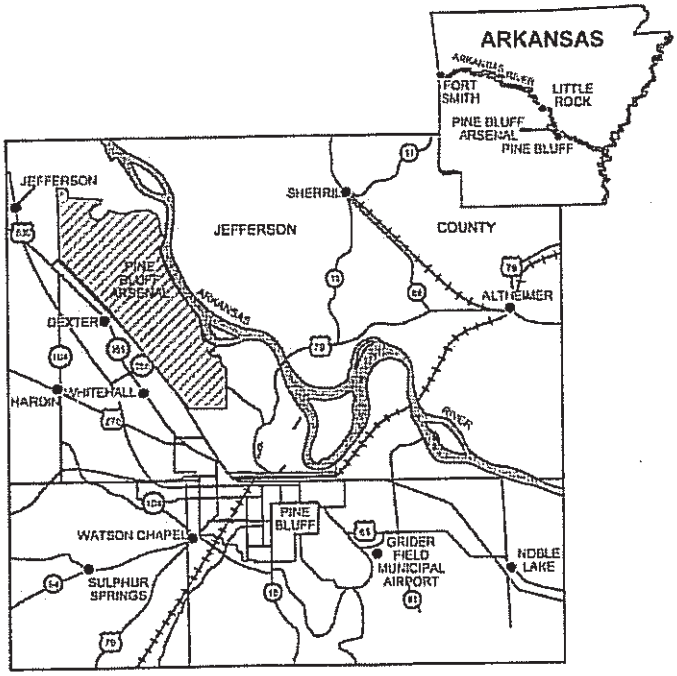

Figure 1. Location of the Pine Bluff Arsenal in Arkansas.

of the NSCM in storage at PBA consists of RCM which contain chemical warfare agents or industrial chemical fills[1] and which may also have explosive components. This EA has been prepared by the Product Manager for Non-Stockpile Chemical Materiel (PMNSCM) to evaluate the potential environmental impacts of destroying the RCM stored at PBA. These destruction activities must be accomplished in time to meet U.S. obligations for destroying the RCM by the April 29, 2007, deadline established by the Chemical Weapons Convention (CWC).

Purpose and Need. The purpose of the proposed action is to destroy the RCM stored at PBA and to dispose of the associated wastes in a safe, environmentally acceptable, and cost-effective manner. This action is needed to meet current U.S. obligations under the CWC and Congressional directives for destroying the NSCM stored at PBA. In addition, the completion of the proposed action would eliminate the need for continued surveillance and maintenance of the RCM currently in storage at PBA.

Overview of the Proposed Action. In December 2002, the Army published an EA for the construction and operation of a facility at PBA (called the Pine Bluff Non-Stockpile Facility, or PBNSF) to destroy the RCM containing chemical agents and industrial chemical fills by using chemical neutralization processes. The 2002 PBNSF EA concluded that the RCM could be destroyed safely and effectively in the PBNSF without significant impacts to the environment (U.S. Army 2002a). The PBNSF would incorporate "munition management device" technologies previously developed and tested as part of the Army's Transportable Treatment Systems for destroying the chemical agents. The generic environmental impacts of deploying the "munition management device" technologies were evaluated in a Programmatic Environmental Impact Statement (U.S. Army 2001a), and the Army determined in its Record of Decision (67 FR 43091; June 26, 2002) that these technologies were "environmentally safe" and the "subsystems could be used in the future."

During the design stages for constructing and operating the PBNSF, the Army encountered potential problems with (a) the increasing complexity of the proposed facility, (b) risks associated with constructing the PBNSF and completing its operations before the CWC deadline, and (c) unexpectedly high cost estimates. Because of these potential problems with the PBNSF, the Army subsequently investigated the use of another previously developed Transportable Treatment System, namely the Explosive Destruction System (EDS), which is described in detail in Section 2.1. The proposed PBNSF project was also independently reviewed and assessed by the National Research Council (NRC) of the National Academy of Sciences. The NRC concluded that the use of multiple EDS units would "work better, with less risk, and in a more timely manner" than the proposed PBNSF (NRC 2004).

EDS units have been successfully tested and deployed at Porton Down (in the United Kingdom); at Spring Valley, Washington, D.C.; at the former Camp Sibert, Alabama; at Rocky Mountain Arsenal, Colorado; and at the Aberdeen Proving Ground, Maryland (see NRC 2004). These deployments have resulted in the successful processing of over 100 items, including munitions

[1] For the purpose of this document, the industrial chemicals considered here are defined as hazardous or toxic chemicals (such as phosgene) that were manufactured for use in normal industrial operations or research and were not developed solely for military purposes. The military, however, has used some of these industrial chemicals as fills inside chemical weapons.

containing the same types of chemical warfare agents and industrial chemical fills as those in the RCM inventory at PBA. While the use of EDS units at PBA was considered (but eventually rejected) during the time the PBNSF was conceptualized in 2001, improvements in the throughput of the EDS units have been made since that time. Hence, multiple EDS units are currently being considered for use as a replacement for the PBNSF. The proposed replacement would be called the Pine Bluff EDS (PBEDS).

Three EDS units would be deployed at PBA as part of the PBEDS. These units would be used to deactivate the explosive components, reduce the toxicity of the chemical fills and explosive residues, and decontaminate the metal fragments. The products of the neutralization process (also called "neutralents") and other hazardous wastes would be shipped to one or more off-site commercial treatment, storage, and disposal facilities (TSDFs) which are permitted under the Resource Conservation and Recovery Act (RCRA) for final treatment and ultimate disposal of such wastes.

1.2 PBA's INVENTORY OF RECOVERED CHEMICAL MUNITIONS

Over the years, activities such as construction and excavation have led to the recovery of chemical munitions from ranges and disposal sites. The majority of the RCM at PBA were recovered on-site at PBA; however, a few were shipped to PBA from other active and formerly used defense sites. These RCM were placed in some type of overpack container (e.g., 30- or 55-gal drums or a steel shipping cylinder) and transported to storage igloos within the Bond Road Exclusion Area (BREA) where they await treatment or destruction.

The RCM inventory to be destroyed in the PBEDS consists of approximately 1,260 items. The majority (about 98%) of RCM stored at PBA are 4.2-inch mortar rounds and German traktor rockets (GTRs). The inventory also includes smaller numbers of 75-mm projectiles, 200-mm Livens projectiles, and bombs. No nerve agents are known or suspected to be associated with any of these RCM items at PBA; however, the chemical fills that are expected to be encountered include mustard agent (agent H, HD, and HS), nitrogen mustard (HN-3), agent HD with possible arsenical additives, lewisite (L), phosgene (CG), and arsenical agents alone or in mixtures. In addition to the chemical fills, some of the RCM at PBA contain energetic materials, such as explosives in bursters, primers, and fuzes.

The GTRs are discussed in greater detail later in this EA, because some of these GTRs will require special processing. About 30 of the GTRs are currently stored at PBA with their motors (i.e., propellant charges) intact with the chemical-filled warhead. The remaining GTRs have no existing propellant charge.

Prior to initiating operations at the proposed PBEDS, the Army will operate the Pine Bluff Munitions Assessment System (PBMAS). The PBMAS will employ non-intrusive testing methods (such as X-ray) to examine and better characterize the RCM that would eventually be destroyed in the PBEDS (see U.S. Army 2001b). Information obtained from the PBMAS is expected to refine the current estimate of the number of items to be processed in the PBEDS and to provide additional

details about the types of chemical fills, as well as the explosive configuration, of the RCM in storage at PBA.

1.3 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

This EA evaluates the significance of the potential environmental impacts of the proposed deployment and operation of the PBEDS at PBA. The potential impacts associated with the destruction of the same RCM that would be treated by the PBEDS have already been evaluated in the PBNSF EA (U.S. Army 2002a), which concluded that the PBNSF could destroy the RCM without causing significant environmental impacts.

To avoid unnecessary documentation and to comply with the intent of the Council on Environmental Quality's guidance at 40 CFR 1500.4 on reducing paperwork, this EA relies upon the findings of the PBNSF EA where appropriate, rather than presenting new analyses. Where it is clear that the magnitude of the PBEDS impacts would be equal to or smaller than those of the PBNSF, those comparisons are used to demonstrate that the corresponding PBEDS impacts would likewise not be significant. Where a simple comparison between the PBEDS and the PBNSF is not sufficient to determine the relative magnitude or significance of the potential impacts, additional analysis is presented in Section 3 of this PBEDS EA.

2. PROPOSED ACTION AND ALTERNATIVES

This section describes the proposed action (i.e., the use of multiple EDS units in the PBEDS at PBA), as well as the alternatives considered by the Army. Section 2.1 describes the proposed action, including installation, operation, and closure of the PBEDS. This section also describes waste streams that would be produced during the lifetime of the PBEDS and provides estimates of the quantities of waste that would be generated. Section 2.2 discusses the no-action alternative; that is, not installing or using the EDS units of the PBEDS and continuing to store the RCM at PBA. Section 2.3 identifies other alternatives that were considered but eliminated from detailed evaluation in this EA.

2.1 THE PROPOSED ACTION—INSTALLATION AND OPERATION OF THE PINE BLUFF EXPLOSIVE DESTRUCTION SYSTEM

The proposed PBEDS would consist of three EDS units with associated support and management facilities. The EDS units would begin operation during the summer of 2005 and would complete the destruction of the inventory during the spring of 2007.

2.1.1 The EDS Units to be Used at PBEDS

The EDS units are transportable systems designed to help the Army accomplish its mission to dispose of RCM in a safe and environmentally sound manner. The primary component of the EDS is a thick-walled, blast-proof, stainless steel containment vessel. The system is operated by first placing RCM inside the containment vessel after attaching explosive shaped charges. Detonation of these shaped charges deactivates the explosive components of the RCM and accesses its chemical fill. The chemical fill would thus be released into the containment vessel (i.e., no release to the environment). Neutralizing reagents are then pumped into the sealed containment vessel to chemically react with the chemical fill and contaminated components of the munition. After sufficient time to allow the mixture of chemicals to react, a sample is drawn through the sealed vessel to verify that the chemical fill has indeed been neutralized. Then, the neutralent is drained into drums for shipment to a permitted, commercial TSDF. The pressure generated inside the containment vessel is vented through a carbon filter, which removes any residual reagents and other noxious chemicals from the air stream. After rinsing the interior of the containment vessel, the door is opened, and the solid wastes are removed.

There are two versions of the EDS units, identified as Phase 1 units and Phase 2 units (see Figures 2 and 3, respectively). The principal difference between the two versions is capacity. The Phase 1 unit is designed for smaller munitions, while the Phase 2 unit is designed for larger munitions.

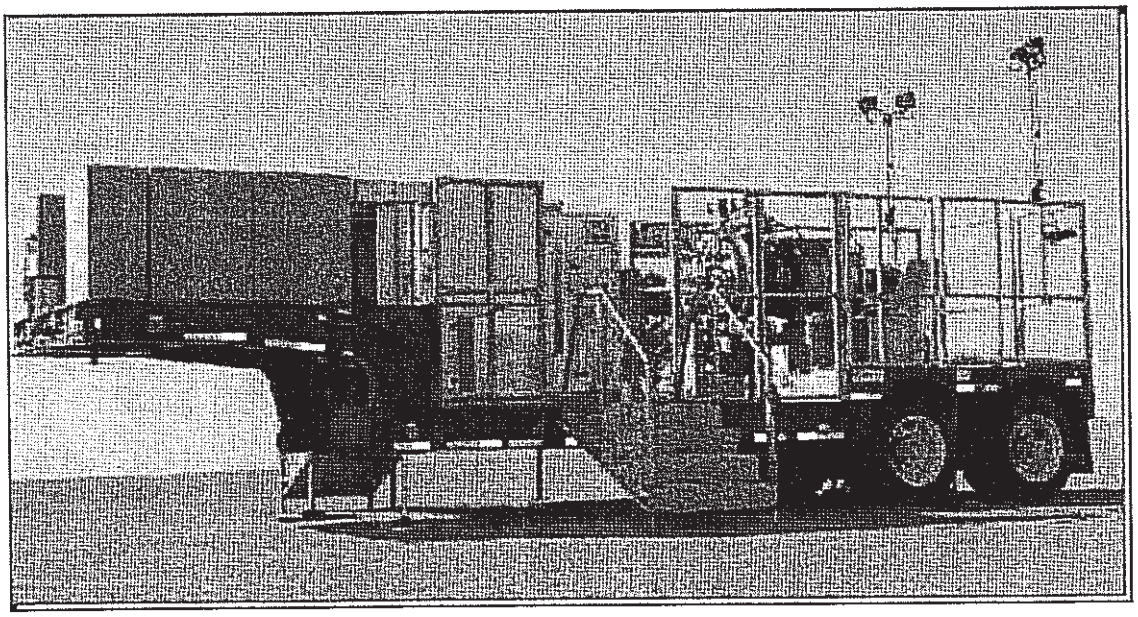

Figure 2. Explosive Destruction System (EDS) Phase 1 unit.

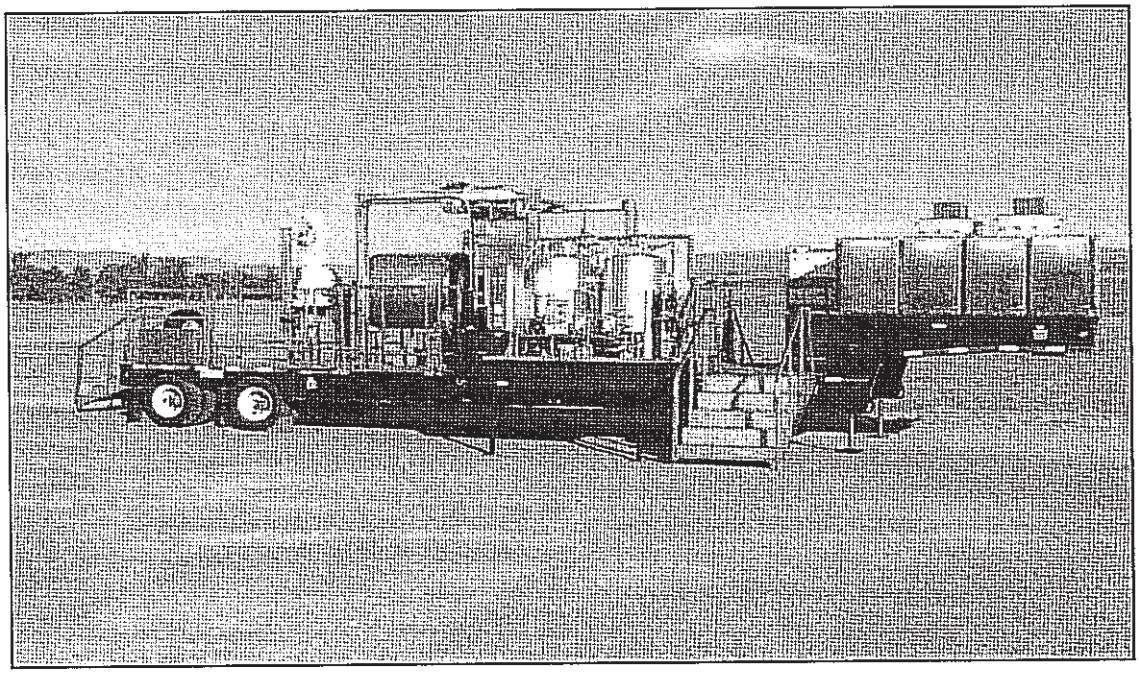

Figure 3. Explosive Destruction System (EDS) Phase 2 unit.

The Phase 1 unit has a 50-gal containment vessel, and is designed to withstand the explosive force from a number of commonly recovered munitions, such as the 75-mm cartridge, the 4.2-inch mortar round/cartridge, and the Livens projectile. To be applicable for use in the Phase 1 unit, these munitions plus the shaped charges used in the EDS must have a total explosive capacity less than 1.5 lb of TNT equivalent. The EDS Phase 2 unit has a 165-gal containment vessel, and is designed to an explosive rating of 4.8 lb of TNT equivalent and to accommodate larger items, such as 8-inch and 155-mm projectiles.

2.1.2 Proposed Site, PBEDS Layout, and Installation

The proposed location of the PBEDS is in the north-central portion of PBA. The site lies within the northwest end of the Integrated Binary Production Facility (IBPF), which is currently scheduled for demolition (see Shaw Environmental 2003). The overall PBEDS proposed site will occupy about 6 acres, including an employee parking lot (see Figure 4). All of the facilities described in the following paragraphs would be located on this site.

Each of the three EDS units would be set up in a separate vapor containment structure (VCS) constructed of preformed steel panel arches. The floor of each VCS would be a newly installed concrete pad (i.e., one such pad for each of the three VCSs). One of the personnel doors on each VCS

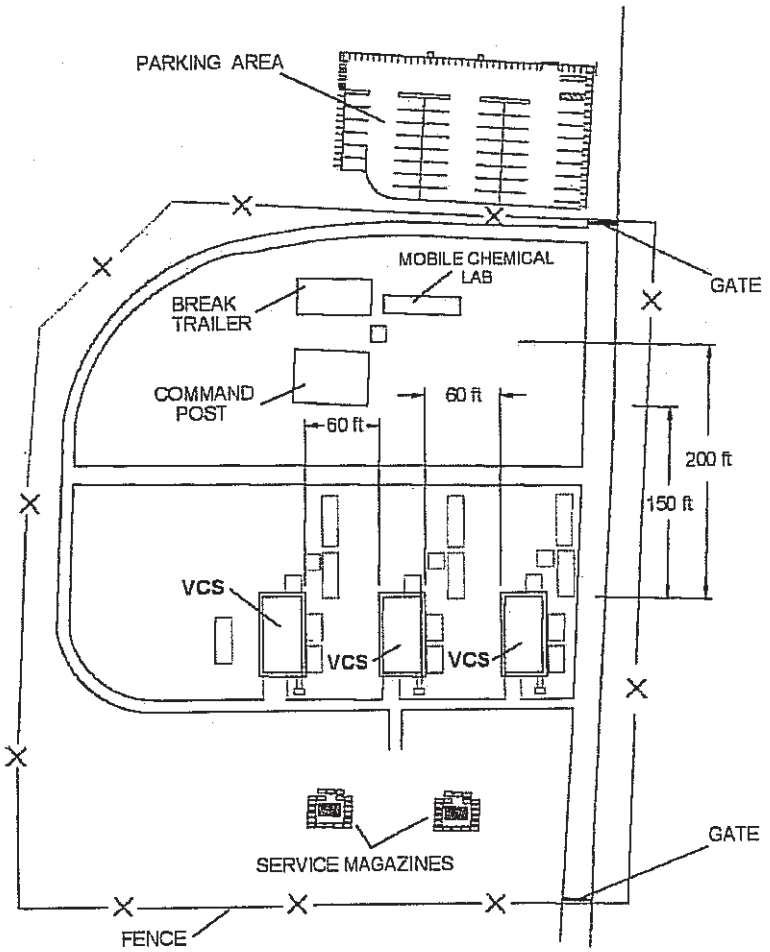

Figure 4. Conceptual site layout for the PBEDS. [*Note: VCS indicates a Vapor Containment Structure, inside which an Explosive Destruction System (EDS) unit would be deployed.*]

would be equipped with a personnel decontamination station (PDS) through which personnel would enter and exit. An opening in one end of each VCS would provide a connection to the filtration system, and a louvered opening in the opposite end of the structure would supply makeup air. The exhaust filtration system for each VCS would consist of prefilters, high efficiency particulate air (HEPA) filters, and carbon filters along with a motor, fan, and duct work.

In addition to the PDS, each VCS/EDS will be served by an air compressor, a monitoring shelter, a back-up generator, plus support/storage containers. As shown in Figure 4, each VCS will be located 60 feet from the adjacent VCS.

The entire PBEDS site will be surrounded by a security fence, and access to the site will require passing through a guarded gate. A trailer will be provided for the workers' lunch and bathroom breaks. A Mobile Chemical Laboratory will perform chemical analyses to verify the destruction of chemical warfare agents and fills. A medical support station will be provided to monitor personnel, as well as to assist personnel in case of an injury. The Command Post will supervise activities at the site and will support personnel. Air monitoring equipment would be housed in a shelter adjacent to each VCS. Finally, two service magazines will be established for storage of the shaped explosives which will be used to access the RCM inside the EDS's containment vessel.

Electrical power for the PBEDS site would be provided by connecting to the existing PBA distribution system. Diesel-powered, back-up generator sets would be provided at each EDS unit for critical systems (air filtration system and monitoring equipment) should loss or interruption of power occur. New water, sewer, and natural gas connections will also be provided to the site from existing PBA utilities systems.

The PBEDS site will be designed and prepared between Spring 2004 and Summer 2005. The arrival and deployment of the EDS units at the PBEDS site will be conducted as follows. Initially, two EDS Phase 2 units will be deployed and operated. An EDS Phase 1 unit is currently planned for deployment at PBA adjacent to the PBMAS (see Section 1.2) to deal with any immediately hazardous RCM which must be destroyed promptly (U.S. Army 2003a). When operations are complete at the PBMAS, the EDS Phase 1 unit would be available for deployment at the PBEDS site, where it will become part of the PBEDS activity. Alternatively, a separate EDS Phase 1 unit might be brought to PBA and deployed as part of the PBEDS.

2.1.3 Operation of the PBEDS

Heretofore, EDS units have been used to treat one munition at a time on an as-needed basis. Given the large number of munitions to be processed at the PBEDS, the Army has tested operation of EDS units with up to three munitions at one time (NRC 2004). Additional tests of the EDS Phase 2 unit with up to six munitions at a time are planned. Whether treating a single munition or several munitions, operation of an EDS unit proceeds as described in the following paragraphs.

PBEDS operations would begin with the movement of RCM by truck from the storage igloos to the PBEDS site. Up to 30 RCM per week would be delivered to the PBEDS. The individual RCM overpacks would be moved inside a VCS where they would be unpacked and checked for leakage. The RCM would be placed on a loading tray prior to placing them into the EDS's containment vessel, as described below. Known leakers would have been identified during the PBMAS assessment (see Section 1.2). Any "new" leakers encountered during unpacking at the PBEDS would be appropriately wrapped to contain the leakage prior to placing the RCM into the containment vessel. Any contaminated overpacks and packaging materials would be decontaminated while inside the VCS. Uncontaminated empty overpacks will be held for reuse, and uncontaminated packing materials will be handled in accord with appropriate waste disposal practices. Decontaminated overpacks or packaging materials, if any, will be handled and managed as hazardous wastes.

Approximately 30 German Traktor Rockets (GTRs) are known to have intact rocket motors (i.e., containing propellant). With intact motors, the GTRs exceed the explosive capacity rating of an EDS unit. Therefore, before processing, each intact rocket motor will be removed (possibly by a proposed water jet cutting process) from the GTR warhead. Specific plans for the removal of intact motors are being developed. These intact rocket motors may be removed in an existing PBA facility, or they may be removed in an explosive containment chamber brought to PBA specifically for that purpose. After removal of the GTR's intact motor, the chemical-filled warhead of the GTR would be treated in the EDS unit. The removed GTR motors will be placed in containers and shipped off-site to a permitted commercial TSDF.

The destruction processing at each EDS unit begins when one or more munitions are placed into the fragment suppression system. The fragment suppression system serves as a support for the munitions, a support for shaped charges, and a shield to protect the interior of the EDS containment vessel. After the munitions are placed into the fragment suppression system, shaped charges are placed near each RCM. These shaped charges are intended to de-energize the RCM's explosive components and to access the body of the RCM, thereby releasing the chemical fill. After the shaped charges and the fragment suppression system are assembled, the entire assembly is placed inside the EDS containment vessel. Once the EDS containment vessel is sealed, the shaped charges are detonated.

Chemical neutralization is then used for the treatment of the chemical fills following the rupture of munitions in the EDS containment vessel. In the neutralization process, the appropriate reagent chemicals are pumped into the EDS containment vessel, which is agitated and heated as necessary to mix the contents and thus allow the neutralization reactions to proceed. The neutralization processing for mustard agent may require more than 24 hours, but phosgene can be neutralized in less than 8 hours of processing. Samples may be collected from the containment vessel at various times to verify treatment effectiveness. If the release criteria[2] for the neutralent are not met, then additional reagents would be pumped into the containment vessel and/or additional heat, agitation, or reaction time would be employed to ensure the neutralization reactions were complete. Processing would continue until treatment effectiveness has been confirmed. The liquid waste inside the vessel would then be transferred into drums and stored inside the VCS prior to being moved to an existing, permitted storage area at PBA. The drums will eventually be shipped to an off-site TSDF for further treatment and/or disposal. The fragmented munition body, fragmentation shields, and any residual solid wastes will be decontaminated with neutralizing reagents, collected, containerized, characterized, and transferred to an existing, permitted storage area at PBA pending their ultimate disposition.

Following the processing of the RCM and the removal of the contents of the containment vessel, the vessel would be rinsed before the next RCM, fragment suppression system, and shaped charges are placed inside. Then the destruction and neutralization process would be repeated.

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[2] "Release criteria" as used in this context applies to the measured concentration of hazardous chemical fill remaining in the neutralent after the neutralization reactions are completed. The numerical value of the release criteria for each type of chemical fill will be determined as part of the RCRA permitting process for the PBEDS.

Each EDS unit is expected to be loaded with RCM for detonation two or three times each week. Following detonation, the munitions processing (including neutralization) in each EDS unit will require up to two days to complete.[3] The processing of all 1,260 items in the EDS units is expected to be completed within 20-months of operations, while allowing crews to work five-day weeks. Previous tests have confirmed that three mustard-filled munitions can be processed simultaneously in a Phase 2 EDS unit (NRC 2004). Currently, tests with the Phase 2 unit are underway to verify that up to six 4.2-inch mortar rounds can be processed at a time. Additional tests are planned to confirm that up to three GTRs, without intact motors, can be processed at a time in a single EDS Phase 2 unit. The 20-month schedule is achievable if the PBEDS performs 15 detonations every two weeks and if the only RCMs subjected to multiple-round processing are the 4.2-inch mortar rounds (i.e., processed three at a time). If multiple-round processing will allow for three GTRs in a single EDS unit, as well as six 4.2-inch mortars inside a separate EDS unit, the entire RCM inventory at PBA can be processed in about 11 months.[4]

2.1.4 Waste Management

Wastes generated by PBEDS operations would include: (1) neutralents from the neutralization reactions; (2) decontaminated metal munition fragments, pieces of munition casings, and fragmentation shields; (3) spent rinse water and decontamination solutions; (4) spent filter elements; (5) miscellaneous solids, such as spent cleanup materials, debris, and RCM storage and packaging materials; (6) contaminated personal protective equipment (PPE), if any; and (7) miscellaneous liquid wastes, such as fluids containing waste oils and solvents.

All wastes generated from PBEDS operations would be appropriately containerized and characterized. All wastes, such as neutralents, directly associated with chemical agents and chemical fills would be managed as a hazardous waste. All other wastes that could potentially be contaminated with chemical agents or chemical fills would be sampled and analyzed for the presence of toxic chemicals. If the analysis shows that chemical agents or industrial chemical fills are present at concentrations higher than the release criteria for these compounds, the waste is to be further decontaminated and managed as a hazardous waste, as appropriate. If the analysis shows that no hazardous constituents are present, wastes that are not classified as a hazardous waste under RCRA may be managed as non-hazardous wastes. Spent decontamination solutions and rinse waters which are determined to be non-hazardous and which meet the PBA discharge requirements will be containerized and transported by truck to the existing PBA wastewater treatment facility for treatment. Otherwise, the liquids will be shipped off-site to a permitted TSDF.

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[3] Because the chemical neutralization of mustard agent requires more than 24 hours, the entire processing cycle for mustard-filled RCM is approximately two days. Because phosgene can be neutralized much more quickly, phosgene-filled RCM can be processed on a schedule of approximately one day per detonation. Because most of the RCM at PBA are filled with mustard agent, the discussion of schedule in this EA is based on a two-day processing cycle.

[4] These estimates assume one detonation every other day and that the crews work alternating 6-day and 4-day work weeks. Thus, the average detonation rate is 7.5 per week for the total of three EDS units.

Any wastes destined for shipment to an off-site TSDF(s) would be stored only temporarily on/near the PBEDS site. Such wastes would be containerized and moved to a less-than-90-day waste container storage area at PBA where they would be stored pending shipment to the off-site TSDF.

The data in the following paragraphs represent the best available estimates of the maximum quantities of wastes that would be generated during the destruction of the RCM at the PBEDS (Hallam and Prokhorenko 2004). These waste quantities are based on the assumption that 1,260 munitions would be processed individually (i.e., no multiple-round processing) in the largest EDS unit (i.e, the Phase 2 unit) and that each charge of the EDS unit would involve the munition requiring the largest volume of reagent and rinse water and producing the largest quantities of metal and solid waste. These assumptions therefore result in an upper bound estimate of the waste quantities which would be generated over the operational lifetime of the PBEDS. The actual waste quantities would be much smaller.

Experience with testing and operating the EDS units has shown that the amount of liquid neutralent waste generated per munition processed individually in an EDS Phase 2 unit would be about 87 gal (about 740 lb). The treatment of 1,260 munitions would therefore generate about 110,000 gal (470 tons) of neutralent over the operational lifetime of the PBEDS. An additional 52 gal (about 440 lb) of spent rinse water would also be generated for each charge of an EDS Phase 2 unit. If 1,260 munitions were to be processed individually by the EDS units, the total quantity of spent rinse water generated over the operational lifetime of the PBEDS would be about 66,000 gal (270 tons).

In the event of personnel exposure, the ensuing decontamination procedures would generate up to about 20 gal of spent decontamination solutions (consisting of water, bleach and soap). Such procedures are expected to be needed very infrequently, and the resulting total quantities of spent decontamination solutions generated over the lifetime of the PBEDS is therefore expected to be very small in comparison to the other liquid wastes (i.e., neutralents and rinse waters) from the facility.

The total quantity of liquid wastes from the PBEDS would be 740 tons (= 470 tons of neutralent plus 270 tons of spent rinse water) and the volume of these liquid wastes would be 176,000 gal (= 110,000 gal of neutralent plus 66,000 gal of rinse water). If the 176,000 gal were to be packaged into 55-gal drums for off-site shipment, approximately 3,200 drums would be required, and up to 40 off-site shipments would be needed. If 5,000-gal tanker trucks were to be used, about 35 shipments would be required.

Up to 390 lb of solid waste would be generated by the detonation of the largest RCM inside the EDS unit. These solids would be primarily residual metals from the RCM itself and from the EDS unit's fragment suppression system. Current plans call for these wastes to be packaged and shipped to a TSDF for treatment and disposal. The processing of 1,260 RCM would create up to 490,000 lb (245 tons) of metal solid waste. Other solid wastes would include carbon filters used to remove contaminants from gases vented to depressurize the containment vessel, and any PPE that became contaminated if there were a spill or leak. Most of the used PPE would be sent to the PBA laundry for reuse, and therefore would not be designated as a hazardous waste. In the event used PPE cannot be sent to the laundry for reuse, it would be containerized and shipped to a permitted TSDF.

The carbon filtration system for each EDS unit includes carbon filters which are replaced every time a munition is treated with monoethanolamine (MEA); this includes all munitions filled

with mustard agent. For the purpose of developing an upper bound estimate of the waste generated, all of the RCM at PBA are assumed to contain mustard agent (which would be treated with MEA); hence, the carbon filters are assumed to be changed after each RCM is processed. Each EDS unit uses one 10-lb carbon filter. Thus, up to 12,600 lb (i.e., 6.3 tons) of carbon filters are expected to be disposed of as a result of processing 1,260 munitions.

Small amounts of hazardous contaminants (including reagent vapors) could be released to the atmosphere when the vessel door is opened. However, the carbon filter system of each VCS is designed to remove such vapors and to ensure that emissions to the atmosphere are safe. Each VCS uses an 800-lb carbon filter bank. Because no contamination is expected to escape from the EDS units, the VCS carbon filter is not expected to be replaced during PBEDS operations, but will be disposed of after the processing of the entire RCM inventory at PBA has been completed. Thus, a total of 2,400 lb (i.e., 1.2 tons) of VCS carbon filter waste will be generated by all three VCSs over the lifetime of the PBEDS.

The total amount of carbon filter waste would therefore be 7.5 tons (= 6.3 tons of waste from the EDS units plus 1.2 tons from the VCS filters) over the operational lifetime of the PBEDS.

2.1.5 Resource Consumption

PBEDS operations will require consumption of electricity, natural gas, diesel fuel, and water. The quantities of electricity, natural gas, and diesel fuel required to operate the PBEDS would be small in comparison to other uses at PBA. Diesel fuel will be used to power a back-up generator for each of the three EDS units. Each back-up generator will be operated for one hour each month to ensure that it is capable of operating in an emergency. Each EDS unit will also be served by a diesel-powered air compressor which would serve as a back-up in the event that site electrical power is lost.

The EDS units will use water from the existing PBA potable water system for rinsing and clean-up. Reagents will be shipped to the site already mixed; hence, no additional on-site water will be required for the reagents. As discussed in Section 2.1.4, the quantities of rinse water to be used during the individual processing of 1,260 items could total 66,000 gal over the operational lifetime of the PBEDS. This would be approximately 125 gal/day, if the PBEDS were to be operated only five days each week. Because many RCM would be processed three or more at a time inside a single EDS unit, this is an overestimate of the quantity of rinse water required.

Additional water would be used for drinking, cleanup, showers, and toilets, such as in the PBEDS break trailer, the command post, and other places where people are employed at PBEDS. The crew for the PBEDS is expected to consist of 34 persons working five days per week to operate the EDS units. Approximately 8 support personnel will also work at the PBEDS. Assuming 10 gallons of water daily per person for the support personnel, and 15 gallons per person per day for EDS operators (who may take a shower after their shift), the non-process water use for PBEDS operations will be 590 gal/day, or about 2,950 gal/week. This equates to about 307,000 gal over the PBEDS lifetime.

Based on the numbers presented in the two preceding paragraphs, the total quantity of water required over the operational lifetime of the PBEDS would be 373,000 gal (= 66,000 gal of rinse water plus 307,000 gal of potable water for workers). This would be about 720 gal/day.

2.1.6 Approvals and Permits

An application for a RCRA permit for the PBEDS is being prepared for submittal to the Arkansas Department of Environmental Quality (ADEQ). The Army will not operate the PBEDS without receiving a RCRA permit from the State of Arkansas. The Army is already pursuing a RCRA permit for the EDS Phase 1 unit which is associated with operations at the PBMAS (see Section 2.1.2). The RCRA permit for the PBEDS would be patterned after the permit for the PBMAS EDS unit.

PBA has an existing, arsenal-wide Clean Air Act Title V operating permit. A modification to this Title V permit (i.e., to include the emissions from the PBEDS) is being prepared for submittal to the ADEQ.

A site safety plan will be developed for the PBEDS and submitted to the Department of Defense Explosive Safety Board (DDESB) for approval. This plan will address both the hazards from accidental release of chemical agent fill and the hazards from accidental detonations (i.e., overpressure and fragmentation hazards). The Army will also develop and implement an environmental monitoring plan for the PBEDS prior to its operation.

2.1.7 Clean Closure of the EDS Units

After all of the RCM at PBA have been destroyed, the EDS units would be decontaminated and clean closed. Once the EDS units have been certified clean closed, they will be demobilized for reuse. Demobilization will involve removing the trailer-mounted equipment from the environmental enclosures for use at another location on PBA or removed from PBA for use elsewhere. If not immediately reused, the EDS units would be placed into lay-away status[5] and maintained in a condition ready for transport to any site in the United States where they might be needed.

Following the removal of the EDS units from the PBEDS site, the VCS and other support facilities would also be removed. All foundations and concrete pads that were constructed and/or used for the EDS units or support facilities, as well as all utility connections, would be left in place. Otherwise, no facilities would remain on the PBEDS site. At the conclusion of PBEDS operations, the site would then be available for other uses.

2.2 THE NO-ACTION ALTERNATIVE: CONTINUED STORAGE OF RECOVERED CHEMICAL MUNITIONS AT PBA

Under the no-action alternative, the three EDS units would not be deployed to PBA. The inventory of RCM at PBA would not be destroyed and would continue to be stored and maintained in igloos at PBA. Under the no-action alternative, routine surveillance, inspection, and maintenance

[5] If housed at PBA, these EDS units would not be placed in lay-away status to promote or support the receipt of any additional RCM at PBA, although PBA is authorized to accept such items in the future.

activities would continue for the RCM in storage. Thus, the RCM would continue to be monitored for leaks and other signs of deterioration. If leaks were detected, the leaking materiel would be repackaged to contain the leak. These continued surveillance, monitoring, and maintenance activities would consume financial and manpower resources for as long as the RCM remained in storage at PBA. In addition, if the RCM were not destroyed, then their existing storage igloos would not become available for alternative uses.

Under the no-action alternative, the site modifications required to support the PBEDS would not be performed. Also, there would be no environmental impacts from construction and operation of the PBEDS. As reported in the IBPF EA (see Section 4.2.1 in Shaw Environmental 2003), the IBPF site would be cleared and revegetated.

The continued long-term storage and maintenance of the RCM—as would occur under the no-action alternative—would not allow the Army to meet the U.S. obligations under the CWC and U.S. Public Law 102-484.

2.3 ALTERNATIVES TO THE PROPOSED ACTION

This section describes a set of alternatives to the PBEDS and discusses the rationale for not evaluating these alternatives in detail. In general, these alternatives were deemed not to be viable because of (1) the need for additional research and development of the proposed technologies and/or (2) cost and schedule uncertainties that might result in the Army not being able to meet the CWC deadline of April 2007 for destroying the RCM.

The PBNSF Option. As discussed in Section 1.1, an alternative once considered for the destruction of the RCM at PBA was the construction and operation of an on-site facility (i.e., the PBNSF) that would use chemical neutralization processes. During the design stages for constructing and operating the PBNSF, the Army encountered potential problems with (a) the increasing complexity of the proposed facility, (b) risks associated with constructing the PBNSF and completing its operations before the CWC deadline, and (c) unexpectedly high cost estimates. These problem areas are discussed in more detail in the following paragraphs.

As documented in the PBNSF EA (U.S. Army 2002a), the preliminary design concepts for the PBNSF encompassed a complex operation. As these concepts were refined, numerous data and information gaps were identified in the PBNSF design and operating procedures, particularly in regard to GTR processing and neutralization chemistry. If significant deviations from the initial PBNSF conceptual designs were encountered, then unplanned equipment purchases, design revisions, and permit modifications would have to be undertaken. Also, systemization of this one-of-a-kind facility would have presented unique challenges and could have adversely affected the overall schedule for completing the proposed PBNSF campaigns. In comparison to this situation for the PBNSF, the EDS units to be used in the PBEDS are a mature and proven technology. Also, the physical handling and procedures to be used at the PBEDS are already known, practiced and documented.

The initial estimates for the PBNSF construction schedule were unacceptably long. These schedule problems were determined to produce unacceptable risks in regard to meeting CWC deadlines. In contrast to this situation for the PBNSF, the EDS units have been previously deployed

and field tested; therefore, the schedules for their deployment and operation are significantly better understood than those for the PBNSF. In addition, the Army's current estimates for facility operations show that the PBEDS can become operational much quicker than the PBNSF.

The initial engineering cost estimates for the PBNSF were higher than anticipated, and were recently revised upward by over 15%. These most recent increases are approximately equally attributable to anticipated increases in construction costs and research/development costs. Such cost increases are difficult for the Army to manage within the DOD's multi-year funding cycles.

In summary, the Army has determined that the PBEDS approach is superior to the PBNSF option because the PBEDS (a) is less complex; (b) uses mature and proven EDS technology, (c) reduces schedule risk in the areas of permits, construction, and operations/processing; and (d) reduces the overall cost. For these reasons, the PBNSF option has been abandoned in favor of the proposed action: to deploy and operate three EDS units at PBA as part of the PBEDS.

While the PBNSF option is not evaluated in detail in this EA, the PBNSF was previously addressed in an EA issued by the Army (see U.S. Army 2002a). The analyses of potential impacts in the PBNSF EA are incorporated by reference into this PBEDS EA for the purpose of comparing the two alternatives.

Other Alternatives Considered But Not Evaluated in Detail. In the past, range-recovered chemical munitions were typically disposed of near the location where they were discovered by detonating them in the open after first evacuating the area and after packing sandbags over the munition. This practice is not considered appropriate for the RCM stored at PBA because of the large number of items that need to be destroyed. Open burning and/or open detonation of these RCM at PBA is therefore not considered to be a reasonable alternative.

In its assessment of the PBNSF, the NRC developed and considered two options for replacement of the PBNSF (NRC 2004). The NRC's Option 1 is essentially the proposed action (i.e., the PBEDS) as described in Section 2.1. Option 2 would have retained part of the PBNSF capabilities for processing the GTRs with intact rocket motors, while processing all other munitions in EDS units. Under Option 2, the retained PBNSF components would include an explosive containment chamber, the chemical processing trailer, a heel-dissolving tank, the detonation chamber, and a metal decontamination unit. The NRC found that Option 2 offered only modest advantages over the PBNSF and no safety, economic, or environmental advantages over the multiple-EDS approach (NRC 2004). Because the NRC's Option 2 has no advantages over the proposed PBEDS, this option does not warrant further consideration in this EA.

In addition to the EDS units, other types of controlled detonation chambers are being evaluated by the Army. Because of the uncertainty of when these technologies might become available, this option has not been given further consideration for use with the RCM at PBA. These other technologies will be evaluated as they become available for deployment.

The Army has constructed and plans to operate a facility at PBA for destroying the U.S. defense stockpile of lethal unitary chemical weapons stored there. This facility—the Pine Bluff Chemical Agent Disposal Facility (PBCDF)—is scheduled to begin destroying chemical warfare agents and munitions in 2004. The Army considered using the PBCDF to also destroy the RCM stored at PBA because some of the types of RCM and chemical fills are identical to the

stockpile items to be destroyed in the PBCDF. This option was rejected, however, for the following reasons: (1) the generally deteriorated states of the RCM are not suitable for the munitions disassembly processes that will be used at the PBCDF; (2) existing PBCDF approvals and permits do not allow for the treatment of chemical compounds containing arsenic; therefore, a permit modification would be required; (3) existing handling equipment at the PBCDF would need to be modified, and (4) incorporating this large amount of non-stockpile RCM into the campaigns planned for the PBCDF would lengthen the overall PBCDF schedule and could jeopardize meeting the CWC deadlines for destroying the stockpile items and/or the RCM. For these reasons, the use of the PBCDF has not been given further consideration in this EA.

3. EXISTING ENVIRONMENT AND POTENTIAL ENVIRONMENTAL CONSEQUENCES

This EA addresses direct, indirect, and cumulative impacts to the following categories of environmental resources: land use, air quality, groundwater and surface water, terrestrial and aquatic ecological resources, wetlands, threatened and endangered species, socioeconomic resources, and cultural (i.e., archaeological and historic) resources. In addition, this EA also addresses potential impacts to environmental justice populations, regional waste management practices, and human health and safety (including the consequences of hypothetical accidents).

Because the proposed PBEDS is intended to serve the same purposes as the now-defunct PBNSF (see Section 1.1), this EA compares the potential environmental impacts of the PBEDS to those previously evaluated in the PBNSF EA (U.S. Army 2002a). Simple comparisons between these two facilities indicate that, for most environmental resource categories, the potential impacts of the PBEDS would be even smaller than those of the PBNSF. In compliance with the Council on Environmental Quality's NEPA guidance (at 40 CFR 1502.21), this EA incorporates the findings of the PBNSF EA to streamline the analysis of the PBEDS proposal.

Table 1 summarizes the environmental impacts reported by the PBNSF EA, and—where simple comparisons between the two projects would suffice—presents the rationale used to conclude that the impacts of PBEDS would be of comparable magnitude and significance to those of PBNSF. However, for four categories of impacts (i.e., air quality during operations, groundwater depletion, waste management, and human health and safety during operations) simple comparisons with PBNSF were not sufficient to reach a conclusion about the magnitude and significance of the potential environmental impacts of PBEDS. Additional, more detailed analyses of the impacts in these four categories are described in Sections 3.1 (air quality during operations), 3.2 (groundwater depletion), 3.3 (waste management), and 3.4 (health and safety during operations).

Section 3.5 presents a discussion of the cumulative impacts issues associated with the PBEDS proposal. Section 3.6 describes the environmental impacts associated with continued storage of the RCM at PBA (i.e., the no-action alternative).

Table 1. Comparison of potential impacts between the Pine Bluff Non-Stockpile Facility (PBNSF) and the Pine Bluff Explosive Destruction System (PBEDS)

Potentially impacted resource category	Impacts associated with the PBNSF alternative	Impacts associated with the proposed PBEDS
Land use	**From Section 3.1.2 of the PBNSF EA:** Construction and operation of the PBNSF would occur on a vacant, but previously disturbed 25-acre site, which was used for disposal of construction fill material when an adjacent former industrial production facility (i.e., the IBPF) was built. The change in land use for the PBNSF site would be compatible with the surrounding land uses and would convert the unused, previously disturbed site to a productive use for the lifetime of the PBNSF. Use of the site for the PBNSF should have no impact on the use of any of the surrounding lands.	**Land use impacts would be smaller than those associated with the PBNSF,** because preparation of the 6-acre PBEDS site would occur on a portion of the to-be-demolished IBPF site which is previously disturbed and which has existing utilities. However, the use of this site for the PBEDS would be different than the plans to clear and revegetate the site as described in the IBPF EA (see Section 4.1.3 in Shaw Environmental 2003). The proposed PBEDS site and the site planned for the PBNSF are approximately one-half mile apart.
Air quality:		
• Construction	**From Section 3.2.2.1 of the PBNSF EA:** Fugitive dust would result from earthwork and from the movement of construction vehicles. Temporary and localized emissions of nitrogen oxides, carbon monoxide, sulfur dioxide, volatile organic compounds (VOCs), and particulate matter would result from exhaust emissions of vehicles and other machinery; however, these emissions would be very small compared to regulatory thresholds typically used to determine whether further air quality impact analysis is necessary.	**Air quality impacts during construction would be smaller than those associated with the PBNSF,** because the proposed 6-acre PBEDS footprint would be smaller than the 25-acre footprint of the PBNSF and would require much less construction activity than for the PBNSF.
• Operations	**From Section 3.2.2.2 of the PBNSF EA:** While emissions from operation of the proposed PBNSF could potentially contain chemical warfare agent, hazardous air pollutants, and VOCs, the planned engineering controls (including the use of a carbon filter system) would reduce emissions to levels that would meet permit requirements and cause no significant impacts.	**From Section 3.1 in this EA:** Atmospheric emissions from the PBEDS would be small. The PBEDS would use carbon filters to reduce these emissions. Emissions during the operation of the PBEDS would be expected to be well below regulatory requirements and would not be expected to cause any significant air quality impacts.

Table 1. (Continued)

Potentially impacted resource category	Impacts associated with the PBNSF alternative	Impacts associated with the proposed PBEDS
Water resources:		
• Groundwater	**From Section 3.3.2.1 of the PBNSF EA:** Total process water requirements over the lifetime of the PBNSF (about one year) amount to less than 90,000 gal. While this represents an additional stress on the already over-utilized Sparta aquifer, the incremental increase in groundwater usage at PBA due to PBNSF operations would be a very small fraction (i.e., about 0.03 %) of the water already being used at PBA. Compared to Jefferson County's total estimated annual withdrawals from the Sparta aquifer, the proposed PBNSF water usage would represent only 0.0002 % of these withdrawals. Given the relatively minor water requirements of the proposed PBNSF, any impacts to the groundwater resources of the area would be negligible.	**From Section 3.2 in this EA:** Water consumption during the operational lifetime of the PBEDS would total 373,000 gal, including 66,000 gal for rinse water and decontamination solutions and 307,000 gal for the workers and support staff (e.g., for drinking, showers, and toilets). This incremental increase in water usage attributable to the PBEDS would be a very small fraction (about 0.12%) of the current annual water use at PBA. Also, compared to the amount of water currently withdrawn from the Sparta aquifer in Jefferson County, the incremental PBEDS water usage would represent an increase of only 0.0014%. Given the relatively minor water requirements of the proposed PBEDS, any impacts to the groundwater resources of the area would be negligible.
• Surface water	**From Section 3.3.2.2 of the PBNSF EA:** Use of best management practices for erosion and spill control, would ensure that construction and routine operation would have negligible impacts on nearby surface waters. During operations, the PBNSF would not generate any effluents to be discharged to local surface waters, other than sanitary wastes transferred to the existing PBA central sanitary waste treatment facility. Also, no surface waters would be diverted or consumed.	**Impacts to surface water would be smaller than those associated with the PBNSF**, because the PBEDS would likewise employ best management practices during construction and would discharge smaller quantities of effluents through the existing PBA sanitary water treatment facility. Also, the PBEDS would not divert or consume any surface waters.

Table 1. (Continued)

Potentially impacted resource category	Impacts associated with the PBNSF alternative	Impacts associated with the proposed PBEDS
Ecological resources:		
• Terrestrial resources	**From Section 3.4.2.1 of the PBNSF EA:** Construction of the PBNSF would alter up to about 30 acres, including the PBNSF site, the area needed for a new electrical substation, the associated new access roads, and the new electrical power line rights-of-way. Loss of up to 30 acres of previously disturbed area would represent an insignificant loss of non-unique vegetation and wildlife. Larger, similar and less disturbed areas are present throughout the PBA installation and surrounding areas. Increases in local vehicle traffic from facility personnel could slightly increase the number of road kills of wildlife, but wildlife population levels would be unlikely to be significantly affected.	**Impacts to terrestrial resources would be smaller than those associated with the PBNSF,** because the PBEDS would be constructed completely within the former IBPF industrial area. Use of this site has even less potential for impacts on terrestrial ecological resources than does the PBNSF.
• Aquatic resources	**From Section 3.4.2.2 of the PBNSF EA:** No perennially flowing streams, lakes, or ponds that support aquatic organisms are located on the PBNSF site or its immediate environs. Impacts during construction upon aquatic habitats and biota would therefore be insignificant, if not complete absent. During normal operations, no process effluents would be discharged to the environment. Sanitary liquid wastes would be transferred to and treated in the existing PBA central sanitary waste treatment facility prior to being discharged to area waters under an NPDES permit. Therefore, no adverse effects on aquatic resources and their biota are anticipated from aqueous effluents during operations. Atmospheric emissions of pollutants during operations are expected to be minor and would therefore be unlikely to adversely affect aquatic species during operations.	**Impacts to aquatic resources would be similar to those associated with the PBNSF,** because the proposed PBEDS site is not located near any aquatic resources. Also, smaller quantities of sanitary liquid wastes from the PBEDS would be treated in and discharged by the PBA central treatment facility, and the atmospheric emissions of the PBEDS would be smaller than those from the PBNSF.
• Wetlands	**From Section 3.4.2.3 of the PBNSF EA:** No wetlands have been identified on the PBNSF site; however, the site lies upstream of the known wetlands along Phillip's Creek. The erosion control measures to be used during PBNSF construction would prevent impacts to these wetlands.	**Impacts to wetlands would be the same as those associated with the PBNSF,** because no wetlands have been identified on the proposed PBEDS site and because PBEDS construction activities would employ erosion control measures to prevent impacts to wetlands along Phillip's Creek.

Table 1. (Continued)

Potentially impacted resource category	Impacts associated with the PBNSF alternative	Impacts associated with the proposed PBEDS
• Threatened and endangered species	**From Section 3.4.2.4 of the PBNSF EA:** No federally listed threatened or endangered species are known to occur within PBA installation boundaries; hence, there would be no impacts to such species. The rattlesnake master borer moth and the diana fritillary butterfly (both of which are candidates for listing as state endangered or threatened species) have been observed at PBA, but only in settings that are both distant from, and less disturbed than, the PBNSF site. Thus no adverse effects to these species would be expected.	**Impacts to threatened and endangered species would be the same as those associated with the PBNSF**, because the distance between the proposed PBEDS site and the observed locations of threatened and endangered species is similar to that for the PBNSF site.
Socioeconomic resources	**From Section 3.5.2 of the PBNSF EA:** Construction of the PBNSF would have a minor impact on the socioeconomic resources of the region. Construction activities would result in a peak employment of 100 to 150 workers. Because many of these jobs could be filled by workers who had been employed in construction of the Pine Bluff Chemical Agent Disposal Facility or other PBA construction projects, construction of the PBNSF would create a positive impact for employment in the region but would be unlikely to result in adverse impacts on housing, schools, and other public services from in-migration of any new workers. Operation of the PBNSF would require the employment of about 90 to 150 workers, some of whom would be drawn from the existing workforce at PBA. This relatively small work force would have little adverse impact, if any, on the socioeconomic resources of the region.	**Impacts to socioeconomic resources would be smaller than those associated with the PBNSF**, because the deployment and operation of the PBEDS would require less than 50 workers, some of whom would be drawn from the existing PBA workforce.
Cultural (i.e., archaeological and historic) resources	**From Section 3.6.2 of the PBNSF EA:** The nearest known archaeological or historical site is about 1.7 miles east-southeast of the PBNSF. Thus, no impacts to these resources would be expected during the construction or operation of the PBNSF. Because access to the PBNSF would follow an existing right-of-way, the proposed action would not be expected to impact any previously unidentified archaeological or historic resources.	**Impacts to cultural resources would be the same as those associated with the PBNSF**, because the proposed PBEDS site is in an existing industrially developed area known to be devoid of any cultural resources and because the PBEDS access roads already exist.

Table 1. (Continued)

Potentially impacted resource category	Impacts associated with the PBNSF alternative	Impacts associated with the proposed PBEDS
Environmental justice	**From Section 3.7.2 of the PBNSF EA:** No significant off-site impacts or impacts to human health and safety are anticipated during the construction or operation of the PBNSF. Timely destruction of the RCM stored at PBA would eliminate the small risks associated with continued storage of RCM to all off-site populations. Thus, in the absence of impacts, no disproportionately high or adverse impacts to minority or low-income populations would be expected.	**Environmental justice impacts would be the same as those associated with the PBNSF**, because the impacts of PBEDS on minority or low-income populations would be indistinguishable from those of the PBNSF.
Waste management:		
• Solid wastes	**From Section 3.8.2.1 and 3.8.2.3 of the PBNSF EA:** An estimated 15 tons of decontaminated metal parts would be produced at the PBNSF. The options for disposition of these solid wastes include metals recovery/recycle or sending them to a landfill. These metal wastes generated by the PBNSF would increase metal recovery in Arkansas by less than 4%, and these wastes would be an even smaller fraction of metals recovery in Louisiana, Missouri, or Texas. Potentially contaminated PPE suits and spent carbon from filters would be packaged for shipment to an off-site commercial TSDF(s). Because the quantities of these solid wastes are small compared to the quantities already disposed of annually at nearby commercial TSDFs, no significant impacts from the disposal of such wastes would be expected.	**From Sections 3.3.1 and 3.3.2 in this EA:** Approximately 245 tons of decontaminated metal waste would be generated over the lifetime of the PBEDS. These metal wastes would represent only 5% of such wastes managed by metal recovery methods in Arkansas. The quantities of wastes from un-reusable PPE suits, spent carbon filter material, and GTR intact motors would likewise be small in comparison to the quantities of these types of wastes already disposed of annually at commercial TSDFs in Arkansas; hence, no significant impacts from the disposal of such wastes would be expected. The small quantities of non-hazardous wastes to be generated by the PBEDS could be readily handled by existing PBA waste management practices and waste disposal capacity.

Table 1. (Continued)

Potentially impacted resource category	Impacts associated with the PBNSF alternative	Impacts associated with the proposed PBEDS
• Liquid wastes	**From Section 3.8.2.2 and 3.8.2.3 of the PBNSF EA:** During its operational lifetime, the PBNSF would generate 80 tons of neutralent (primarily organic compounds) and 700 tons of spent rinse water and decontamination solutions (consisting of caustic water with traces of salts and soot). All liquid process effluents would be collected for shipment to an off-site TSDF(s). The neutralent would be suitable for disposal by incineration, energy recovery, or fuel blending. However, the quantity of neutralent would be less than 0.05% of the hazardous wastes treated by these methods each year in Arkansas. The spent decontamination solutions and rinse waters could be disposed of by several methods, including deep-well injection. Each year, Arkansas disposes of over 750 times as much hazardous waste by deep-well injection as would be generated by PBNSF. The small quantities of non-process liquid sanitary wastes generated by the PBNSF could readily be accommodated by the capacity of the existing PBA wastewater treatment facility.	**From Sections 3.2 and 3.3.3 in this EA:** Up to 730 tons of liquid process wastes would be generated during the lifetime of the PBEDS, including about 470 tons of neutralent and 270 tons of spent rinse water. The 470 tons of neutralent from the PBEDS would represent about 0.4%, 0.5%, and 0.6% of the hazardous wastes managed at TSDFs in Arkansas by incineration, energy recovery, and fuel blending, respectively. The 270 tons of spent rinse water from the PBEDS would be about 1,800 times smaller than the amount of such wastes disposed of by deep-well injection in Arkansas. The small quantity of non-process sanitary wastewater generated by the PBEDS could readily be accommodated by the capacity of the existing PBA wastewater treatment facility.
Human health and safety:		
• Construction	**From Section 3.9.2.1 of the PBNSF EA:** The hazards of constructing the PBNSF would not be unique and would be indistinguishable from those of any similarly sized industrial construction project. No significant impacts to human health and safety would be expected during construction.	**Impacts to human health and safety during construction would be smaller than those associated with the PBNSF**, because the PBEDS would be a much smaller, less complex facility.

Table 1. (Continued)

Potentially impacted resource category	Impacts associated with the PBNSF alternative	Impacts associated with the proposed PBEDS
• Operations	**From Section 3.9.2.2 of the PBNSF EA:** The hazards during PBNSF operations include unintentional exposure to chemical warfare agents or hazardous chemicals. The potential impacts of such exposure would include injury to PBNSF personnel. Shaped charges would be used to destroy the energetic components of explosively configured RCM in a detonation chamber inside the PBNSF. The shaped charges were discussed in the PBNSF EA, but their hazards were not addressed in any detail. The PBNSF would have appropriate alarms to indicate leaks, and workers would be trained and provided with protective equipment for these situations. The containment system should prevent any releases outside the facility.	**From Section 3.4 in this EA:** The hazards from exposure to chemical warfare agents or hazardous chemicals would be the same as for the PBNSF. Shaped charges would be placed on all RCM and would be used to access the RCM's contents and destroy the energetic components. The potential impacts of the above hazards include worker injury or death. The same mitigation measures as described for the PBNSF would be implemented for the PBEDS. In addition, the quantities of explosive shaped charges would be kept to a minimum (including the charges stored inside each service magazine), and the handling and placement of such charges would be conducted by personnel with highly specialized training.
Hypothetical accidents	**From Section 3.10.3 of the PBNSF EA:** The instantaneous release of the phosgene fill from one Livens round was identified as the hypothetical "worst case" accident for PBNSF operations. Because the airborne concentrations of phosgene from this "bounding accident" do not create lethal doses at any off-post location, there would be no chance of off-site fatalities during the proposed action. However, the "no-effects" dose from this bounding accident could occur at off-post locations. PBNSF workers would be provided with protective equipment, and other on-site personnel would be restricted from the immediate vicinity of the storage area, along the transportation route, and near the PBNSF site during the transport and destruction of the RCM. **From Section 3.9.2.2 of the PBNSF EA:** The anticipated lifetime number of liquid effluent shipments (i.e., 60 tanker truck loads) from the PBNSF would not be very noticeable in existing local traffic and would also not be expected to have any significant impact on human health and safety as the result of any traffic accidents.	**Potential impacts from hypothetical accidents during PBEDS operations would be smaller than those associated with the PBNSF,** because no Livens rounds will be processed at the PBEDS (i.e., they will be processed with the EDS unit located near the PBMAS). An accident involving a German Traktor Rocket would then become the hypothetical "worst case" event for the PBEDS; however, this event was included in the previous accident analysis for the PBNSF and was determined to produce smaller downwind hazard distances than those for the PBNSF's Livens round accident. The same mitigation measures as described for the PBNSF (e.g., such as using protective equipment and administrative controls for on-site personnel) would be implemented for the PBEDS. The anticipated lifetime number of liquid effluent shipments (i.e., 40 truck loads) from the PBEDS would be smaller than previously analyzed for the PBNSF; hence, the potential impacts of the off-site shipment of liquid wastes would be smaller than those previously assessed for the PBNSF.

Source for PBNSF Information: U.S. Army, *Environmental Assessment: Proposed Construction and Operation of the Pine Bluff Non-Stockpile Facility at Pine Bluff Arsenal, Arkansas*, Program Manager for Chemical Demilitarization, Product Manager for Non-Stockpile Chemical Materiel, Aberdeen Proving Ground, Md., December 2002.

3.1 AIR QUALITY

Affected Environment. The U.S. Environmental Protection Agency (EPA) considers air quality in Jefferson County to meet the National Ambient Air Quality Standards (NAAQS) for ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter less than or equal to 10 μm in aerodynamic diameter (PM_{10}) (see 40 CFR 81.304). Air monitoring data for the area around PBA are presented in Table 2. Although data from a monitoring station in North Little Rock, more than 30 miles from PBA, exceeded the 8-hr ozone standard in 2002 (see Table 2), neither Pulaski County in which North Little Rock is located, nor Jefferson County were designated as nonattainment areas by EPA during their April 2004 announcement of such areas for the new 8-hr ozone standard. New standards for very fine particulate matter—less than or equal to 2.5 μm in aerodynamic diameter ($PM_{2.5}$)—have been promulgated, survived court challenges, and are expected to become effective when sufficient monitoring data are in place. A monitoring station in Pine Bluff exceeded the annual $PM_{2.5}$ standard in 2001 (see Table 2), but it is unknown if Jefferson County will be designated by EPA as a nonattainment area for $PM_{2.5}$.

PBA has a Title V air permit covering discrete emission points at the Arsenal, including the PBA production areas and the Pine Bluff Chemical Agent Disposal Facility (PBCDF). The Arkansas Department of Environmental Quality (ADEQ) has established allowable emission limitations for each of these sources. The PBEDS will require a modification to the existing PBA Title V air permit.

Potential Impacts of PBEDS Operations. Two sources of air emissions are anticipated during the PBEDS operational lifetime. First, emissions during the processing of RCM in the EDS units would result from the detonation of explosives, TNT, and cyclonite. According to the application to modify the existing PBA Title V Air Permit (PBA 2004), a total of 1,260 munitions would be processed in the three EDS units over a 12-month period. It is conservatively assumed for the analysis in this EA that none of the pollutants from the processing would be captured by the EDS or VCS filter systems.[6] Second, a total of six back-up diesel engines, as described below, would be operated at the PBEDS whenever electrical power to the site is lost or interrupted. At each EDS unit, one diesel engine would be used to drive an emergency electric generator to provide electricity for EDS operation, and a second diesel engine would provide emergency power for the EDS air compressor. Thus, two diesel engines would be operated at each of the three EDS units; however, emissions from these engines would only occur during monthly test periods and during infrequent power failures. As an upper bound, it is assumed for the analysis in this EA that each of the six diesel engines would operate up to 100 hours annually. Although each of the three EDS units would be equipped with its own diesel fuel storage tank, the emissions of volatile organic compounds (VOCs)—which would occur during the filling of these tanks—would be negligible and are not discussed further in this analysis.

[6] The assumption that none of the pollutants would be captured by the EDS or VCS filter systems is equivalent to detonating the RCM in the open air. This is an extremely conservative assumption, which would significantly overestimate the quantities of these pollutants released into the atmosphere.

Table 2. Summary of ambient air quality in the Pine Bluff area

Criteria pollutant	Monitor location	Averaging period	Year	Concentration [a] ($\mu g/m^3$)	Ambient Air Quality Standard [b] ($\mu g/m^3$)
Particles ≤10 μm in diameter (PM_{10})	Little Rock	24-hr	2001	57	150
			2002	50	
		Annual	2001	29	50
			2002	26	
Particles ≤2.5 μm in diameter ($PM_{2.5}$) [c]	Pine Bluff	24-hr	2001	29	65
			2002	33	
			2003	25	
		Annual	2001	17.9	15
			2002	12.1	
			2003	12.4	
Sulfur dioxide (SO_2)	North Little Rock	3-hr	2002	29	1,300
			2003	26	
		24-hr	2002	18	365
			2003	18	
		Annual	2002	8	80
			2003	5	
Nitrogen dioxide (NO_2)	North Little Rock	Annual	2002	28	100
			2003	26	
Ozone	North Little Rock	1-hr	2001	200	235
			2002	202	
			2003	194	
		8-hr	2001	157	157
			2002	172	
			2003	147	
Carbon monoxide (CO)	Little Rock	1-hr	2002	7,015	40,000
			2003	4,255	
		8-hr	2002	5,980	10,000
			2003	2,530	
Lead (Pb) [d]		Calendar quarter			1.5

[a] Concentrations for comparison with standards (e.g., the second highest recorded concentration, if appropriate).

[b] Not to be exceeded more than once per year for CO and 3-hr SO_2. Not to be exceeded more than 1 day per year for 24-hr PM_{10}, 24-hr SO_2, and 1-hr ozone. For 8-hr ozone, the fourth highest value in a year may not exceed this level. For 24-hr $PM_{2.5}$, the 98th percentile of 24-hour values for a year may not exceed this level.

[c] New standards for very fine particulate matter, ≤2.5 μm in diameter ($PM_{2.5}$), have been promulgated, survived court challenges, and are expected to become effective when sufficient monitoring data are in place. It is likely that these new standards will be effective during the period of PBEDS operations.

[d] Lead concentrations are no longer measured near Pine Bluff. In 1989 the highest average concentration for a calendar quarter in Little Rock was 0.34 $\mu g/m^3$, which is less than 25% of the allowable limit (1.5 $\mu g/m^3$). Atmospheric lead concentrations have been declining in recent years as a result of the increased use of unleaded gasoline.

Source: Environmental Protection Agency, AirData website; URL: http://www.epa.gov/air/data/reports.html (accessed April 16, 2004).

For each of the criteria pollutants, the process emissions and diesel engine emissions were summed to obtain the total PBEDS emissions in tons/year (see Table 3). To evaluate their significance, the total air emissions were compared with significance thresholds established by the EPA (see 40 CFR 51.166). For example, a net carbon monoxide (CO) emissions increase of 100 tons/year or more represents a significant increase that may adversely affect ambient CO concentrations (see Table 3). A net increase below this threshold would not be expected to be significant. As indicated in Table 3, all of the total annual emissions (CO, NO_x, SO_2, PM_{10}, and VOCs) are less than 6% of their respective threshold values. Therefore, no adverse impacts to air quality caused by criteria pollutants would be expected from emissions during PBEDS operation.

The only ambient air quality constituents that are not well below NAAQS in the Pine Bluff area are ozone and $PM_{2.5}$ (see Table 2). Ozone, a regional pollutant, is formed during photochemical reactions involving VOCs and NO_x in the presence of sunshine. While any emission of VOCs and NO_x in the region may contribute to ozone generation, the very small quantities released by PBEDS operations would be well below the significance thresholds in Table 3. By definition, the $PM_{2.5}$ category is a subset of the PM_{10} category. The $PM_{2.5}$ NAAQS are roughly one-third of the PM_{10} NAAQS (see Table 2). The ambient $PM_{2.5}$ concentrations in the Pine Bluff area appear to be approximately half of the PM_{10} concentrations at monitoring stations in the Little Rock area (see Table 2). While the EPA has not developed a threshold for $PM_{2.5}$, such a threshold would probably be at least one-third of the PM_{10} threshold of 15 tons/year, which would equate to about 5 tons/year of $PM_{2.5}$. Even if all of the PBEDS annual PM_{10} emissions of 0.44 tons (see Table 3) were assumed to be $PM_{2.5}$ emissions, these emissions would be less than 10% of the assumed $PM_{2.5}$ threshold of 5 tons/year. Consequently, no adverse impacts to air quality would be expected from $PM_{2.5}$ emissions during PBEDS operation.

Table 3. Comparison of average air emissions during PBEDS operation with significance thresholds

[Units are tons/year, except for far right column]

Pollutant [a]	Source: Emissions from PBEDS processes	Source: Emissions from diesel engines [b]	Total PBEDS emissions	Significance threshold [c]	Percent of threshold
CO	1.22	0.47	1.69	100	1.7%
NO_x	N/A [d]	2.15	2.15	40	5.4%
SO_2	N/A [d]	0.14	0.14	40	0.3%
PM_{10}	0.28	0.16	0.44	15	2.9%
VOCs	negligible	0.18	0.18	40	0.5%

[a] CO = carbon monoxide, NO_x = oxides of nitrogen, SO_2 = sulfur dioxide, PM_{10} = particulate matter less than or equal to 10 μm in aerodynamic diameter, VOCs = volatile organic compounds.

[b] Includes three EDS back-up generator sets and three back-up engines for the EDS air compressors.

[c] Based on 40 CFR 51.166

[d] N/A means "not applicable."

While emission rates for the two sources are small (as shown in Table 3), actual PBEDS emissions would be much less. Emissions from munition detonation would be much less than these estimates because the emissions used here are based on the detonation of 2.4 lb of TNT and 2.4 lb of cyclonite in the open air for each RCM item processed. No credit was taken for removal of the particulate matter inside the EDS unit's containment vessel, capture of gaseous species during post-detonation processing inside the vessel, capture of particulates and gaseous species by the EDS unit's air filters, or capture of any pollutants that might escape the EDS and be captured by the VCS's air filtration system. In addition, the assumption that each diesel engine would run for 100 hours/year is also conservative. A more realistic value would be about 50 hours/year. Consequently, the proposed PBEDS emissions are not expected to have any adverse impact on local or regional air quality.

3.2 WATER RESOURCES

No surface waters exist on the proposed PBEDS site, and no surface water would be consumed, diverted, or affected during the deployment and operation of the PBEDS. Therefore, this section focuses upon the potential impacts to groundwater resources.

The primary water-bearing, subsurface formations in the vicinity of PBA are the "alluvial" aquifer, the Cockfield Formation, and the Sparta Formation. The alluvial aquifer is heavily used for irrigation in Jefferson County. Wells completed in the Cockfield Formation are used for domestic, commercial, and industrial purposes, but the primary use is domestic. Neither of these two aquifers is used as a primary source of water at PBA.

The Sparta aquifer, which underlies the Cockfield formation, is a major groundwater supply for eastern Arkansas and Louisiana (ASWCC 2001). The Sparta aquifer consists of massive sand units, which are highly productive (in regard to both water quality and quantity) and have yields up to 2,000 gpm (Kreese and Huetter 1999). Wells established in this aquifer at depths of about 1,000 ft supply the on-post water needs of PBA, as well as the needs of area municipalities and industries. In 1999, groundwater withdrawals in Jefferson County from the Sparta aquifer totaled about 70 million gal/day, or 26 billion gal/year (ASWCC 2001).

Heavy use of groundwater in Jefferson County and in the surrounding counties has led to substantial declines in the water levels of the Sparta aquifer (Joseph 1999; ASWCC 2001). Continued de-watering of the Sparta Formation would result in reduced productivity of the aquifer and, possibly, irreversible damage to the aquifer. The regional importance of the Sparta aquifer has resulted in efforts to promote conservation and reduce the use of the Sparta aquifer as a water supply. For example, the Arkansas Ground Water Protection and Management Act requires groundwater withdrawals from the Sparta aquifer to be metered for all new wells constructed after September 30, 2001, and for all existing wells by September 30, 2006.

The existing domestic water treatment plant at PBA has a capacity of 1.25 million gal/day and provides an average of 892,000 gal/day of potable water for use at the Arsenal (Shaw Environmental 2003). As discussed in Section 2.1.5, the total water requirement for the PBEDS would be about 720 gal/day (i.e., rinse water requirements, plus potable water use). The total amount of groundwater used by the PBEDS would therefore be a very small fraction (about 0.08%) of the daily water use at PBA. Also, compared to the 70 million gal/day withdrawn from the Sparta aquifer

in Jefferson County in 1999, the PBEDS water usage would represent an increase of only 0.001%. Given the relatively minor water requirements of the proposed PBEDS, any impacts to the groundwater resources of the area would be negligible.

3.3 WASTE MANAGEMENT

The PBEDS would produce solid and liquid, hazardous and nonhazardous wastes during its operational lifetime. These wastes would consist primarily of (1) neutralent, containing organic compounds; (2) spent rinse water and decontamination solutions, consisting of caustic water with traces of salts; and (3) decontaminated metal parts. All PBEDS wastes would be disposed of in compliance with federal, state, and local regulations. Any PBEDS wastes to be shipped off-site would be packaged in accordance with applicable U.S. Department of Transportation specifications and would be transported to licensed and permitted commercial TSDFs for final treatment and disposal.

The following subsections examine the effects of the proposed action on waste management systems, both on- and off-site, that could be affected by the proposed action.

3.3.1 Non-Hazardous Wastes

Non-hazardous solid wastes generated from the operation of the PBEDS would consist primarily of dunnage from the stored RCM and supplies from non-process areas that do not contact agent, reagent or neutralent. These non-hazardous wastes would be segregated from contaminated materials and hazardous wastes, and would be managed with other solid wastes generated at PBA. Non-hazardous solid wastes currently produced at PBA are disposed of in the Jefferson County Municipal Landfill, which has the capacity to dispose of such wastes through July 2010. Because the quantities of non-hazardous wastes generated by PBEDS operations would be small compared to those generated by other PBA operations, no appreciable effect on the Jefferson County Municipal Landfill operations are expected from PBEDS operations.

3.3.2 Solid Wastes

PBA operates a hazardous waste landfill at the northwest corner of the Arsenal. A portion of the hazardous wastes resulting from current PBA operations are disposed of in this on-site facility, with the remainder being transported off-site to a permitted TSDF. No hazardous wastes resulting from operations of the PBEDS would be disposed of on-site at PBA; all such wastes would be shipped to one or more off-site TSDFs.

As discussed in the following paragraphs, the quantities of hazardous solid wastes to be generated by the PBEDS are small in comparison to the quantities disposed of annually by nearby commercial TSDFs; therefore, the existing TSDFs would be able to accommodate the wastes generated at the PBEDS with little disturbance to current waste management systems. Hence, no significant impacts on regional waste management capacity would be expected to result from PBEDS operations.

Metal Parts. Up to 245 tons of metal parts would be produced during the lifetime of the PBEDS (see Section 2.1.4) . Uncontaminated munition overpacks that did not contain leaking munitions would be returned to PBA for reuse. Munitions overpacks that held leaking munitions would be appropriately decontaminated and disposed of with other decontaminated metal parts (e.g., munitions bodies).

The TSDF options for disposition of the metal waste generated by the PBEDS include metals recovery/recycle or sending it to a landfill. According to 2001 data from the U.S. Environmental Protection Agency (EPA), over 5,000 tons of hazardous waste is managed annually by metals recovery in the state of Arkansas (EPA 2003). In addition, over 153,000 tons is managed annually by landfill/surface impoundment[7]. The estimated 245 tons of metal waste to be generated over the lifetime of the PBEDS is small in comparison to the quantities of solid hazardous waste already managed in Arkansas (i.e., about 5% of the waste managed annually by metals recovery, and about 0.2% of that managed annually by landfill/surface impoundment). Thus, existing TSDFs in Arkansas should have more than sufficient capacity to manage the metal wastes that would be generated by the PBEDS.

German Traktor Rocket Motors. The Army is currently evaluating disposal options for the GTR intact motors which will be removed from the GTR warheads (see Section 2.1.3). It is expected that these motors would be appropriately containerized and shipped off-site to a permitted commercial TSDF. The quantities of waste generated by the approximately 30 GTR motors would be very small in comparison to the quantities of similar wastes already managed in Arkansas.

Other Hazardous Solid Wastes. Potentially contaminated spent carbon from the VCS and EDS ventilation/emissions controls systems would be packaged or drummed for off-site treatment and disposal at a permitted commercial TSDF. Approximately 6.3 tons of spent EDS carbon filters would be generated during the lifetime of the PBEDS (see Section 2.1.4). An additional 1.2 tons of spent carbon would be generated from the 800-lb filtration units on each of the three VCSs.

One option for disposition of the spent carbon filter material is incineration. Over 112,000 tons of hazardous waste are managed annually in Arkansas by incineration (EPA 2003). The estimated 7.5 tons of carbon filter waste to be generated over the lifetime of the PBEDS is small in comparison to the quantities of solid hazardous waste already managed in Arkansas (i.e., 0.007% of the waste managed annually by incineration). Thus, if the spent VCS and EDS carbon filters were to be disposed of by incineration, then the potential impacts to existing TSDF capacity in Arkansas would be negligible.

Potentially contaminated PPE suits which are not sent to the PBA laundry for reuse would be containerized and shipped off-site to a permitted TSDF. However, the quantities of this PPE waste would be small in comparison to the quantities of similar wastes already managed annually in Arkansas, and no significant impacts on regional waste management capacity would be expected.

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[7] The EPA's waste management source data provide only a single numerical entry for the combined categories of "landfill" and "surface impoundment." Therefore, no further breakdown is available for use in this analysis, even though the PBEDS metal wastes would not be appropriate for disposal by surface impoundment.

3.3.3 Liquid Wastes

Up to 470 tons of neutralent (see Section 2.1.4) would be generated during the operational lifetime of the PBEDS. Because this liquid process waste contains primarily organic compounds, it would be suitable for treatment and disposal by a variety of methods, including incineration, energy recovery, or fuel blending. The EPA's hazardous waste disposal data for 2001 show that TSDFs in Arkansas managed over 112,000 tons of hazardous waste by incineration, over 87,000 tons by energy recovery, and over 73,000 tons by fuel blending (EPA 2003). Thus, the 470 tons of neutralent from the PBEDS would represent 0.4%, 0.5%, and 0.6%, of the waste processed annually in Arkansas by these methods, respectively.

Up to 270 tons of spent rinse water (see Section 2.1.4) would be generated during the operational lifetime of the PBEDS. Because these liquid wastes would be primarily water, they could be disposed of by several methods, the most suitable of which would be deep-well injection. In 2001, TSDFs in Arkansas disposed of over 495,000 tons of hazardous waste by this method (EPA 2003). The lifetime quantity of rinse water and spent decontamination solutions from the PBEDS would thus be about 1,800 times smaller than the quantity of such wastes disposed by deep-well injection annually in Arkansas.

Because the quantities of liquid process wastes (i.e., neutralents, rinse waters, and decontamination solutions) generated by PBEDS are small compared to the quantities disposed of annually by commercial TSDFs, no significant impacts on regional waste management capacity would be expected.

3.4 HUMAN HEALTH AND SAFETY

The hazards associated with the construction and deployment activities needed to prepare the proposed PBEDS site would be characteristic of those for any similarly sized construction project. Adverse impacts from these types of hazards can be appropriately managed by implementation of an effective occupational safety and health program. No significant impacts to human health and safety would be expected during construction and deployment. Thus, this section focuses upon the potential hazards that would be associated with the operation of the PBEDS.

The hazards during PBEDS operations include (1) unintentional exposure to chemical warfare agents or hazardous chemical fills, (2) unintentional exposure to the chemical reagents used in the neutralization processes, and (3) the explosive components of the RCM and the use of explosive shaped charges. The potential impacts of these hazards would include worker injury or death. PBEDS personnel would be protected from these hazards by personal protective ensemble (PPE), by engineering controls, by barriers, and by training .

The PBEDS would have appropriate alarms to indicate leaks of chemical warfare agents or industrial chemical fills, and workers would be trained and equipped with protective equipment for these situations. The processing at PBEDS would take place inside a VCS, which would be maintained at a slight negative pressure and which would be vented through a carbon filter. This system would control any release of vapor emissions to the environment. The floor of the VCS would

be a concrete pad, which would prevent the migration of spilled liquids, if any spills should occur. These containment systems would prevent any releases and, therefore, no impacts would be expected outside the facility.

The PBEDS workers would be trained and equipped with protective equipment as needed for handling the RCM or the hazardous reagent chemicals. The reagents would include monoethanolamine (MEA), solutions of sodium hydroxide (NaOH), and solutions of sodium permanganate ($NaMnO_4$). Each of these chemicals is corrosive and/or would cause irritation to exposed skin or eyes. The chemical reagents at the PBEDS would be retained inside storage tanks until they were pumped into the EDS unit's containment vessel through piping and valves, thereby minimizing the potential of exposure to the PBEDS workers. Likewise, process effluents (i.e., neutralents) would be drained through valves and piping systems into containers appropriate for off-site shipments; thus, any worker exposure would again be minimized.

To limit the potential for explosions at the PBEDS, all munitions and their associated shaped charges would be limited to the rated explosive capacity of each EDS unit (see Section 2.1.1). The quantity of explosives stored in each service magazine (i.e., shaped charge storage) would be limited to 50 lb of TNT to afford adequate protection to nearby work areas and inhabited buildings from overpressure and fragmentation hazards. Barriers would be constructed around each service magazine. All handling of RCM and the placement of shaped charges would be conducted by personnel with highly specialized training for such operations, such as members of the U.S. Army's Edgewood Chemical Biological Center (ECBC). Thus, the use of shaped charges at the PBEDS would not introduce any new or unique hazards to these trained individuals.

3.5 CUMULATIVE IMPACTS

Section 3.11 in the PBNSF EA (U.S. Army 2002a) addressed the cumulative impacts of those actions that are reasonably foreseeable. As listed in the PBNSF EA, several other projects will be undertaken at PBA in compliance with the April 2007 deadline of the CWC. These projects would therefore be conducted during the same time frame as the PBEDS and would include:

- the on-going decontamination, clean-out and recycling of surplus ton containers stored at PBA (U.S. Army 1999);
- the on-going demolition of the Integrated Binary Production Facility (IBPF) (Shaw Environmental 2003);
- operation of the Pine Bluff Chemical Agent Disposal Facility (PBCDF) (U.S. Army 1997), which is scheduled to begin destroying the national defense inventory of chemical weapons stored at PBA later this year;
- operation of the Pine Bluff Munitions Assessment System (PBMAS) (U.S. Army 2001b) to non-intrusively assess and characterize the RCM currently in storage at PBA (see Section 1.2);
- deployment of a single EDS unit at the PBMAS (U.S. Army 2003a) to destroy any unstable RCM that are identified during PBMAS operations (see Section 2.1.2); and
- construction and operation of a Binary Destruction Facility (BDF) to destroy two types of binary precursor agents stored at PBA (U.S. Army 2003c);

In addition to the above projects, three other projects would/might be implemented at PBA:

- deployment of the Rapid Response System (RRS) to destroy chemical agent identification sets stored at PBA (U.S. Army 2003b);
- construction and operation of a Quality Evaluation Facility (QEF) (U.S. Army 1987), which would test filters and filtration media, and which has received funding for construction; and
- the possible construction and operation of a Vaccine Production Facility, which at this time has not received funding for construction.

The PBNSF EA previously evaluated the cumulative impacts of all the above projects in conjunction with the construction and operation of the PBNSF itself. As discussed in Table 1, most of the potential environmental impacts of the proposed PBEDS would be bounded by those previously identified and assessed for the PBNSF. Therefore, with the exceptions noted in the following paragraphs, the conclusions of the PBNSF EA in regard to the absence of cumulative impacts would also apply to the PBEDS.

Cumulative Impacts to Air Quality. As discussed in Section 3.1, ozone and $PM_{2.5}$ are two air pollutants of concern in the Pine Bluff area. Because existing ozone concentrations approach or are slightly above the level of the NAAQS (see Table 2), VOC and NO_x emissions that contribute to ozone concentrations are potentially contributors to a significant cumulative impact on air quality. To evaluate significance, the sum of VOC emissions from all foreseeable projects on or near PBA, as well as the sum of NO_x emissions from these projects, can be compared with EPA-established threshold values of 40 tons/year for VOC emissions and 40 tons/year for NO_x emissions (see Table 3). Using these thresholds, a net VOC or NO_x emissions increase of 40 tons/year or more represents a significant increase that may adversely affect regional ozone levels (40 CFR 51.166). If both of the increases are below their respective thresholds, then no significant impact to regional ozone levels would be expected. Even with conservative assumptions about back-up diesel engine usage, VOC emissions associated with operation of the PBEDS would be about 0.5% of the 40-ton/year threshold, and NO_x emissions would be less than 6% of the 40-ton/year threshold (see Table 3). Because each of the planned and proposed projects at/near PBA would have similar VOC and NO_x emission levels, neither the combined (i.e., cumulative) VOC emissions nor the combined NO_x emissions would approach the 40-ton/year thresholds. Consequently, the combined impact of PBEDS operations with other reasonably foreseeable actions is not expected to have a significant cumulative impact on regional ozone concentrations.

As an additional perspective on cumulative emissions of VOC and NO_x, an examination of Table 1.1 in the Title V Air Permit application for the PBCDF (U.S. Army 2002b) indicates that the anticipated PBCDF emissions would be 401 tons/year of NO_x and 6.0 tons/year of VOCs. The combination of the anticipated PBCDF and PBEDS VOC emissions would thus be 6.18 tons/year, which would remain well below the 40-ton/year threshold. Consequently, VOC emissions from the PBEDS do not appear likely to contribute to significant cumulative impacts on air quality.

The Title V Air Permit application for the PBCDF was prepared, in part, because anticipated NO_x emissions from the PBCDF were above the 40-ton/year threshold. Table 8.26 in that permit application provides additional information on NO_x emissions for PBA and other stationary sources

within 60 km (37 miles). The table in the permit application reports the NO_x emissions for other PBA sources at 113 tons/year and the total NO_x emissions for all major sources within 60 km at over 69,000 tons/year (including the proposed PBCDF emissions). The PBEDS NO_x emissions, at 2.15 tons/year, would therefore constitute less than 0.5% of all PBA stationary emissions (which would include the anticipated PBCDF emissions) and about 0.003% of regional stationary NO_x emissions. Consequently, NO_x emissions from PBEDS operations would not contribute appreciably to NO_x emissions from other sources at PBA or within the region.

$PM_{2.5}$ is the other pollutant with existing concentrations approaching or slightly above the level of the NAAQS (see Table 2). Accordingly, any $PM_{2.5}$ emissions are potentially contributors to significant cumulative impacts. To evaluate significance, the sum of $PM_{2.5}$ emissions from all foreseeable projects on or near PBA can be compared with a threshold value for particulate emissions established by the EPA. For PM_{10} emissions, a net increase of 15 tons/year or more is the threshold value which represents a significant increase that may adversely affect regional particulate levels (40 CFR 51.166). While the EPA has not developed a threshold value for $PM_{2.5}$, such a threshold would probably be at least one-third of the PM_{10} threshold of 15 tons/year, which would be 5 tons/year of $PM_{2.5}$. Even with conservative assumptions about munitions processing and emergency generator usage and assuming that all of the PBEDS annual PM_{10} emissions (see Table 3) were actually $PM_{2.5}$ emissions, these $PM_{2.5}$ emissions would be less than 10% of the 5-ton/year threshold. Because each of the planned and proposed projects at/near PBA would have similar $PM_{2.5}$ emission levels, the combined $PM_{2.5}$ emissions would not approach the 5-ton per year threshold. Consequently, the cumulative impact of EDS operations with other reasonably foreseeable PBA actions is not expected to significantly affect regional particulate concentrations.

The PBCDF Title V Air Permit application reports the estimated PM_{10} emissions at 20.7 tons/year for the PBCDF (see Table 1.1 in U.S. Army 2002b). From Table 3, the PM_{10} emissions from the PBEDS would be about 2% of the emissions expected from the PBCDF[8]. Consequently, particulate matter emissions from PBEDS operations would not make an appreciable contribution to particulate matter emissions at PBA.

Cumulative Impacts to Groundwater Resources. Concerns about groundwater withdrawals (see Section 3.2) suggest that an additional evaluation of the water usage requirements of the PBEDS, in conjunction with the water requirements of the above projects, is warranted. Among the aforementioned projects, the PBCDF would be the largest consumer of water, because the wet stack scrubbers in that facility's pollution abatement system would require large amounts of water. When in operation, the PBCDF is expected to use about 145,000 gal/day and to discharge about 18,300 gal/day to the existing PBA wastewater treatment facility (U.S. Army 1997). From the data presented in Section 2.1.5, the daily water usage of the PBEDS would be approximately 720 gal/day, of which 590 gal/day would be transferred to the PBA wastewater treatment system. Therefore, the combined water requirements of the PBEDS in conjunction with the PBCDF would be about

[8] The Title V Air Permit application for the PBCDF provides no information on other sources of particulate matter around PBA, because the PM_{10} emissions from the PBCDF were predicted to have ground-level concentrations below the threshold for which detailed modeling would have been required (see p. 8-7 in U.S. Army 2002b).

146,000 gal/day, and a combined 18,900 gal/day would be transferred for treatment in the PBA wastewater facility.

Total daily water use at PBA is about 892,000 gal/day, and the PBA wastewater treatment plant in the southern portion of the arsenal receives, processes, and discharges about 330,000 gal/day (Shaw Environmental 2003). Because the current total water use at PBA and the quantities currently transferred to the PBA wastewater treatment facility are large compared to those that would result from the combined PBCDF and PBEDS projects, there should be no significant cumulative impacts as related to water consumption issues at PBA.

Cumulative Impacts to Waste Management. Many of the NSCM projects at PBA are intended to accomplish remedial activities related to the treatment and disposition of existing non-stockpile materiels. Because of the potentially large quantities of hazardous wastes that could be generated by these combined actions, an examination of their cumulative effects is warranted. Table 4 shows the best estimates of the wastes to be generated by the aforementioned projects at or near PBA. These estimates can be compared to the quantities of waste already treated/disposed by existing waste management methods in the state of Arkansas. The data in Section 3.3.2 indicate that 153,000 tons of hazardous waste are managed annually in Arkansas by landfill and/or surface impoundment. An additional 5,000 tons of such wastes are managed by metals recovery/recycle. In comparison to these numbers, the lifetime solid waste totals in Table 4 (i.e., 35,000 tons and 5,100 tons) are sufficiently small to conclude that adequate waste management capacity exists in Arkansas to handle the cumulative quantities of solid waste that would be generated over the lifetimes of these projects.

Also, the data in Section 3.3.3 indicate that 112,000 tons of hazardous waste are managed each year in Arkansas by incineration; 87,000 tons by energy recovery; and 73,000 tons by fuel blending. Assuming that the liquid waste totals in Table 4 could be treated by one or more of these methods, adequate waste management capacity would already exist in Arkansas to handle the cumulative quantities of liquid waste that would be generated over the lifetimes of these projects.

Therefore, the combined quantities of wastes to be generated by the PBEDS and other foreseeable projects at or near PBA would not be expected to have significant adverse impacts on any off-site waste management systems.

3.6 IMPACTS OF THE NO-ACTION ALTERNATIVE

Under the no-action alternative (as described in Section 2.2), the proposed PBEDS would not be constructed at PBA, and there would be no new construction associated with the continued storage of the RCM at PBA. Thus, there would be no changes in land use (either at the existing BREA or at the proposed PBEDS site) and no potential for disturbance of cultural (i.e., historic and archaeological) resources as related to continued RCM storage activities. Nor would there be any adverse effects from modifications to or disturbances of existing terrestrial and/or aquatic communities, wetlands, or threatened and endangered species habit areas. Impacts to such resources would therefore be negligible. Furthermore, the EA on the demolition of the IBPF (Shaw Environmental 2003) indicates that the entire IBPF site, including the area proposed for use by the PBEDS, would be revegetated, thereby increasing terrestrial habitat in general.

Table 4. Estimated quantities of wastes which could be generated by U.S. Army activities and other foreseeable activities at PBA through 2007 and which might require off-site treatment or disposal

[Units are total tons over the project's lifetime]

Activity[a]	Nonhazardous solid waste	Hazardous solid waste	Organic liquid waste[b]	Contaminated liquid waste[c]
BDF	152	161	966	109
EDS at PBMAS	small	6	0	57
PBEDS	small	250	470	270
PBCDF	8,600	4,600	0	0
PBMAS	150	0	0	120
TC cleanout and recycle	3,500	—[d]	0	—[d]
QEF	—[d]	—[d]	—[d]	—[d]
IBPF demolition	22,000	—[d]	small	small
RRS	—[d]	—[d]	0	57
Vaccine production facility	—[d]	—[d]	—[d]	—[d]
Totals[e]	*35,000*	*5,100*	*1,500*	*650*

[a] BDF = Binary Destruction Facility, EDS = Explosive Destruction System at PBMAS, IBPF = Integrated Binary Production Facility, PBCDF = Pine Bluff Chemical Agent Disposal Facility, PBEDS = Pine Bluff Explosive Destruction System, PBMAS = Pine Bluff Munitions Assessment System, QEF = Quality Evaluation Facility, RRS = Rapid Response System, TC = ton container.

[b] Organic liquid wastes are primarily water, but have a large enough organic content that oxidative treatment is necessary before disposal.

[c] Contaminated liquids contain only trace amounts of organic compounds.

[d] No estimate is available.

[e] The totals are rounded-up sums of the tabulated waste quantities; note that if the unknown waste quantities are large, the totals would increase.

There would be no new air emissions or water consumption requirements for the no-action alternative; hence, there would be negligible effects on air quality and/or water quality. No additional workers would be required under the no-action alternative, and no socioeconomic impacts would be anticipated. No disproportionate impacts to minority or low-income populations would be expected during continued storage of the RCM at PBA.

No additional solid or liquid wastes—beyond those currently generated during routine surveillance and maintenance activities—would be produced under the no-action alternative. Thus, there would be no need for additional treatment or disposal of any new wastes, and the impacts of the waste management practices necessary for the small quantities of waste generated during continued storage activities would be insignificant.

Under the no-action alternative, the RCM would continue to be safely stored and maintained at PBA, although the condition of the RCM would continue to deteriorate. The possibility of a low-probability accident would continue for as long as the RCM remained in storage. Such an accident could cause a release of chemical warfare agents or hazardous chemicals from the storage igloos and could possibly affect nearby populations. The no-action alternative would do nothing to reduce this risk over the long term.

While continued storage would not be expected to have any adverse impacts, neither would it eliminate the need to destroy the RCM in storage at PBA. Rather, taking no action would simply defer the resolution of the RCM problem to some future date.

4. CONCLUSIONS

The information and analysis presented in this EA indicate that the proposed action of deploying and operating the PBEDS to destroy the RCM currently stored at PBA would have no significant environmental impacts. Implementation of appropriate health and safety measures would minimize the potential risk of exposure to hazardous chemicals for workers and the public. An evaluation of the no-action alternative of continuing to store the RCM at PBA also concludes that no significant impacts would occur. However, choosing the no-action alternative would require the continued commitment of resources for monitoring, surveillance, and maintenance for as long as the RCM remained in storage and would prevent the Army from meeting Congressional directives and international treaty agreements to destroy RCM by April 2007. In addition, the risk of accidentally releasing chemical warfare agents or hazardous chemical fills during continued storage of the RCM would be totally eliminated upon the completion of the proposed action.

Based on the above considerations and the lack of significant adverse environmental effects, it is concluded that the most desirable course of action is to proceed with the deployment and operating the PBEDS to destroy the RCM currently stored at PBA. This action would create no significant impacts. A finding indicating this conclusion will be prepared and published for public comment.

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