95-61R-2

PROGRAM MANAGER FOR
ROCKY MOUNTAIN ARSENAL

U.S. ARMY
MATERIEL COMMAND

– COMMITTED TO PROTECTION OF THE ENVIRONMENT –

WORK PLAN

RIFLE AND PISTOL RANGE CLEARANCE

AT

ROCKY MOUNTAIN ARSENAL

Prepared by

R&R
INTERNATIONAL, INC.

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THE RIFLE RANGE IS LOCATED IN THE SOUTHERN AREA OF RMA, NORTH OF THE ARMY RESERVE CENTER AND SOUTHWEST OF THE ROD AND GUN CLUB POND. THE PISTOL RANGE IS LOCATED IN THE NORTHERN PART OF RMA, EAST OF THE BASIN F SEWAGE TREATMENT PLANT AND E STREET. THE OBJECTIVE OF THIS TASK IS TO RESTORE THE SITES TO HABITAT FOR NATIVE WILDLIFE, AS WELL AS REDUCE POTENTIALLY CONTAMINATED MATERIALS SUCH AS LEAD FROM THE AREA. ACCORDING TO HISTORICAL DATA, THE RIFLE RANGE AND PISTOL RANGE WERE USED BY RMA SECURITY, NATIONAL GUARD, ARMY RESERVE, AND VARIOUS OTHER STATE AND LOCAL AGENCIES FOR FIREARM QUALIFICATIONS, AND BY ROD AND GUN MEMBERS FOR TARGET PRACTICE. THIS WORK PLAN DESCRIBES THE METHODS AND PROCEDURES TO BE USED FOR REMOVAL OF THE METAL AND BULLET FRAGMENTS 1/8 INCH AND LARGER PRESENT AT THE DESIGNATED AREAS OF THE SITES AS A RESULT OF THESE ACTIVITIES. THE SCOPE OF WORK FOR THESE SITES CONSISTS OF EXCAVATION AND SIEVING OF THE TOP PORTION AND FACE PORTIONS OF BERMED SOILS TO REMOVE METAL AND BULLET FRAGMENTS. APPENDIX A OF THIS PLAN INCLUDES THE SITE SPECIFIC UXO PLAN.

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WORK PLAN

RIFLE AND PISTOL RANGE CLEARANCE

AT

ROCKY MOUNTAIN ARSENAL

95061R02

RIFLE AND PISTOL RANGE CLEARANCE
AT
ROCKY MOUNTAIN ARSENAL

(ELIN A001)

CONTRACT NO. DAAM02-94-D-0003

WORK PLAN
DELIVERY ORDER NO. 001

Revision 2

R&R INTERNATIONAL, INC.
PROJECT NO. 202111
30 JANUARY 1995

R&R
INTERNATIONAL, INC.

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FIGURES, TABLES, APPENDIX

LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	Applicable and Relevant and Appropriate Regulations
CFR	Code of Federal Regulations
CQCP	Contractor Quality Control Plan
DO	Delivery Order
EOD	Explosive Ordnance Disposal
HFA	Human Factors Applications, Inc.
OSHA	Occupational Safety and Health Administration
PID	Photoionization Detector
PMRMA	Program Manager, Rocky Mountain Arsenal
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control
R&R	R&R International, Inc.
RMA	Rocky Mountain Arsenal
SDWA	Safe Drinking Water Act
SEC	Sediment & Erosion Control
SHERP	Safety, Health, and Emergency Response Plan
SOW	Statement of Work
SSHO	Site Safety and Health Officer
TEU	Technical Escort Unit
USFWS	U.S. Fish & Wildlife Service
UXO	unexploded ordnance
WP	Work Plan

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1.0 INTRODUCTION

This Work Plan (WP) has been prepared by R&R International, Inc. (R&R) as a contract deliverable under Delivery Order 0001 (Rifle and Pistol Range Clearance) of Contract DAAM02-94-D-0003 between R&R and the U.S. Department of the Army.

The Program Manager, Rocky Mountain Arsenal (PMRMA) has tasked R&R International, Inc. (R&R) with conducting environmental remediation services at the above named site. Delivery Order (DO) No. 001 consists of the excavation, sieving of metal and bullet fragments from soil, and spreading of bermed soil by R&R in accordance with the requirements contained in the statement of work (SOW). The objective of this task is to restore the sites to habitat for native wildlife.

This Site-Specific Work Plan (ELIN A001) describes the corrective actions to be performed at the Rifle and Pistol Range, Rocky Mountain Arsenal, Commerce City, Colorado.

The Rifle Range is located in the southern area of RMA, north of the Army Reserve Center and southwest of the Rod and Gun Club Pond. The Pistol Range is located in the northern part of RMA, east of the Basin F sewage treatment plant and E Street. The Rifle and Pistol Range sites are shown in Figure 1-1, Site Location Map. The details of the sites are shown in Figures 1-2 and 1-3.

According to historical data, the Rifle Range and Pistol Range were used by RMA Security, National Guard, Army Reserve, and various other state and local agencies for firearm qualifications, and by Rod and Gun Club members for target practice. This Work Plan describes the methods and procedures to be used for removal of the metal and bullet fragments 1/8 inch and larger present at the designated areas of the sites as a result of these activities.

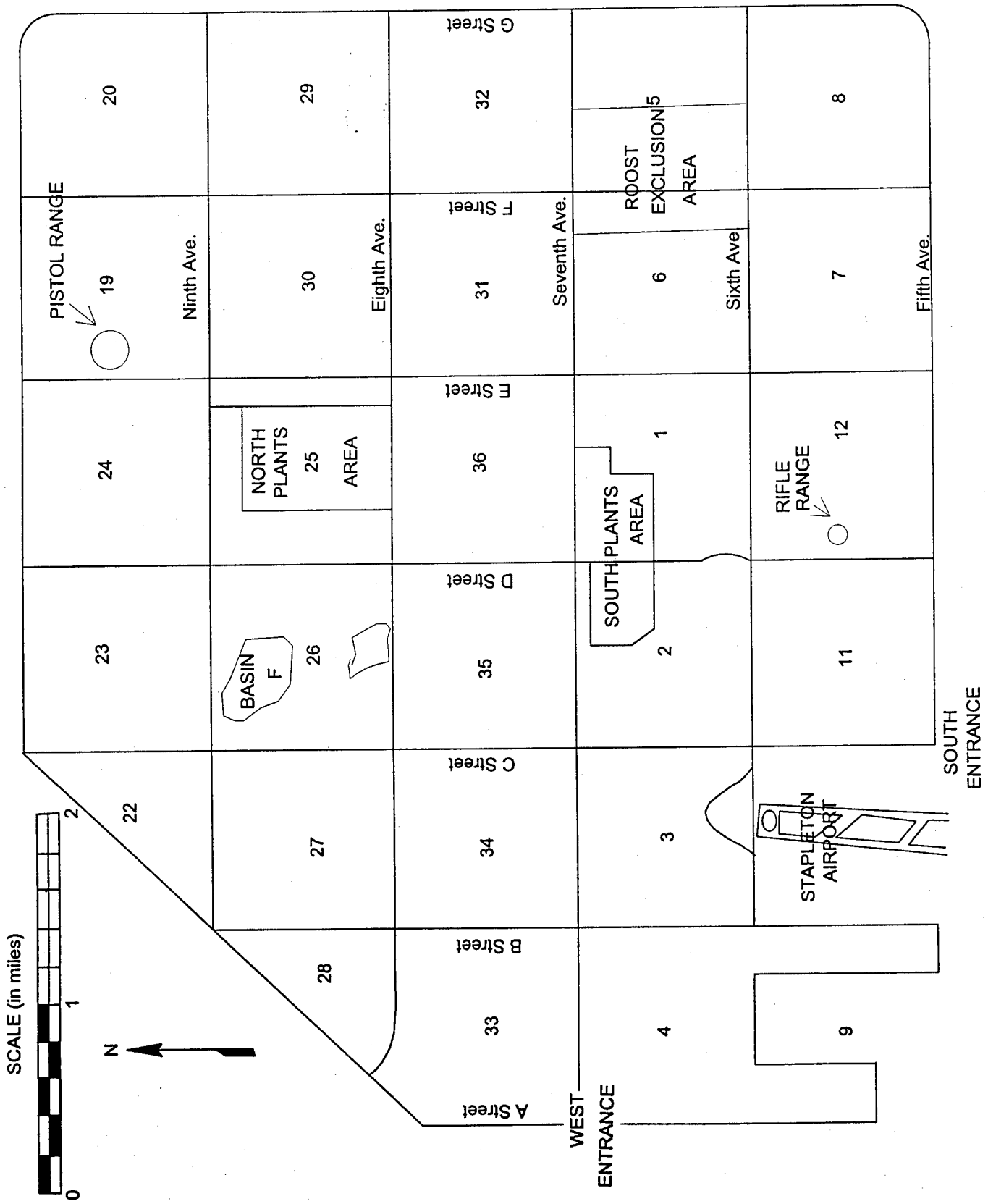

Figure 1-1 Site Location Map

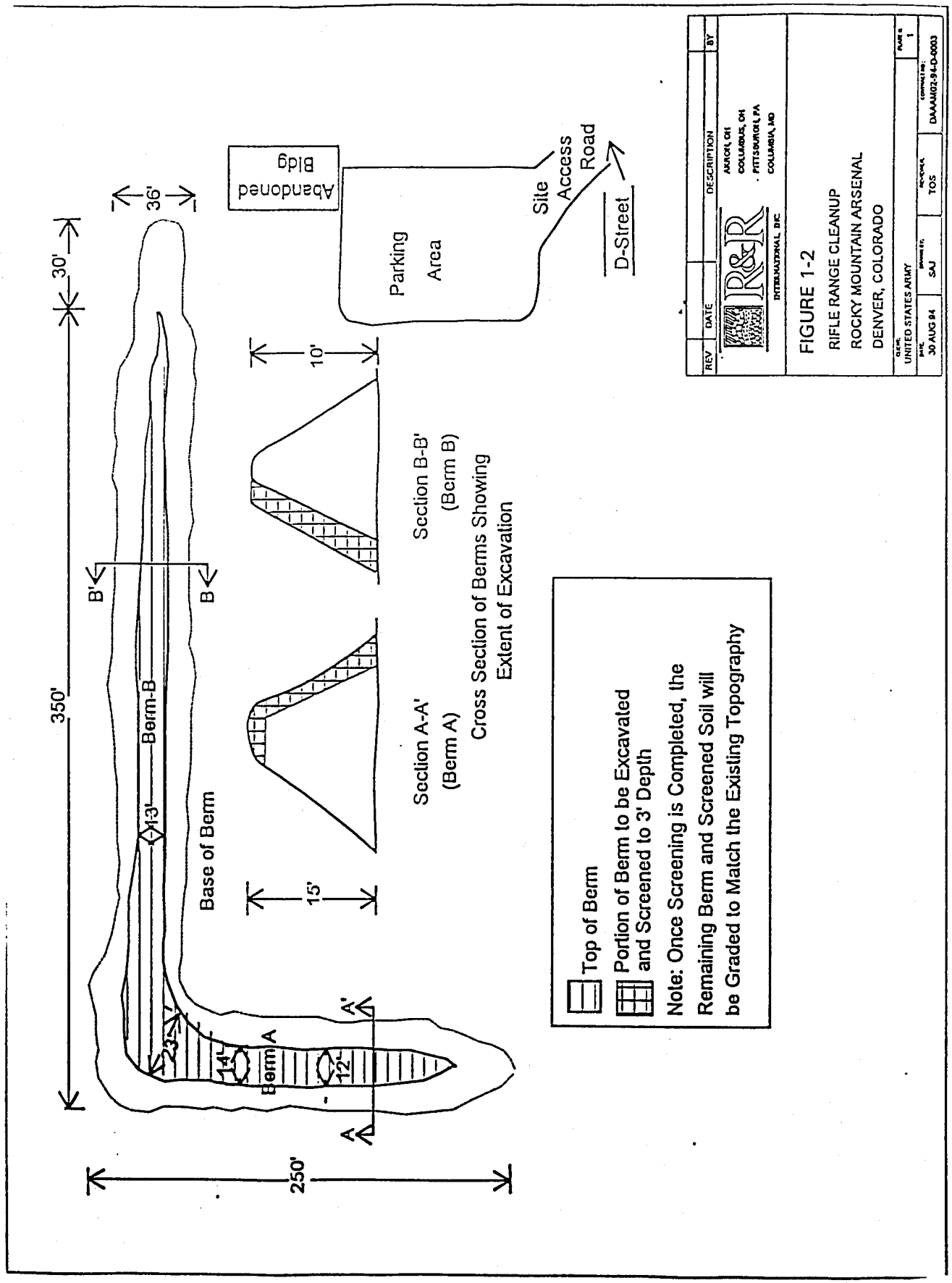

Figure 1-2 Detail of Rifle Range Site

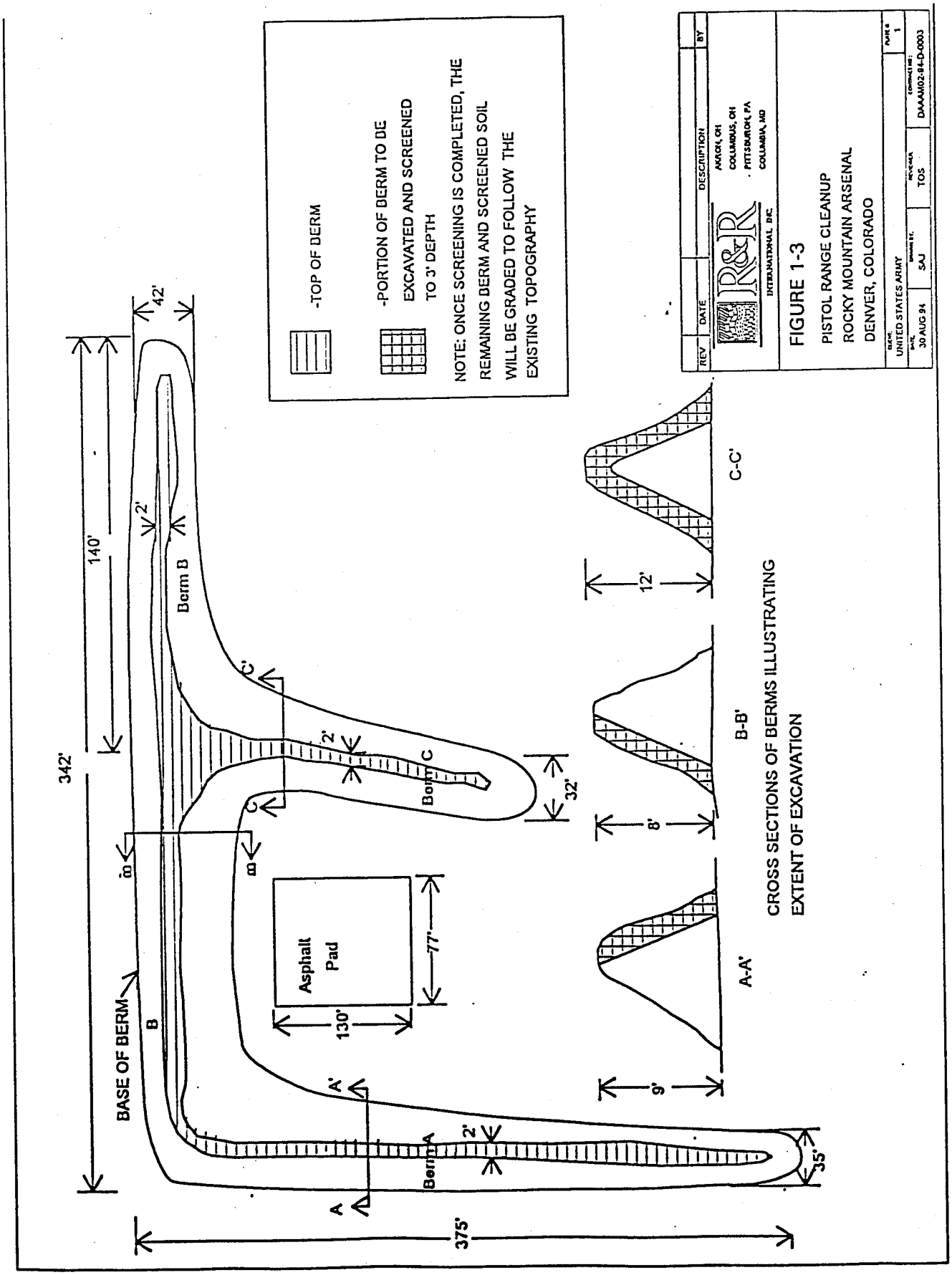

Figure 1-3 Detail of Pistol Range Site

1.1 SCOPE OF WORK

The scope of work for these sites consists of excavation and sieving of the top portion and face portions of bermed soils to remove metal and bullet fragments. The objective of this removal is to restore these areas to habitat for native wildlife, as well as to reduce potentially contaminating materials, such as lead, from the area. It is assumed that the soil is non-hazardous, and prior to field activities, one sample of soil shall be tested to verify that the lead content in the soil is below hazardous waste criteria. Since the efficiency of sieving is a direct function of soil particle size as well as moisture content, samples of the berm areas will be taken and geotechnical testing will be performed to ensure that excavation activities will occur during an optimal period. Metal fragments will be separated in accordance with the criteria in Section 3 and transported in 55-gallon drums for processing at a designated and approved recycling facility.

The total length of the bermed areas at the Rifle Range is approximately 600 ft. by 36 ft. in width (Figure 1-2). The total length of the bermed areas of the Pistol Range is approximately 715 ft. by 35 ft. in width (Figure 1-3). The dominant vegetation in the vicinity of the areas is native perennial grassland, although weedy grasses and forbs dominate the sites. Only a three-foot depth of the bermed areas (face and top portions) are targeted for sieving activities.

Upon completion of excavation activities, the sieved soil shall be used to restore the original grade of the site. In addition, the unexcavated portions of the berm will be spread to conform to the original topography. No compaction will be required.

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2.0 PREVIOUS ASSESSMENT ACTIVITIES

No previous assessment activities have been conducted at the Rifle and Pistol Range sites. Visual inspection has confirmed the presence of various types of metal and bullet fragments. During firearm practice activities, ammunition was fired toward the soil berms, leaving residual bullet casings along the upper and side portions of the areas. Other metal fragments such as shell cases resulting from related activities are also evident by visual inspection.

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3.0 SITE-SPECIFIC WORK PLAN

This section details the various tasks to be performed to excavate the soil and package recyclable material for pickup and processing by the designated and approved contractor/facility, and restore the site to original conditions. These specific tasks have been developed based on R&R's visual inspection, review of the site history, and guidance provided by the U.S. Army, PMRMA. The activities to be performed during the course of this project can be classified as:

1. Pre-mobilization Activities
2. Site Work
3. Final Report

Each of these categories is described in detail below, including the tasks to be accomplished under each.

3.1 PRE-MOBILIZATION ACTIVITIES

Several tasks need to be conducted prior to commencing mobilization. These tasks primarily involve clearance of subsurface utilities in the work area, appropriate notifications, and selecting/scheduling of subcontractors. Upon completion of these tasks, there will be an initial inspection by PMRMA. These pre-mobilization tasks are discussed below.

3.1.1 Permits

No permits are anticipated for these activities. It is also assumed that an excavation permit will not be required. Although no additional permit is required, sediment and erosion control measures, as discussed below, shall be taken to limit any potential erosion impact to the site.

3.1.2 Notifications

Notification shall be made verbally two to three weeks prior to mobilization, followed within one week by a letter indicating basic project information such as location, scope of work, and project schedule. The following offices shall be notified:

- The Fire Department (303/289-0192), shall be contacted by R&R prior to commencement of work with a schedule for planned work.

- Vehicle passes shall be coordinated with the appropriate office at the RMA area.

No utilities are present in the areas of work; thus no utilities clearance will be required.

3.1.3 Subcontractors

During pre-mobilization, the selection and scheduling of subcontractors shall take place. The subcontractors tentatively involved with this project are:

a. Human Factors Applications, Inc. (HFA): Before excavation, the site shall be cleared of any unexploded ordnance (UXOs) by HFA.

b. Hydroseeding: A local hydroseeding contractor will be identified prior to field acitivities.

c. Recycling: The recycling facility to be used shall be Neiman Salvage, 905 West Iliff, Denver, Colorado. This facility has previously performed work for the Dept. of Defense. The facility's Dept. of Defense Surplus Property Buyer's Identification Card Number is #230957. Neiman Salvage shall recycle 75% of the materials within one year, in accordance with the scope of work.

d. Air Sample Analysis: A local laboratory shall be utilized for analysis of personal air monitoring samples (lead dust) and shall be identified prior to field activities.

3.1.4 Work Coordination

R&R shall submit a weekly written plan of work to the designated representative of the U.S. Fish & Wildlife Service on the Tuesday two weeks prior to the week for which the work is planned. A blank sample form is shown in Figure 3-1. R&R shall obtain prior permission and designated routes to access the work site on a weekly basis. R&R shall also attend the contractors' coordination meeting which is held on the second work day of the week at 7:30 a.m. in Building 111 at Rocky Mountain Arsenal. The site supervisor shall attend this meeting and coordinate his efforts with concurrent projects on RMA at this meeting.

RMA ACTIVITIES COORDINATION

WEEK OF: _____ COMPANY/AGENCY: _____
POC: _____ PHONE: _____ FAX: _____

ACTIVITY: _____
_____
_____
_____
PPE LEVEL: _____ LOCATION: _____
DURATION: (DATES) _____ TIME: _____

ACTIVITY: _____
_____
_____
_____
PPE LEVEL: _____ LOCATION: _____
DURATION: (DATES) _____ TIME: _____

ACTIVITY: _____
_____
_____
_____
PPE LEVEL: _____ LOCATION: _____
DURATION: (DATES) _____ TIME: _____

Return completed by Tuesday each week to:
Greg Langer
U.S. Fish and Wildlife Service
Rocky Mountain Arsenal Building 111
Commerce City, CO 80022-2180
303-289-0232

Indicate activity locations (using the activity number) on map. (See reverse side.)

Figure 3-1 RMA Activities Coordination Form

3.2 SITE WORK

The site work shall consist of:

a. Geotechnical Sampling & Testing of Bermed Areas

b. Mobilization and Site Preparation

c. UXO Survey and Clearance

d. Excavation and Sieving of the Soil

e. Segregation, Containerization, and Recycling of Metal Fragments

f. Backfilling

g. Seeding

h. Demobilization

All of the above tasks shall be performed in accordance with health and safety requirements as specified in the Safety, Health, and Emergency Response Plan (SHERP). The waste removal and recycling activity shall be performed in accordance with the Waste Management Plan.

3.2.1 Record Keeping Requirements

The site supervisor shall maintain records in three-ring binders and/or field notebooks. Records shall include the following at a minimum:

a. The Environmental Condition Survey (see Section 8 of this Work Plan).

b. Field notebooks.

Notebook entries shall include date, time, weather conditions, a description of all activities, equipment used, personnel on site, observations, and any problems

encountered. Documentation on soil conditions such as color, foreign material (other than metal fragments), etc. shall be included. Daily field reports shall be signed and dated by the Site Supervisor.

c. All methods/procedures utilized.

d. SHERP records (See SHERP).

e. Photographic log of site operations.

f. Contractor Quality Control Records.

These records shall include information regarding R&R's preparatory meeting, which includes: a review of contract and delivery order requirements with the field supervisor, field crew, and any applicable subcontractors; detailed discussion of equipment to be used, the proposed work schedule, and standard operating procedures.

3.2.2 Geotechnical Testing of Soil in Bermed Areas

In order to determine optimal conditions for conducting the soil sieving activities, several geotechnical tests will be performed. Samples from both sites shall be collected concurrently, prior to mobilization, to enable smooth excavation operations to follow at the second site upon completion of excavation activities at the first site.

These samples shall be surface grab samples taken prior to mobilization to determine geotechnical properties. Two grab samples shall be taken from each site (Rifle Range and Pistol Range). The results of these tests will determine the characteristics of the soil at the site relative to the required operations. Procedures, required tests, and evaluation criteria are discussed in Section 6 of this work plan.

3.2.3 Mobilization and Site Preparation

3.2.3.1 Mobilization

R&R personnel and equipment shall mobilize upon completion of all pre-mobilization work. The major resources (labor, equipment, and materials) to be mobilized may include, but are not limited to, the following:

Labor:

- Health and Safety Manager
- Site Safety and Health Officer (SSHO)
- Site and QC Supervisor
- Project Manager
- Remediation Technicians

Equipment:

Construction:

- Truck
- CAT Excavator/Loader (Govt furnished)
- Water Truck for dust control (Govt furnished)
- Ditchwitch (Govt furnished)
- Dozer (Govt furnished)
- Mechanic's tools
- Picks and shovels
- Wheel barrow
- Loader
- Soil Sieving Equipment

First Aid/Safety Gear:

- Fire extinguisher
- Stretcher
- Drinking water containers
- Photoionization Detector (PID) with calibration kit
- Fire blankets
- First Aid Kit
- Personal Protective Equipment (PPE)
- Mobile telephones (2)
- Safety horns
- Emergency eye wash station

Materials:

- CAUTION/DO NOT ENTER tape
- Heavy gauge plastic sheets
- Pallets
- Straw Bales (18"x 18"x 36")
- 55 gallon drums
- Duct Tape
- Silt fence
- Stakes

The above is not a comprehensive list but is intended to provide major subcategories of resources required. Additional resources shall be drawn upon as needed.

3.2.3.2 Government Furnished Support

The RMA will provide the following equipment in support of this project:

- Cat 255 Excavator
- D7 Dozer
- Diesel & vehicle fuel
- Loader
- Water Truck
- Ditchwitch

All Government furnished property shall be obtained in accordance with standard RMA procedures, and shall be accounted for in accordance with the contract Scope of Work, Government Property in Possession of Contractors. R&R shall be responsible and accountable for all Government property provided under this contract, and shall be responsible for the proper care of such equipment. Records shall be kept to indicate type and National Stock Number of government furnished equipment in R&R's possession.

Government support will also include access to the project site and the movement of government materials, if required, from the project working area prior to mobilization. The Government will provide access to the Rocky Mountain Arsenal Technical Information Center.

3.2.3.3 Site Preparation

Once the mobilization of personnel and equipment has been completed, site preparation activities shall begin. Prior to initiation of excavation activities, background air monitoring (for dust levels) shall be conducted. The site shall also be delineated into one major work zone marked with yellow DO NOT ENTER caution tape. Due to the presumed absence of hazardous materials as well as decontamination activities for this project, delineation of standard work zones will not be required. Should ambient dust/lead dust levels be found to exist beyond recommended health levels during excavation and sieving activities, R&R shall upgrade safety procedures in accordance with the SHERP and OSHA regulations for lead exposure. Site preparation activities include securing all required equipment and materials prior to start of work.

A staging area for equipment and materials shall be located in close proximity to the excavation area of the site. This area includes a storage area for equipment and materials necessary for the field activities. Items to be stored include drums used to store the metal fragments for separation from the soils. Equipment on-site will include construction equipment (loader, excavator, picks, shovels, and tools). All of these items shall be removed upon project completion. A temporary lined staging area for the drums shall be designated. Plastic sheeting shall be used to cover the drums until loading activities begin for transport to the recycling facility. This is dependant upon whether the excavated material can be loaded directly into trucks.

3.2.3.4 UXO Survey and Clearance

The site shall be cleared of UXO by HFA. All excavation work shall be closely monitored by UXO personnel. The site history indicates that 40 mm target grenades have been found in the area. The method of clearance shall include a visual inspection of the area and survey by magnetometers/detectors capable of detecting ferrous and non-ferrous ordnance at the specific locations planned for excavation. A Site-Specific UXO plan and procedure prepared by HFA is enclosed in Appendix A-1. Additional UXO procedures are also outlined in R&R's SHERP.

As a result of the survey, if a UXO is located, the following actions shall be carried out:

> Explosive-, propellant-, or pyrotechnic-loaded UXO: The location of the UXO shall be marked with a yellow survey marker, and operations in the affected areas shall be stopped. The R&R Project Manager and PMRMA shall be notified of the UXO presence. All UXO shall be immediately reported as follows:
>
> Dial Fire Department at RMA (303/289-0192)
>
> The PMRMA Safety, Health & Environmental Office shall be contacted by calling 289-0441 if contact can not be made with the PMRMA Fire Department. It shall be ensured that the person receiving the call understands that an emergency call has been made regarding a UXO situation. R&R shall ensure interim security for the site by having the UXO Specialist remain at the site to control access until such time as the U.S. Army Technical Escort Unit/EOD detachment, Fort Carson personnel arrives on scene. Until TEU/EOD personnel arrive, the UXO

specialist shall not permit entrance to work zone or access to the UXO without specific approval from PMRMA and positive identification of personnel requesting access. Any non-explosive loaded or empty ordnance components found shall be certified as such by the Technical Escort Unit prior to being designated for recycling.

Miscellaneous metallic debris: These items shall be collected and stored in designated location for pickup.

In all cases of injury or exposure, the personnel identified in the SHERP shall be notified. It must be understood that emergency first aid begins with ensuring the safety of oneself and then moving the victim from the contaminated area. Entry into areas that have suffered a detonation should only be attempted by persons trained to recognize general types of explosive munitions. Only RMA/Fort Carson Emergency Response Units will perform rescue operations in the event of a detonation/explosion.

3.2.4 Excavation and Soil Sieving

The areas shall be cleared of UXO before the areas are excavated with an excavator. Excavation shall be closely monitored by a qualified Explosive Ordnance Disposal Specialist for the presence of unexploded ordnance. In the event ordnance is discovered, R&R shall immediately cease work and evacuate the area. The ordnance will be removed or detonated by Army personnel.

The soil at the Rifle Range and Pistol Range shall be excavated along the side surface of the berms and the top portions in the impact areas. The soil excavation shall not exceed a depth of three feet in accordance with PMRMA guidance provided during the site visit of August 1994. The areas to be excavated and sieved are shown in Figures 1-2 and 1-3. The volumes of soil to be excavated are given in Table 3-1. Using a track excavator, the top portions of the berms will be excavated and fed through a soil screener/shaker. Water shall be sprayed as a dust control measure as required, in the form of a light mist which shall not impede the sieving operation. The shaker screen shall be capable of removing bullets and bullet fragments one eighth inch in diameter and larger. A wire brush shall be used to remove any soils from the bullets and the rocks, stones, etc. shall be segregated from the metal fragments. The bullets shall be placed in appropriate containers for transportation to Neiman Salvage Co., Denver, Colorado. This facility is the designated metals recycling facility for this project.

Table 3-1 Volume of Soil to be Excavated

Site	Area of Berm*	Cubic Yards
Rifle Range	Berm A	417
	Berm B	390
	Top Section	933
Total Rifle Range Soil Volume:		1740
Pistol Range	Berm A	375
	Berm B	304
	Berm C	227
	Top Section	197
Total Pistol Range Soil Volume:		1103

* Berm locations refer to Figures 1-2 and 1-3. Volume of soil is approximate.

Excavated soil shall be placed in a lined staging area. No hazardous waste is expected to be generated during these activities. Accordingly, Level D protection shall be used for these site activities, unless ambient dust/lead dust levels exceed permissible levels. Additional safety procedures are detailed in the SHERP. All site activities shall be conducted in accordance with federal, state, local, and RMA regulations. The location of the staging area shall be adjacent to the berm area being excavated.

Due to the limited amount of soil being excavated, a Sediment and Erosion Control (SEC) Plan is not required. Surface run-off controls in the excavated areas may include, but are not limited to, surrounding the excavated area with straw bales or, if practical, covering the excavated areas with a polyethylene liner.

3.2.5 Segregation, Containerization, and Recycling of Bullet/Metal Fragments

As the bullets and bullet/metal fragments are collected on the soil screener, designated personnel shall segregate the materials in accordance with Table 3-2. Efforts will be made to remove the soil adhered to the bullet fragments by hand brushing and thus minimize the soil that is shipped off with the fragments to the greatest extent possible. Materials other than bullets, bullet fragments, and shell cases that have salvage value shall be segregated in the on-site staging area. The Government shall retain all salvage rights. R&R shall prepare the turn-in document for the scrap. The copies of the turn-in documents, and waste characterizations and certifications, if any are required, shall be furnished in the Completion Report (see Section 3.3).

After being placed in drums in accordance with the above referenced criteria, the containers shall be marked with the following statement prior to transportation:

> THIS MATERIAL HAS BEEN INSPECTED, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT DOES NOT CONTAIN ANY LIVE ROUNDS, UNFIRED PRIMERS, EXPLOSIVES, OR OTHER DANGEROUS MATERIALS.

The bullets, bullet fragments, and shell cases shall be transported to Neiman Salvage Co., Denver, Colorado which is the metals recycling facility. R&R shall furnish Certification from the approved recycler, that a minimum of 75% of the metals shall be recycled within one year of the date they are received by the recycler.

3.2.6 Backfilling

The excavated area shall be backfilled. The screened soil shall be temporarily stockpiled and then returned to the berm area with a track loader after the metal/bullet fragments have been screened out. It is assumed that the screened soil shall be non-hazardous, and that this has been verified via testing of a sample for lead content prior to the start of field work. The replaced soil and remaining berm shall be graded to match the existing topography. No compaction shall be required.

The excavation, sieving, containerization, and backfilling shall be performed at one site, immediately followed by the second site to enable efficient completion of these activities. Subsequent tasks of seeding, recyclable materials transport, and final demobilization shall be scheduled together for both sites.

Table 3-2 Exhibit A - Scrap Metal Segregation Guide

Light Steel	Under one-eighth of an inch thick (magnetic material)
Short Heavy Steel	At least one-eighth of an inch thick, under 36 inches in length (magnetic material). It is not necessary to cut larger pieces of steel to make this type of scrap, larger pieces go into Heavy Steel.
Heavy Steel	At least one-eighth of an inch thick, over 36 inches in length (magnetic material).
Aluminum	Any size (non-magnetic)
Cast Iron	Any size (magnetic material)
Stainless Steel*	Any size (magnetic and non-magnetic material).
High Temperature Alloy	Any size (non-magnetic)
Electric Motors	
Copper Wire	Any type electrical wire except communications wire.
Material that Cannot be Included as Scrap	The following items must be turned in separately for proper disposal by DRMO. - 55-gallon drums - Hazardous material - Concertina, barbed, or razor wire

3.3.7 Seeding

Prior to completing demobilization and concluding all field activities, the construction (removal) site shall be restored to reflect the original topography. Upon completion of grading, R&R shall spot-apply Roundup and/or 2,4-D to weeds in the firing range and access road areas. This application will be conducted using hand-held sprayers. R&R shall then utilize hydroseeding procedures to all disturbed areas with the seed mixes shown in Table 3-3. R&R shall mulch and crimp a native grass hay mulch into the seeded areas immediately after seeding.

3.2.8 Demobilization

R&R shall begin to remove its major equipment from the site immediately after backfilling and site restoration have been completed. In addition, appropriate RMA personnel shall be contacted regarding removal of Government furnished equipment from the site.

Prior to final acceptance of the work, R&R shall obliterate all signs of temporary construction facilities such as work areas, stockpiles of excess or waste materials and other vestiges of construction.

3.3 COMPLETION REPORT

Upon completion of all field work, a Site-Specific Completion Report shall be prepared. The report shall contain all technical, pre-mobilization and field work accomplished at this site, pertinent observations, procedures followed, and nature of any problems encountered.

Table 3-3 Recommended Seed Mix for Firing Range, Section 12 Rocky Mountain Arsenal, 1993

Species to be seeded			Rate (lbs/acre)
Scientific name	**Common name**	**Variety**	
Bouteloua gracilis	Blue grama	Hachita	1.1
Calamovilfa longifolia	Prairie sandreed	Goshen	0.4
Bouteloua curtipendula	Side-oats grama	Vaughn	0.6
Sporobolus cryptandrus	Sand dropseed		0.1
Stipa comata	Needle-and-thread		1.9
Andropogon hallii	Sand bluestem	Woodward	1.0
Pascopyron smithii	Western wheatgrass	Arriba	5.0
Oryzopsis hymenoides	Indian ricegrass	Nezpar	0.8
Artemisia filifolia	Sand sagebrush		0.05
Artemisia frigida	Fringed sagebrush		0.01
Helianthus annuus	Annual sunflower		0.1
Liatris punctata	Blazing-star		0.1
Oeonothera villosa	Tall evening primrose		0.1
Ipomoea leptophylla	Bush morning glory		0.1
Gaillardia aristata	Blanket flower		0.1
Penstemon angustifolia	Narrow-leaf penstemon		0.1
Linum lewisii	Blue flax		0.1
Achillea lanulosa	Yarrow		0.1
Coreopsis tinctoria	Plains coreopsis		0.1
Abronia fragrans	Sand verbena		0.1
Total			11.96

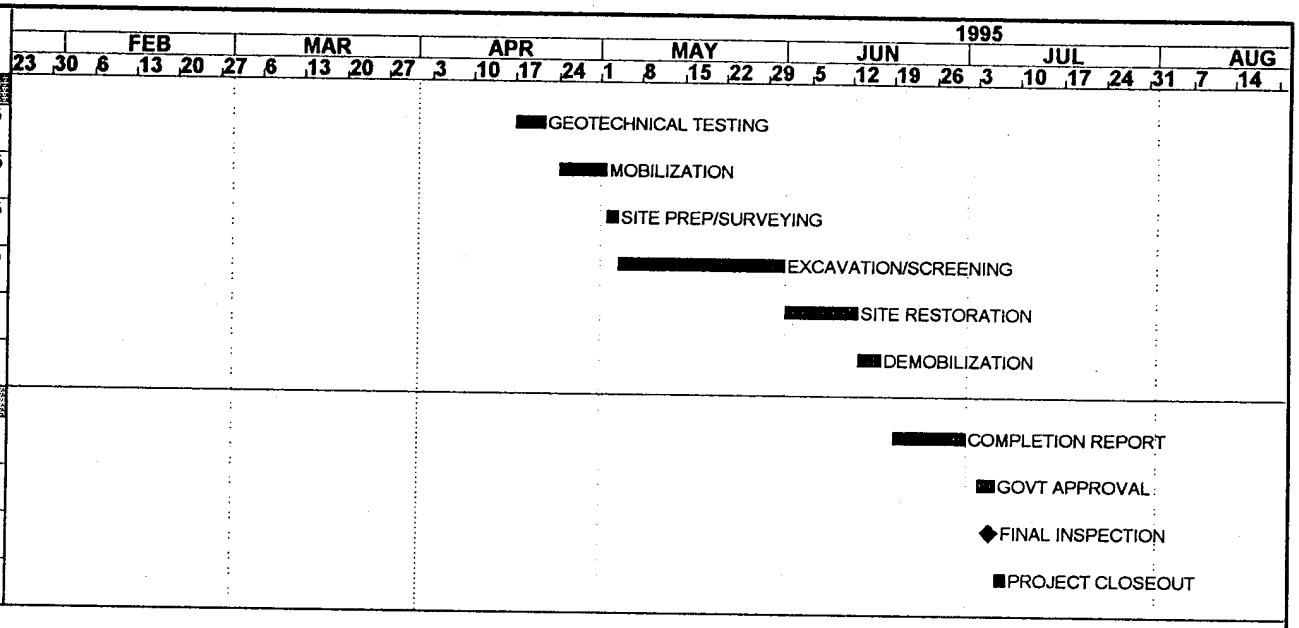
4.0 PROJECT SCHEDULE

Figure 4-1 shows the proposed project schedule. Due to the location of the Rifle and Pistol Range sites being in the Bald Eagle Management Area as well as considerations of weather and soil conditions in the winter months, field work is not planned to commence until spring. The Bald Eagle Management Area is closed to human use for the period of October 15 to April 15 (see Section 8).

(See insert)

Figure 4-1 Proposed Schedule

Activity description	Orig Dur	Early Start	Early Finish
SITE WORK			
GEOTECHNICAL TESTING	5	17APR95	21APR95
MOBILIZATION	6	24APR95*	01MAY95
SITE PREP/SURVEYING	2	02MAY95	03MAY95
EXCAVATION/SCREE	20	04MAY95	31MAY95
SITE RESTORATION	8	01JUN95	12JUN95
DEMOBILIZATION	4	13JUN95	16JUN95
FINAL PROJECT ACTIVITIES			
COMPLETION REPORT	10	19JUN95	30JUN95
GOVT APPROVAL	3	03JUL95	05JUL95
FINAL INSPECTION	0	05JUL95	
PROJECT CLOSEOUT	2	06JUL95	07JUL95



Project Start 22AUG94
Project Finish 13JUN95
Data Date 22AUG94
Plot Date 27JAN95

Early Bar
Progress Bar
Critical Activity

RMA3

R&R INTERNATIONAL, INC.
RIFLE AND PISTOL RANGE, RMA
Classic Schedule Layout

Sheet 1 of 1

5.0 APPLICABLE RELEVANT AND APPROPRIATE REQUIREMENTS

As required by paragraph C.2.8 of Section C of the basic contract, all local, federal, and state environmental applicable relevant and appropriate regulations (ARARs) which govern the excavation effort at the Rifle and Pistol Range shall be followed. These requirements have been identified and are provided in Table 5-1. Specific regulatory requirements that are applicable to the excavation operations at the Rifle and Pistol Range are also listed in Table 5-1. The excavation and sieving operations described in this plan are not expected to have any adverse impact on water, air and surrounding environment. Specific environmental and wildlife issues related to these sites is discussed in Section 8 of this Work Plan. Any specific issue that arises during these operations that requires PMRMA guidance shall be coordinated with PMRMA by R&R.

Table 5-1 Applicable Regulatory Requirements

Applicable Federal Regulations

Regulation	Description	Site Applicability
40 CFR Hazardous Waste Regulations; part 262	Outlines standards for generators of hazardous waste. Requires waste determination, waste analysis, shipping and manifesting, record keeping and reporting, and waste minimization responsibilities. Outlines groundwater protection closure and post-closure, waste piles, and land treatments.	Remedial actions involving removal and disposal of berm waste material.
40 CFR 122.26 Stormwater Management	Water Pollution Control Regulations that require obtaining a stormwater permit when discharging stormwater runoff associated with "industrial activity" (categories I-XI); also requires submission of an erosion control plan.	Permits and erosion control plan required for construction activity (category X) associated with grading and excavation activities at 2 berm areas.
Safe Drinking Water Act (SDWA)	EPA has promulgated primary and secondary drinking water regulations and standards.	No sampling action at site shall have an adverse impact on the protection of water resources.
National Primary Drinking Water Standards	Established primary drinking water standards. Outlines maximum contaminant levels.	As in SDWA. Protection of water resources at site.
National Secondary Drinking Water Standards 40 CFR 143	Promulgates standards to control contaminants that may affect aesthetic qualities of drinking water. Designed as guidelines for states.	As in SDWA. Protection of water resources at site.
Occupational Safety and Health Act 29 CFR 1910 and 29 CFR 1904	Regulates worker safety. Recording and reporting occupational injuries and illnesses.	Standard safety practice.
Occupational Safety and Health Act 29 CFR 1926.62	Occupational exposure to lead in construction work. Requires initial lead exposure determination, respiratory protection, protective clothing, medical surveillance, training, posting, record keeping, and a written program.	Perform mandatory air monitoring to determine personal air exposure while excavating and sieving lead contaminated soil.

Applicable U.S. Army Regulations

Regulation	Description	Site Applicability
AR 11-34	Respiratory Protection Program	Health & Safety.
AR 75-15	Responsibilities and Procedures for Explosive Ordnance Disposal	UXO survey and avoidance at sites.
AR 385-40	Accident Reporting and Recordkeeping	Sampling and remedial actions.
AR 385-1-1	Corps of Engineers, Safety and Health Requirements (1992)	Field activities

Applicable State of Colorado Regulations: (Applicability as listed under Federal regulations)

Regulation	Description	Site Applicability
5ccr 1001-3; Regulation No. 1; seIII: Particulate, Smoke, Carbon Monoxide, and Sulfur Oxides	Regulates fugitive emissions. Requires Emission Permits and dust control plans.	Preparation of a Dust Control Plan and acquisition of an emission permit relative to excavation of two berm areas.
CO Laws se 25-7-114.1 Air Pollutant Emission Notice (APN)	Requires emission notice to be filed with the Colorado Health Department; Air Division prior to project activity. Notice to specify location, nature of activity, and estimated quantity of emission. Application fee of $75.00 required. Construction permit may be needed.	APN required prior to excavation of two berm areas and sieving operation.
CO Laws se 29-22-107; Hazardous Substance Listing	Access to Information About Hazardous and Toxic Substances. Requires notification to local authorities regarding hazard type and quantity.	Requires notification to local fire department and waste management division of Colorado Health Department regarding quantity of explosives (e.g., UXO) that may be encountered during excavation.
5ccr 1002-2\se6.4; Stormwater	Water Pollution Control Regulations that require obtaining a permit from the Colorado Health Department, Water Division prior to discharging stormwater runoff associated with "industrial activity" (categories I-XI).	
6ccr 1007-3\pt262	Standards applicable to generators of hazardous waste	

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6.0 GEOTECHNICAL REQUIREMENTS

The geotechnical testing of berm soil samples for this project shall be conducted in conjunction with the site activities described in Section 3 of this Work Plan.

6.1 Geotechnical Testing of Bermed Soil

The soil characteristics and conditions at the Rifle and Pistol Range sites will determine the efficiency and suitability of planned sieving methods for the berm areas. In order to determine this, soil identification tests as outlined in the following subsections shall be performed. All tests shall be performed by R&R's geotechnical laboratory or by a local geotechnical laboratory in the vicinity of RMA. Tests shall be performed on two samples of bermed soil at each site.

6.1.1 Sieve Analysis

Each sample shall undergo a sieve analysis to determine the particle size of the soil. The analysis will determine if the grain size will enable separation of the bullet fragments in an efficient manner.

6.1.2 Hydrometer Analysis

In order to determine the amount of particles finer than a #200 sieve, each sample shall undergo a hydrometer analysis. Soil types such as silt and clay would be expected to pass through this size sieve, indicating that the sieving operation would be efficient. If the soil is found to be clayey, the soil can be expected to clump together during attempted sieving and may indicate the need to either manually break soil clumps, or introduce the use of water to flush soil through the sieve. Based upon this determination, the procedures to be used during sieving may need to be revised.

6.1.3 Liquid Limit/ Plastic Limit

Each sample shall be tested for liquid limit and plastic limit. As the soil's water content approaches its liquid limit, the shear strength of the soil decreases and the soil behaves more like a liquid. When the water content of the soil is between the plastic and liquid limits, the soil behaves as a plastic material and is difficult to work with. The

plastic limit value in conjunction with the moisture content of the soil shall be used to determine if soil contains excessive water content, impacting sieving operations.

6.1.4 Water Content

Each sample shall be tested for water content. If the soil contains over 20 percent water, the soil will approach its plastic limit and sieving operations will be impeded. If the moisture content exceeds the plastic limit, the soil may need to be dried and alternative procedures for achieving the project goals may be required.

6.2 Geotechnical Test Evaluation

R&R shall evaluate the results of the geotechnical tests and will determine if the soils at the Rifle and Pistol Range meet the above criteria and if current procedures will enable sieving operations to be completed using the methods outlined herein. If geotechnical evaluation reveals that soil conditions warrant additional procedures, R&R shall provide PMRMA with alternative methodologies to complete the specified scope of work.

R&R shall not mobilize until the above geotechnical evaluation is completed.

7.0 CONTRACTOR QUALITY CONTROL PLAN

R&R's Contractor Quality Control Plan has been prepared to describe the components of the quality control program that shall be used to ensure that the completed project meets or exceeds all contract requirements, plans, and specifications. The CQCP shall be used in monitoring and documenting the quality of materials used and the methods employed.

7.1 PROJECT DESCRIPTION AND PURPOSE

Delivery Order No. 001 consists of the excavation of soil and removal/disposal of bullets and metal fragments at the Rifle and Pistol Range at Rocky Mountain Arsenal, Commerce City, Colorado. All work shall be done in a manner consistent with environmental regulations and safety considerations.

7.2 SCOPE

The scope of work for activities at the Rifle and Pistol Range will involve the excavation of bermed soil and the sieving of soil to enable segregation, removal and disposal of the bullets/metal fragments from the soil. These items will be segregated and collected in 55-gallon drums and transported to an approved recycling facility in accordance with Section 3.2.4 of this plan.

7.3 ORGANIZATION AND PERSONNEL

R&R's project organizational chart is enclosed in Figure 7-1.

7.4 FIELD QC TASKS

All operations related to field activities are subject to quality control. Starting from premobilization, the site supervisor shall be responsible for assuring that all necessary field equipment and personnel are mobilized and ready to commence field activities. A field equipment list shall be checked at the site to verify that required items have been properly transported and are in working order. During site operations, the site supervisor and project manager shall perform routine inspections to assure that the necessary procedures have been followed as defined in this work plan. The metal/bullet fragment sieving operations shall be monitored to verify that proper segregation is being conducted in accordance with the specified criteria, and that extraneous materials have been separated out of the designated recyclable material.

Project Organization Chart

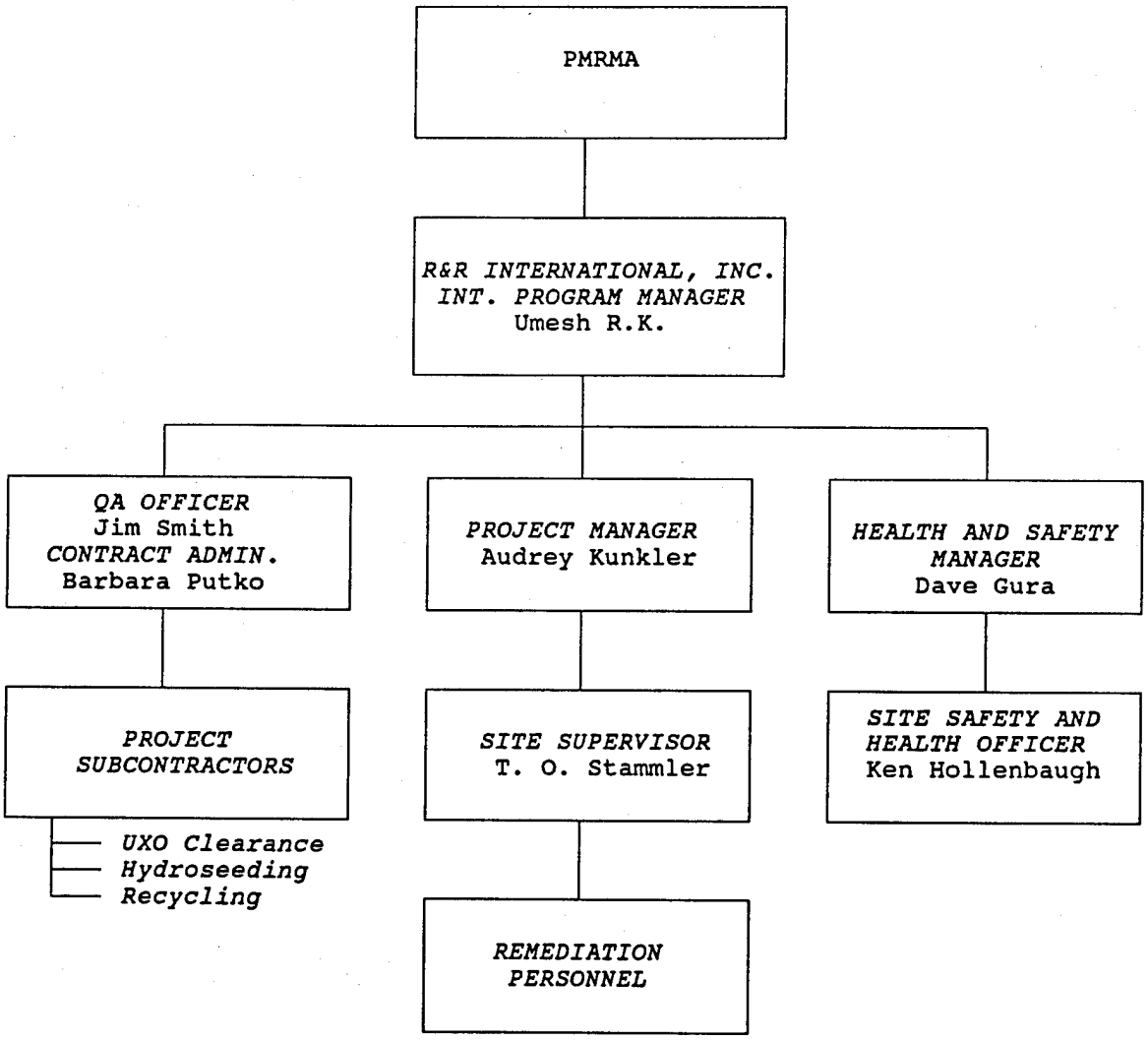

Figure 7-1 Project Organization Chart

APPENDIX A

SITE SPECIFIC UXO PLAN

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APPENDIX A

SITE SPECIFIC UXO PLAN

UXO Survey

Responsibilities and Authority

R&R shall utilize the services of Human Factors Applications, Inc. (HFA) as the most beneficial subcontractor to the Government to perform UXO operations. Approved UXO contractors are authorized by PMRMA through R&R to develop appropriate operational and safety plans and procedures; supervise field operations in accordance with applicable regulations, and PMRMA guidance/instruction. HFA's site-specific work plan follows.

R&R shall be held primarily accountable for technical adherence to PMRMA-approved health and safety procedures during contractor conducted UXO operations.

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HUMAN FACTORS APPLICATIONS, INC
EXPLOSIVE ORDNANCE DISPOSAL DIVISION

UNEXPLODED ORDNANCE (UXO) SITE OPERATIONS

WORK PLAN

AND

SAFETY, HEALTH, AND EMERGENCY RESPONSE PLAN

CONTRACT NO. DAAM02-94-D-003 DELIVERY ORDER NO. 001

CLIENT NAME: U.S. ARMY

PRIME CONTRACTOR: R & R INTERNATIONAL, INC.

PROJECT TITLE: RIFLE AND PISTOL RANGE CLEARANCE

PROJECT LOCATION: ROCKY MOUNTAIN ARSENAL, DENVER, COLORADO

DATE PREPARED: 11-23-94 PREPARED BY: Samuel J. Hooper Sr.

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TABLE OF CONTENTS

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SECTION 1.

WORK PLAN

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1.0 INTRODUCTION

1.1 Project - Human Factors Applications, Inc. (HFA), has been contracted by R & R International (R&R), to provide unexploded ordnance (UXO) services for the Rifle and Pistol Range Project on Rocky Mountain Arsenal (RMA), Denver, Colorado. In support of this project, HFA will provide UXO services consisting of surface visual UXO searches, subsurface magnetometer UXO searches, and standby services as needed to support excavation and sieving the soils from the top and faces of the berms on each range. This UXO Work Plan (WP) and Safety, Health, and Emergency Response Plan (SHERP) describe the overall scope of the project, the general methodology to be used, and the specific UXO site requirements.

1.2 RMA Background - RMA is located approximately 10 miles northeast of Denver, situated on approximately 17,000 acres in Adams County, Colorado. The property was purchased in 1942 by the U.S. Government for the production of chemical and conventional munitions during World War II (WW II). Throughout WW II, RMA produced mustard, lewisite, napalm bombs, incendiary bombs, white phosphorous (WP) cups and munitions, munitions filled with phosgene, and worked with mustard distillation. During the Korean Conflict, RMA manufactured WP filled munitions and incendiary bombs using M-74 bomblets and filled artillery shells with distilled mustard. Between 1953 and 1957, RMA produced nerve agents and filled GB munitions until 1960. During the late '50s to mid '60s, RMA demilitarized mustard filled shells, M47 napalm bombs and incendiary bombs. After 1970, RMA disposed of chemical warfare material including an anti-crop agent (TX), M34 cluster bombs, shells containing mustard, one ton containers, and chemically neutralized and incinerated GB.

1.2.1 Rifle and Pistol Ranges Background - Both ranges have been used for small arms qualification and target practice for a number of years. Both military and sporting small arms ammunition is known to have been fired in these areas. It can be presumed that both ball and tracer type small arms have been fired at these locations. The sites are known to be contaminated with spent bullets, bullet fragments, and cartridge cases. Lead and copper contamination from the bullet impacts in the soil will also be present on the site. Unfired ammunition may also be located in this area. Records indicate that 40 mm "target" grenades have been fired on one or possibly both ranges. "Target" grenades is a misnomer because there is no such classification of 40 mm grenades. It is presumed that the "target" grenades were some type of training ammunition which may include practice, pyrotechnic, or riot control type 40 mm grenades. Depending on which types of 40 mm grenades have been fired into these areas, they may be inert or they may contain high explosive, low explosive, and incendiary hazards.

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2.0 SITE CONDITIONS

2.1 Physical Setting - The arsenal's terrain is generally flat with some low rolling hills. Vegetation ranges from medium high range grasses, small patches of thistles, and some widely scattered small trees and bushes. For the most part, the ranges are covered with patches of native grasslands and weeds.

2.2 Results of Previous Investigations - In accordance with Army Regulation (AR) 415-15, the Rifle and Pistol Range Areas have been designated by the Government as a Category II Sites; possibly containing UXO and/or hazardous toxic waste (HTW). Other then visual observations, no previous investigations have been performed on these sites. It is virtually impossible to predetermine the types or quantities of UXO or non-UXO that could be located during the HFA UXO services in support of the R&R activities.

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3.0 UXO OPERATIONS

3.1 UXO Site Survey - All of the project areas listed in paragraph 1.1 above will receive a visual surface UXO search and/or a subsurface electronic UXO search as needed. The following is a synopsis of the HFA basic UXO site search operations:

A. All HFA UXO activities will be coordinated with the following organizations and activities:

1. R & R International
2. RMA Fire Department (303) 289-0192
3. RMA Safety Health and Environmental Office (303) 289-0112
4. U.S. Army EOD Detachment
5. Explosive Ordnance Disposal Division, Human Factors Applications, Inc. (Mr. Sam Hooper, [301] 743-2377)

B. Only qualified U.S. Army Explosive Ordnance Disposal (EOD) personnel and HFA UXO personnel will be permitted in the project area during UXO search or excavation activities. The restricted access will be coordinated with the R&R Project Manager.

NOTE: ***In accordance with Army Regulation (AR) 50-6, until such time as U.S. Army Tech Escort personnel arrive on scene, HFA UXO personnel will provide interim security for any Category II Chemical Surety Material encountered within the boundaries of the project site.***

NOTE: ***HFA will utilize a magnetometer (ferrous metals only) and an all-metals detector (ferrous and nonferrous metals) to search the excavation areas. It is anticipated that the small arms fragments in the soil may interfere with the operation of the all-metals detector. If large quantities of armor piercing small arms ammunition has been fired into the berms, the steel penetrators in the bullets may also interfere with the operation of the magnetometer. If either or both situations should occur, very careful visual inspection of the soils scraped from the top and the face of the berms will be required.***

C. In accordance with 29 CFR Part 1910.120, paragraph (d)(2) "Buddy System,", the HFA UXO search/excavation team (consisting of two UXO Specialists of which one holds a Master EOD rating) will conduct a visual surface and electronic subsurface UXO search of the project site. In conjunction with the UXO search, the HFA UXO team will perform the following steps:

1. Identify and mark the boundaries of the project site areas within which the basic UXO site search will be performed. The boundaries will be marked with orange survey markers.

NOTE: ***During intrusive operations, hand excavation will be the only method of location for buried UXO. All excavations performed by HFA will be in compliance with 29 CFR Part 1926 and EM 385-1-1.***

NOTE: ***In the event of an explosive accident or if the UXO team should show signs of incapacitation from a chemical agent, the R&R personnel will summon emergency services via the RMA Fire Department. The R&R personnel will under no circumstances enter the site and attempt to rescue the downed HFA UXO personnel.***

2. Using visual surface location techniques, electronic subsurface techniques, and excavation as required, locate and identify UXO within the boundaries of the project site. When a UXO is located, (depending on the UXO category, the following actions will be carried out:

   a. Explosive, Chemical, Propellant, or Pyrotechnic Loaded UXO - The location of the UXO will be marked with a yellow survey marker. The R&R Project Manager and Government representative will be notified of the presence of UXO. All UXO will be immediately reported to the RMA Fire Department (303) 289-0192. The HFA UXO team will provide interim security for the UXO until such time Government personnel arrive on-site and assume responsibility.

   b. Nonexplosive loaded ordnance components - These items will be collected and stored in a designated location for inspection by RMA EOD personnel. Items in this category must be certified by Government EOD as being free of explosive hazards and safe for disposal as salvage material. Items in this category would include but

not be limited to the following types of ordnance/residue:

(1) Armor Piercing (AP) projectiles
(2) Empty ejection munitions
(3) Spent rocket motors (when found separated from warheads)
(4) Nonexplosive loaded training munitions

c. Miscellaneous metallic debris - These items will be collected and stored in a designated location for pick up by Government personnel at a later date.

3. Record the depth and location of all UXO and UXO components in a log book.

D. All necessary "ground penetrating" magnetometry & electromagnetic pulse induction search equipment (29 CFR Part 1910.120, paragraph (j)(1)(ix), "Ground Penetrating System"), hand excavation equipment, and other materials required to conduct a surface/subsurface UXO survey will be provided by HFA.

E. HFA UXO personnel requirements:

NOTE: ***During all hazardous operations related to searching for UXO or any hazardous UXO/explosive-related service, a minimum of two (2) qualified UXO Specialists (29 CFR 1910.120, paragraph (d)(2) "Buddy System"); one (1) of whom is a Master rated EOD technician will be required to perform these services.***

NOTE: ***Most of the UXO projects performed by HFA are performed by a two (2) person UXO team. The Project Leader also acts as the UXO Site Safety Officer.***

1. Search and marking operations - one (1) Project Leader/UXO Site Safety Officer (Master EOD rated) and one (1) UXO specialist
2. UXO excavation operations - one (1) Project Leader/UXO Site Safety Officer (Master EOD rated) and one (1) specialist

3.2 Follow-On UXO Services - The follow-on services listed below will be required to support this project after the basic UXO search has been competed:

NOTE: ***The soil should be removed in one foot increments which will allow the HFA UXO personnel to inspect the soil for UXO between each removal action.***

- As the soil is scraped from the berm surface, the UXO personnel will visually and as conditions allow electronically recheck the newly exposed soil for UXO.
- Check the shakers used to sieve the soil to make sure that no UXO or other explosive hazards are present.
- Other additional UXO services deemed necessary by the R&R.

3.3 UXO Density Report - Upon completion of the basic UXO search operation, a copy of the UXO Density Report will be provided to R&R.

4.0 MANAGEMENT

4.1 Staffing - This section contains a listing of project staff personnel as related to this project.

Director of Operations - Samuel J. Hooper Sr.: Mr. Hooper is responsible for the effective day-to-day management of the project staff; direct communication and liaison with client; technical approach and review of deliverables; management of resources, schedules, and budgets; and coordination among the general and technical support functions.

Project Leader - To Be Determined: This individual is responsible for the on-site management of UXO services and site UXO safety. His responsibilities include coordination and direction of all UXO site operations.

4.2 Project Schedule - UXO services will be performed in accordance with the posted R&R schedule of operations.

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SECTION 2.

SAFETY, HEALTH AND EMERGENCY RESPONSE PLAN

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5.0 Safety, Health, and Emergency Response Plan (SHERP)

5.1 Regulatory Requirements - Occupational Safety and Health Administration (OSHA) standards 29 Code of Federal Regulations (CFR) 1910 and 1926 apply to work performed under this Safety, Health, and Emergency Response Plan (SHERP). Specific sections of 29 CFR part 1910 that apply include 1910.120, Hazardous Waste Operations and Emergency Response; 1910.134, Respiratory Protection; 1910.1000, Air Contaminants; 1926.602, Material handling equipment; and 1926.652, Specific Trenching Requirements. Additional U.S. Army requirements governing this work are included in the U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM 385-1-1) and the U.S. Army Material Command (USAMC) Safety Manual, AMC-R 385-100.

5.2 Safety and Health Policy - The purpose of this SHERP is to protect workers and other on-site personnel, the public, and the environment from hazards associated with site activities and potential site contaminants. This SHERP includes preventive and protective measures against health, physical, fire, and explosion hazards that may exist or occur during UXO search operations. It is the policy of HFA management and a contract requirement that all work be performed according to this SHERP. All HFA personnel and subcontractors will be familiar with the SHERP and will adhere to the SHERP at all times.

5.3 Responsibilities - Responsibilities of the Director of Operations, HFA UXO Safety Officer, UXO Project Leader, and UXO crew will be in accordance with HFA standard practices. Other contractors for this project are subject to the same requirements and responsibilities as field team members.

5.3.1 Director of Operations - Samuel J. Hooper, Sr. - The Director of Operations is responsible for overall project safety. The responsibilities of the Director of Operations include:

A. An effective and comprehensive SHERP is prepared for the project;
B. Adequate and appropriate safety training and equipment are available for project personnel; and
C. Project personnel are medically monitored and qualified for their involvement in the project.
D. Categorizing and identifying the hazards and associated risks for the conditions and activities to be encountered on-site; and
E. Reviewing reports of incidents related to project activities.

5.3.2 UXO Safety Officer - (To be determined) (additional duty for UXO Project Leader on this project) - The UXO Safety Officer is responsible to the Director of Operations for the health and safety of personnel during site activities.

Responsibilities of the UXO Safety Officer include:

A. Implementing all safety procedures and operations on-site;
B. Updating equipment or procedures based upon new information gathered during the site inspection;
C. Upgrading or downgrading the levels of personnel protection based upon-site observations;
D. Determining and posting locations and routes to medical facilities (including poison control centers) and arranging emergency transportation to medical facilities (as required);
E. Notifying (as required) local public emergency officers (i.e., police and fire departments) of the nature of the team's operations and making emergency telephone numbers available to all team members;
F. Ensuring that at least one member of the field team is available to stay behind and notify emergency services if the UXO Project Leader must enter an area of maximum hazard, or entering this area only after notifying emergency services (Emergency Center);
G. Observing work party members for symptoms of on-site exposure or stress; and
H. Arranging for the availability of on-site emergency medical care and first aid as necessary.

The UXO Safety Officer has the ultimate responsibility to stop any operation that threatens the health or safety of the team or surrounding populace or causes significant adverse impact to the environment.

The UXO Safety Officer has experience supervising personnel and functioning as an UXO Safety Officer at hazardous waste sites. He has completed the site supervisor training required under 29 CFR 1910.120

5.3.3 UXO Project Leader - To Be Determined - The UXO Project Leader is responsible to the Director of Operations for all operational activities on-site, as well as for all safety and health practices by site personnel. The responsibilities of the UXO Project Leader include:

A. Ensuring and enforcing compliance with the SHERP;
B. Controlling site entry of unauthorized personnel or coordinating with local law enforcement agencies or state authorities to limit site access;
C. Coordinating site activities so that they are performed in an efficient and safe manner consistent with the SHERP;
D. Enforcing the buddy system on-site; and
E. Ensuring the ready access and availability of all safety equipment.

5.3.4 UXO Crew Member(s) - To Be Determined - HFA employees are responsible to the UXO Project Leader and the UXO Safety Officer for all activities on-site. The responsibilities of UXO survey crew member(s) include:

A. Complying with all aspects of the SHERP, including strict adherence to the buddy system;
B. Obeying the orders of the UXO Project Leader and the UXO Safety Officer; and
C. Notifying the UXO Project Leader or UXO Safety Officer of hazardous or potentially hazardous incidents or working situations.

5.3.5 Site Visitors - Visitors and governmental agency representatives are required to comply with all provisions of the SHERP and may be responsible to the UXO Project Leader and UXO Safety Officer. The responsibilities of site visitors include:

A. Complying with all aspects of the SHERP, including strict adherence to the buddy system; and
B. Obeying the orders of the UXO Project Leader and UXO Safety Officer.

5.3.6 Client Contacts - The client contacts are the individuals serving as the primary liaison between the clients and the HFA Director of Operations/UXO Project Leader. All HFA project personnel and subcontractors are directly or indirectly responsible to the client. However, the client contact must comply with all applicable portions of the SHERP when in areas covered by its provisions. In case of immediate on-site difficulties, the EOD Division Office (Telephone (301) 743-2377) will be contacted.

5.4 Training - In accordance with HFA standard practices, all HFA site personnel will have completed training required by 29 CFR 1910.120. All HFA site personnel working on the site investigation will have completed an extensive training course and have worked at least three (3) days at a hazardous waste site. The course consists of an initial 40-hour session and annual refresher courses of eight (8) hours. The UXO Project Leader will have completed an additional eight (8) hours of waste site management training. The following topics are covered in the HFA Hazardous Waste/Materials Site Investigations Training, Annual Refresher, and Supervisor Training Courses:

<u>Hazardous Waste/Materials Site Investigations Training Course</u>

Safety plans
Fundamentals of industrial hygiene
Properties of hazardous materials/compatibility testing, shipping, and

handling of samples/chain of custody
Levels of personnel protection
Hotline systems
Decontamination operation
Emergency response
Air-purifying respirators and fit-testing air-supplying respirators
Field exercise, air-purifying respirators, and self-contained breathing apparatus (SCBA), levels A, B, and C
Field exercises (site zones and sampling operations)
Confined space entry
Review of regulations
Engineering controls

Annual Refresher

Regulations review
Properties of hazardous materials
Safety plans
Levels of protection
Review of instruments
Transportation
Respiratory protection
Site control/decontamination
Emergency preparedness/prevention
Review and quiz

Supervisor Training Course

Site safety requirements and responsibility
Medical monitoring program
Respiratory protection program
Air monitoring
Regulations--OSHA/Resource Conservation and Recovery Act (RCRA)/Superfund Amendments and Reauthorization Act (SARA), and Hazard Communication
Shipping and handling
Costs of hazardous site work
Problems encountered during site work

Site-specific training will be given by the UXO Project Leader or HFA UXO Safety Officer to inform the UXO team members of site-specific hazards and hazardous activities. Training will be provided prior to site entry, each morning before work begins, and after all project field activity has been completed.

Specific UXO related site safety training will be provided by HFA to all other contractor personnel working on this site. No personnel will be permitted to work on this project site until they have received this training.

5.5 Medical Surveillance - All HFA site personnel will be subject to the HFA medical surveillance program for hazardous waste site workers. This program was designed in accordance with the recommendations found in the National Institute for Occupational Safety and Health (NIOSH)/OSHA/U.S. Coast Guard (USCG)/EPA Occupational Safety and Health Guidance Manual for Hazardous Waste Site Operations, and meets the requirements of 29 CFR 1910.120. Physician statements of findings are kept in employees' personnel files and will be available for review. The following examinations are covered in the Medical Examination and Monitoring Program.

A. Basic physical exam
B. Heart status and functions (electrocardiogram {EKG})
C. Chest X-ray (Roentgenogram posterior-anterior)
D. Pulmonary function-forced vital capacity, forced expiratory volume at 1 second and reserve volume
E. Blood-full SMAC Series

1. Hemoglobin-cell counts, protein levels
2. Acetylcholinesterase activity
3. Heavy metals
4. PCB in serum

F. Liver function-full enzyme profile
G. Renal function-blood, urea, nitrogen (BUN), creatinine, creatine/ Creatinine ratio, lipoprotein count and differential, uric acid
H. Urinalysis
I. Audiometry-audio spectrum response of ear
J. Eye-physical condition, visual acuity.

5.6 Documentation - Personnel and environmental monitoring will be made part of the permanent project record. Monitoring records will be kept in accordance with 29 CFR 1910.20 and standard HFA practices. Training and medical records for HFA personnel are available for inspection as required. Subcontractors are required to have training and medical records available for inspection as required by HFA and client representatives.

5.6.1 Acknowledgement - All workers and site visitors must read, understand, and agree to comply with all provisions of this UXO WP/SHERP prior to entering into the exclusion zone during intrusive UXO activities. Each worker and site

visitor must be briefed and have read this document before they will be allowed on the site. Acknowledgement and compliance with this requirement is indicated by each individual's signature on the HFA "ON-SITE SAFETY MEETING" form in the Daily Operations Journal. ***NO ONE WILL BE ALLOWED ON ANY HFA UXO WORK SITE DURING INTRUSIVE OPERATIONS WHO HAS NOT MET WITH THESE REQUIREMENTS.*** The following guidance will be used to determine who is required to read and comply with this UXO WP/SHERP:

A. All personnel entering the work site exclusion area (100 meter radius of the intrusive activity) where intrusive UXO activities are taking place, must have reviewed the UXO WP/SHERP and must sign the HFA "ON-SITE SAFETY MEETING FORM" in the Daily Operations Journal. Examples of personnel required to do so are listed below:

1. All HFA UXO technicians.
2. Well drillers or environmental technicians taking samples in conjunction with bore hole magnetometer operations.
3. Industrial health personnel monitoring UXO excavations.
4. Any personnel such as, Government inspectors, safety personnel, environmental personnel, Government personnel, contractor or subcontractor personnel, etc., who have a valid need for entry on to the site.

NOTE: ***If someone insists on entry to the work site exclusion area and refuses to comply with this requirement, all site operations will be halted, and the R&R Project Manager will be notified. UXO intrusive operations will not be resumed until such time this issue is resolved.***

B. Personnel with a valid need to enter the site during magnetometer search and marking operations, during which no intrusive UXO activities are being performed, may enter the site without being required to comply with the UXO WP/SHERP requirements, however, they should be briefed and escorted while on the site.

C. Government emergency personnel responding to the site for a UXO incident or some other type of emergency, will assume responsibility for the site and HFA will no longer be responsible for entry control to the site.

5.7 Personnel Protective Clothing - HFA will have on-site all necessary Level D Personnel Protective Equipment (PPE) (29 CFR Part 1910.120, Appendix B) ***for HFA Personnel only.*** The HFA UXO team will normally work in a modified Level

D PPE during the performance of the basic UXO site search. The equipment listed below comprises the HFA PPE Level D for this project.

A. Normal work clothes (long pants and shirt)
B. Gloves (leather)
C. Gloves (inner, chemical resistant) - Required when performing hand excavation of suspected UXO.
D. Boots (leather, non-steel toe) - Due to sensitivity of magnetometers steel toed boots will not be worn during UXO search operations.
E. Hard hat (optional, as required) - Hard hats will not be worn while performing UXO services except for when these services are being performed in conjunction with excavation equipment (backhoes, excavators, bull dozers, etc.), in which case, hard hats will be worn by HFA UXO personnel.

5.8 General Safe Work Practices - The following general safety requirements are based on standard EOD/UXO precautions.

A. Only qualified U.S. Army EOD personnel and HFA UXO personnel will be permitted on the site during HFA UXO search and excavation operations.
B. Use of CB radios or other radio communication devices rated above 5 watts will not be permitted during UXO search or excavation operations.
C. All safety precautions related to UXO will be observed.
D. The UXO Project Leader will be in charge of all UXO operations conducted by HFA. Safety responsibilities of the UXO Project Leader and UXO Safety Officer are as follows:

1. When and if required, ensures that all barricades are in place prior to the start of any UXO operations.
2. Ensures that all personnel in the area of UXO operations are qualified UXO personnel.
3. Ensures that adequate emergency fire/rescue, medical, and security support is available.
4. Has absolute authority to stop all operations and order the immediate evacuation of the project site in the event that UXO or suspected UXO is located.

E. General UXO Safety Precautions and Rules - The following safety precautions and rules will be observed by all personnel present on a UXO survey site:

1. Do not go souvenir hunting.
2. Do not pick up or disturb unidentified items.
3. Report all UXO or unidentified objects.
4. Do not excavate any areas until you are sure they have been checked.
5. Do not go outside the boundaries of the access routes or work sites.
6. Do not enter the uncleared areas of the site.
7. Do not carry fire or spark producing devices into the site.
8. Do not smoke except in areas specifically designated for smoking.
9. Avoid inhalation and skin contact with explosives.
10. Remove from the area any person showing evidence of explosive poisoning or dermatitis.
11. Do not allow one person to work alone during any operations in areas contaminated with explosives or related hazardous materials.
12. Prohibit unnecessary personnel from visiting the operations site.
13. Observe static electric precautions when sampling and processing samples.
14. Suspend all operations immediately upon approach of an electrical storm.
15. Do not attempt to extinguish burning explosives or any fire which might involve explosive materials.
16. If explosive materials are burning or their ignition is eminent, immediately evacuate the area.
17. Have a vehicle in the area in case of an accident or emergency.
18. Have communications equipment in the area in case of an accident or emergency.

5.9 Emergency Services - Emergency services are available on RMA and may be obtained by calling the RMA Fire department (303) 289-0192.

A. Emergency Medical Care for Life Threatening or Unknown Situations- As a contractor employee working on RMA, emergency medical care for life threatening or unknown medical situations is available.

B. Non-Emergency Medical Care - For job related injuries of a non-emergency nature which require a doctors care, the injured person will be transported to medical facilities listed in the R&R Work/Safety Plan.

C. First Aid - For minor cuts, abrasions, or other minor injuries deemed by the HFA Site Supervisor or Team Leader to be treatable on-site by

first aid, will be treated using the site first aid kit.

5.10 Emergency Site Resources - The following on-site emergency equipment will be maintained by HFA.

A. One (1) fire extinguisher, rated at least 1A, 10BC
B. One (1) standard industrial first aid kit
C. One (1) emergency eye wash kit
D. One (1) gallon of household bleach (for emergency chemical agent decontamination)

5.11 Decontamination - For routine decontamination on site, the R&R decontamination instructions and contamination control station will be utilized. In the event HFA personnel or equipment are exposed to chemical agent contamination, the procedures in paragraph 5.11.1 will be followed.

NOTE: ***If an individual has been contaminated with a chemical agent, do not transport this person unless they need emergency medical treatment and Government transport is not available. When the call for emergency decontamination is made, ensure that (if known) the type of chemical agent contamination is reported.***

5.11.1 Emergency Decontamination - In the event of exposure to a chemical agent, household bleach will be used on-site to perform initial emergency decontamination. If an individual has been exposed to a chemical agent, the RMA Fire Department (303) 289-0192 will be notified and emergency decontamination will be requested.

5.12 Toxic Agent Symptoms and First Aid - There is a potential that during UXO operations on a Category II or III site a Military chemical agent may be encountered. It is extremely important that all HFA UXO personnel working on these sites be capable of recognizing agent symptoms and the required first aid/self aid procedures. All of HFA's UXO technicians have had extensive training with military chemical agents.

NOTE: ***If you notice any of the following odors, immediately evacuate the area and request emergency services in accordance with the procedures in paragraph 5.11.1. and report your location.***

- ***The odor of chlorine (chlorine bleach smell) - Chlorine Gas***
- ***The odor of new-mown hay or grass - Phosgene***
- ***The odor of almonds - Hydrogen Cyanide***

- ***The odor of garlic - Distilled Mustard or Mustard-Lewisite Mixture***
- ***A fishy or musty odor - Nitrogen Mustard (HN-1)***
- ***A soap or fruity odor - Nitrogen Mustard (HN-2)***

A. Nerve Agents - Some nerve agents are Tabun (GA), Sarin (GB), Soman (GD) and VX. These act by inhibiting cholinesterase enzymes throughout the body. Effects of these agents vary, depending upon the form of agent, method of exposure, and degree of concentration. Means of exposure can be by inhalation or skin absorption.

1. Symptoms of inhalation.

   a. Moderate.

      (1) Miosis - dimming of vision due to severe constriction of pupils.
      (2) Rhinorrhea - runny nose.
      (3) Tightness in chest.

   b. Symptoms of skin contact.

      (1) Symptoms copy those of inhalation.
      (2) Localized sweating and muscle reaction at site of exposure - skin contact.

   c. Severe symptoms - either type of exposure.

      (1) Nausea.
      (2) Convulsions.
      (3) Respiratory arrest.

2. First aid procedures.

   a. Remove victim to clean area.
   b. Request medical assistance.
   c. Remove contaminated clothing and thoroughly wash skin, using nominal 5 percent sodium hypochlorite (household bleach).
   d. Monitor victim while awaiting medical support. Upon appearance of symptoms beyond miosis, administer the two injectors from the Nerve Agent Antidote Kit, MARK I (atropine, small autoinjector first), hold the injector

against the thigh for at least 10 seconds. Follow immediately with the second injector (2-PAM CL, large autoinjector) and inject in the thigh, holding the injector against the thigh for at least 10 seconds. Administer Nerve Agent Antidote Kit, MARK I, every 5 to 20 minutes, if symptoms persist or recur, with a maximum of 3 sets. no more injections will be administered unless advised by medical personnel. Save spent injectors as a positive means of determining number of autoinjectors used.

e. Administer CPR, if indicted. Mouth to mouth resuscitation should be used when approved mask-bag or oxygen delivery systems are not available. If facial contamination exists, do not use mouth-to-mouth resuscitation.

B. Blood Agents - Some of the blood agents are Hydrogen cyanide (AC) and Cyanogen chloride (CK). Primary site of action is the central nervous system, particularly the respiratory functions by inhibiting cytochrome oxidase and interfering with cell utilization of oxygen. Inhalation is the usual route of entry.

1. Symptoms - depending upon concentration and duration of exposure.

   a. Moderate exposure.

      (1) Vertigo.
      (2) Nausea.
      (3) Headache.
      (4) Followed by convulsions and/or coma.

   b. High concentrations.

      (1) Deep, rapid breathing.
      (2) Violent convulsions after 15 to 20 seconds.
      (3) Cessation of regular breathing - 1 minute.
      (4) Termination of heart action shortly thereafter.

2. First aid - speed in getting medical assistance is extremely necessary.

   a. Don mask immediately.
   b. Move victim to clean area.

c. Request medical assistance.
d. Provide artificial respiration.

C. Choking Agents - Phosgene (CG) is the best known choking agent. It causes irritation to the upper respiratory tract, damaging the air passages in the lungs, and causing them to fill with fluid.

1. Symptoms.

a. Coughing.
b. Choking.
c. Tightness in chest.
d. Nausea.
e. Occasional vomiting.
f. Headache.
g. Lacrimation.
h. Followed by pulmonary edema, rapid shallow breathing, and painful cough and cyanosis.

NOTE: ***Symptoms may be delayed or they may occur and then disappear for a period of up to 24 hours; and then recur as pulmonary edema develops. Seeking medical treatment as soon as possible is essential.***

2. First aid.

a. Don mask.
b. Remove victim to fresh air. If area is clean, mask should be removed.
c. Request medical assistance.
e. Observe victim.
f. Provide drainage from victim's mouth to prevent aspiration.
g. Administer artificial respiration.

D. Incapacitating Agents - Any hallucinogen (i.e., BZ), producing mental confusion and lack of coordination would be an incapacitating agent.

1. Symptoms

a. Rapid heartbeat.
b. Dizziness.

c. Vomiting.
e. Extremely dry mouth.
f. Blurred vision.

NOTE: ***Absorbed by inhalation or ingestion. Symptoms are similar to alcoholic intoxication; therefore, medical identification bracelet or card should be worn/carried to prevent misdiagnosis. Symptoms may not occur for up to several hours after exposure.***

2. First aid.

a. Don mask.
b. Evacuate area.
c. Keep victim calm; restrain if needed.
d. Request medical assistance.
e. Observe and provide ventilation.
f. Keep body temperature down.

E. Irritant or Riot Control Agents - These agents produce temporary effects with no long-term damage. These are the "tear agents", such as CS and CN. Their effect is localized, irritating the eyes and upper respiratory tract.

1. Symptoms.

a. Primary - tearing.
b. Secondary - nausea and vomiting.

2. First aid/self-aid.

a. Don gas mask and evacuate area.
b. Request medical assistance.
c. Remove victim to fresh air.
e. Remove mask and flush eyes with clear water.

F. Vomiting Agents - Examples are DM, DA and DC.

1. Symptoms.

a. Primary - tearing.
b. Secondary (high concentrations) - nausea and vomiting.

2. Self-aid.

   a. Don mask - lift mask from face briefly if necessary to permit vomiting or to drain saliva from the face.
   b. Request medical assistance.

G. Blister Agents - Blister agents (HD, H, HT, and L) cause cell damage to any part of the body they come in contact with. Skin contact can cause effects ranging from reddening to sever blistering. The eye is most vulnerable to mustard - either by liquid or vapor contact. Long exposure to low concentrations or exposures to high concentrations can result in permanent eye damage. Upper respiratory tract damage is caused by inhalation of vapors or aerosol. Severe exposure can cause secondary infection such as bronchial pneumonia.

1. Symptoms may not appear for several hours after exposure. Vapor exposure may cause eye irritation, localized reddening and gritty feeling in the eye, and respiratory distress similar to a chest cold.
2. First aid - Decontaminate exposed area immediately with soap and water and follow with nominal 5 percent bleach solutions.

NOTE: If eye exposure, flush only with water.

3. Request medical assistance.

5.13 Ammunition Color Coding - The color codes listed below are commonly used to identify ammunition. In most instances due to weathering, the colors will no longer be visible, however on recently fired UXO the markings may still be clear enough for identification of the UXO.

NOTE: ***These color codes are not 100 % reliable. In some cases for testing or experimentation, munitions may have been loaded with hazardous materials. Ammunition may also be encountered which has been incorrectly marked by the manufacturer.***

A. One green band and green printing on a gray background

1. Old color code system - GB, CG, AC, and CK
2. New color code system - CG, AC, and CK

B. Two green bands and green printing on a gray background

1. Old color code system - VX, L, HL, HD, H, and HT
2. New color code system - HD, H, and HT

C. Three green bands and green printing on a gray background - New color code system - G and V Series

D. One red band and red printing on a gray background

1. Old color code system - CN, DM, CS, CN1, DM1, and CS1
2. New color code system - CN, DM, CS, CN1, DM1, and CS1

E. Two red bands and red printing on a gray background - New color code system - BZ AND CS2

F. One purple band and purple letters on a gray background - Old color code system - (Incendiaries) TH, NP, PT1, and PTV.

G. One yellow band and yellow letters on a gray background - Old color code system - (Smoke) HC, WP, and PWP

H. One white band and white letters on a gray or olive drab background - Old and New color code system - Illuminating

I. One black band and black letters on a white background - New color code system - Illuminating

J. All printing and markings in black on a light red background - New color code system - (Incendiary) TH, NP, PT1, and PTV

K. All printing and markings in black on a light green background - New color code system - (Smoke) HC

L. All printing and markings in red on a light green background - New color code system - (Smoke) WP and PWP

M. One yellow band and yellow printing on a olive drab background - High Explosive

N. One brown band and brown printing on an olive drab background - Low Explosive

O. White diamonds on an olive drab background - Flechettes

P. Yellow diamonds on an olive drab background - ICM (Submunitions)

Q. Yellow, brown, or white markings on a blue background - High Explosive, Low Explosive, or empty practice munitions

R. Black markings on an orange background - track and recovery munition

S. Any combination of the markings and colors listed above or any strangely painted and marked objects.

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SECTION 3.

DETECTION EQUIPMENT

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6.0 DETECTOR CAPABILITIES

6.1 Detectors - In accordance with 29 CFR Part 1910.120, paragraph (j)(1)(ix), "ground penetrating systems", HFA will provide all necessary ground penetrating magnetometry and electromagnetic pulse induction search equipment required to conduct a surface/subsurface survey for UXO. HFA will be using an active all-metals detector and a passive ferrous metals detector on this project for the electronic subsurface search. Based on current state-of-the-art magnetometer technologies, HFA does not guarantee that 100% of UXO will be located on this or any other site.

6.1.1. Electromagnetic (Active All-Metals) Induction Detectors - Active locators, as a class, generate a magnetic field. Their detection ranges are determined by the strength of their magnetic field, the attenuation of the field in the soil, the size and makeup of the items being sought, and the amount of conductive clutter in the search area. These factors tend to limit active detection ranges to two (2) feet or less, depending on the search instrument. A major advantage to this type of detector is its all-metals capabilities. These instruments are capable of detecting ordnance constructed of both ferrous and nonferrous metals. Active locators can affect influence fuzing; therefore, it is necessary to have some knowledge of the types of ordnance and their fuzing systems that may be encountered within the search area. The U.S. Military currently utilizes locators that employ the multiple-coil, balanced bridge, and phase-imbalance types of active locators. The active all-metals detectors listed below are currently used by HFA:

6.1.1.1 White's Eagle II SL 90 - The Eagle II is a multiple-coil active all-metals detector. Additional features include a programmable memory system and a digital display which provides a readout of the items being located and the status of the instrument.

A. Typical Sounding Depth (Detection Capabilities) - Active detectors as a class have very limited detection ranges of three (3) feet or less, depending on the search instrument. Experience has shown that the Eagle II under average conditions will be able to detect a 75 to 81 mm projectile at a depth of 1.5 to 2 feet.

B. Range of Operation - The Eagle II is normally used in its all metals (Prospecting and Relic Hunting Mode) with a sensitivity range of 1 to 7, with 7 being the most sensitive setting. The Eagle II is very unique in that it can be programmed to search for one (1) type of metal. HFA has used this feature on a number of occasions to locate specific types of UXO such as the M72 LAW rocket (all aluminum).

C. Limitations - The same limitations listed below for the Mk 26 Ordnance Locator also effect the performance of the Eagle II.

6.1.1.2 Fisher 1266XB - This is a multiple-coil active all-metals detector. This instrument is similar to the Eagle II with all controls being operated manually.

A. Typical Sounding Depth (Detection Capabilities) - Same as Eagle II
B. Range of Operation - Principle of operation is same as Eagle II, however, instrument settings are different.
C. Limitations - The same limitations listed below for the Mk 26 Ordnance Locator also effect the performance of the Fisher 1266XB.

6.1.2. PASSIVE FERROUS METAL DETECTORS - Passive magnetic locators detect anomalies in the earth's magnetic field which are produced by ferromagnetic (ferrous metal) targets. Generally passive locators respond to either: 1) the magnitude of the magnetic field strength (Proton-Precession) or 2) the gradient or rate of change of the field (Fluxgate). The detection ranges of passive locators are dependent on not only the resolution of the device, but also the magnetic features of both the search area and the item being located. Within the UXO community the standard passive magnetometers in use today are of the Fluxgate and the Proton-Precession types. The passive ferrous metal magnetometers listed below are currently used by HFA:

6.1.2.1. Mk 26 Mod 0 Ordnance Locator (Förster Ferex® 4.021) - This is a Fluxgate type ferrous metals passive magnetometer. HFA has both Ferex L 4.021.03 (Land Version) and Ferex K 4.021.02 (Land, Underwater, and Borehole Version) magnetometers in our equipment inventory. <u>This magnetometer will only detect ferrous metal UXO</u>.

NOTE: ***The capabilities listed below have been extracted from the Förster Ferex® 4.021 technical manual and are based on <u>clean area laboratory testing procedures</u> and these conditions are rarely encountered in the field. As indicated below in paragraphs 6.1.2.1.B. through C., actual field conditions can and do reduce the depth detection capabilities of the magnetometer.***

A. Typical Sounding Depth (Detection Capabilities Under Laboratory Clean Conditions)

1. 13 mm projectile - .25 m (9.8 inches)
2. Mills-bomb - .6 m (23.6 inches)
3. Anti-personnel mine - 1.1 m (43.3 inches)
4. Flat anti-tank mine - 1.5 m (59.1 inches)

5. 88 mm projectile - 3 m (118.1 inches)
6. 100 mm projectile - 3.3 m (129.9 inches)
7. 250 kg (550 lb) bomb - 4.5 m (177.2 inches)
8. 500 kg (1,100 lb) bomb - 6 m (236.2 inches)

B. Range of Operation - The Förster Ferex® 4.021 Search Instrument has four (4) modes of operation. Each mode selected by rotation of the Operating Mode Switch.

1. Operating Mode 1 (switch position 1) - General search tasks for small and large ferrous objects in a relatively clean area. There are eight (8) sensitivity levels (0.3 to 1000 nT) that can be selected in Operating Mode 1. This is the most sensitive and desirable operating mode; however, when heavy small item metallic contamination such as UXO/target fragments are present, this mode cannot be used. To date, HFA has never performed UXO related services on a project site that was clean enough to allow operation in this mode.
2. Operating Mode 2 (switch position 2) - General search tasks, but primarily to avoid confusion between two magnetic influences where one is much greater than the other. In this mode the larger influence is selected and the smaller is dampened out. There are eight (8) sensitivity levels (0.3 to 1000 nT) that can be selected in Operating Mode 2. This is the second most sensitive operating mode and is used for search operations when site conditions preclude the use of Operating Mode 1. To date, HFA has performed UXO related services on a limited number of project sites that were clean enough to allow operation in this mode.
3. Operating Mode 3 (switch position 3) - Used when searching in the vicinity of ferrous fences, underground ferrous pipes, or areas heavily contaminated with ferrous objects. There are eight (8) sensitivity levels (0.3 to 1000 nT) that can be selected in Operating Mode 3. This is the least sensitive operating mode and is used for search operations when site conditions preclude the use of Operating Modes 1 and 2. This is the most often used mode used by HFA when performing UXO services.
4. Operating Mode 4 (switch position 4) - Used to find magnetic north. There are no search capabilities in this mode.

C. Limitations - There are many environmental considerations that can limit the depth of detection (magnetic signatures), i.e., soil characteristics (minerals and salts present), type of metal being detected, size of the metal object, orientation of the object (vertical or horizontal to the linear axis of the object), metallic contamination of the site

(widespread fragmentation), and the capabilities of the detector. Activities such as earth removal and tree grubbing can also change the magnetic signatures in the earth. ***With all factors taken into consideration, there are no iron clad measurements regarding the sizes of UXO or depths at which they can be detected.***

6.1.2.2. Schonstedt Model GA-52B - This is a Fluxgate type passive ferrous metals magnetometer. HFA has used the Model GA-52B with a great deal of success for the location of buried UXO. As with the Mk 26 Mod 0, the Model GA-52B will only detect ferrous metal UXO.

A. Typical Sounding Depth (Detection Capabilities) - The Model GA-52B is a commercially available magnetometer with detection depth capabilities comparable to the Förster Ferex® 4.021 Search Instrument listed above.

B. Range of Operation - The Model GA-52B is a very simple instrument to use. Operation of the instrument is governed by an ON-OFF switch and a Sensitivity Control Knob.

C. Limitations - The same limitations listed above for the Förster Ferex® 4.021 Search Instrument also effect the performance of the Model GA-52B.

6.1.2.3 Schonstedt Model GA-72CV - This instrument is a reconfigured GA-52B with several design upgrades which are described below. All principles of operations and capabilities are the same as those described above for the GA-52B.

A. The GA-72CV has a new plastic case with a handle grip attached.

B. A meter has been added to the instrument which reads in the "+" and "-" ranges during operation. This added feature aids in determining the orientation of subsurface objects which are in a horizontal or near horizontal position.

SECTION 4.

ENVIRONMENTAL PLAN

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7.0 ENVIRONMENTAL PLAN

7.1 Overview - All of the UXO services performed by HFA will have very minimal impact on the site environment. The temporary disturbance of the site during UXO field activities is not expected to produce adverse effects on the surrounding down gradient areas due to increased storm water runoff, nor adversely affect the ecological resources in the area. All work in the area will be performed in a manner that will minimize the release of contaminants and control dust and noise to within reasonable limits. The proposed UXO services will affect only a very small area of RMA and will not adversely affect any area beyond RMA. Site-specific environmental controls, which will be employed as needed during UXO services, are as follows:

- Minimizing disturbed soil surface areas (all excavations will be performed using shovels, picks, and hand trowels). All excavations performed by HFA will be filled and tamped.

- Avoiding disturbance to trees, shrubs, and ground cover wherever possible.

NOTE: ***In most instances, HFA is on-site with other contractors/subcontractors over whom HFA has no operational control other than UXO safety. HFA is not liable for environmental damages caused by the other contractors/subcontractors. All contractor/subcontractor damages observed by HFA will be duly noted and recorded in the Daily Operations Journal.***

7.2 Site Condition Survey - The HFA Project Leader will perform a site condition survey prior to commencing UXO operations. During this survey, the project site area, access route and adjacent areas will be visually examined to note utilities, site improvements, fences, trees, shrubs and other features. Specific items of interest are:

A. Trees - The physical condition of the trees to include existing damage will be noted.
B. Shrubs and Grassed Areas - The physical condition of the shrubs and grassed areas to include existing damage will be noted.
C. On-Site and Immediate Off-Site Drainage - Existing drainage patterns will be noted, especially areas undergoing active erosion/sedimentation.
D. Access Roads and Haul Routes - The access roads and haul routes will be examined for signs of deterioration and wear, such as potholes, muddy stretches, obstructing debris, and clogged drainage ditches.

E. Drain Culverts - Drain culverts will be checked for crushed sections and blocked openings, and their location will be noted.

F. Fencing - Damaged or missing sections of fencing will be noted.

G. Preexisting Refuse/Debris Accumulations - The location of accumulated refuse or other debris within or adjacent to the project site will be noted.

7.3 Environmental Protection - All land areas on-site and outside of specifically assigned UXO work areas, storage areas, and access routes will be preserved in their original condition during the course of UXO operations. UXO work activities will be confined to the areas defined in the Work Plan. Trucks and equipment will be confined to the designated haul and access routes, and the project work area. During site UXO operations, every effort will be made to prevent damage to the roads, culverts, trees shrubs and grassed areas.

7.3.1 Protection of Landscaping - All landscaping outside of the specifically assigned UXO work area shall be preserved in its original condition with the following restrictions observed:

A. No trees, shrubs, turf, or crops will be removed, cut, or disturbed unless specifically designated for clearing on the plans, or special authority is given by the CO or COR.

B. All public and private easements used for site access will be restored to the original condition.

C. No ropes, cables, or guys will be fastened to any nearby trees for anchorage.

D. If it becomes necessary to erect barrier cable for site security, waste segregation, or equipment staging areas, posts will be placed on anchorages.

NOTE: ***It is very common in UXO project areas containing second and subsequent generations of tree growth to find UXO in the tree root systems. In most cases, the damage to the root system during the UXO access process is very extensive and irreparable. Due to the circumstances involved, HFA is not liable for the damage to the root system or replacement of the tree.***

E. Appropriate measures will be taken during excavation of UXO to prevent root damage to trees that are to remain alive.

F. During excavation of suspected UXO sites, the boundaries will be marked to ensure that all UXO operations are restricted to the limits of the project area.

G. Collection of miscellaneous metallic debris and nonhazardous UXO components will be consolidated in predetermined holding areas awaiting disposal.

7.3.2 Protection of Water Resources - As a rule, all UXO services are limited to surface searches and hand excavation of suspected UXO. Little to no waste is generated by these services that could result in contaminated waste from entering surface waters. The individual UXO excavations performed by HFA usually involve a total surface area of only 2 to 4 square feet. Each hole is immediately filled in after excavation and tamped. Due to the minimal intrusive soil activities runon/runoff control measures as outlined in EM 385-1-1 are not required.

7.4 Contamination Control Measures - This plan focuses on the minimization of contaminant generation resulting from UXO operations on RMA. There are 2 primary areas in which contaminant generation could occur, which are, airborne contaminants of potentially toxic vapors and via spills. HFA's UXO services do not include remediation of hazardous toxic waste (HTW). In the event that HTW is encountered, HFA's personnel will withdraw from the site and report the suspected HTW to the R&R Project Manager. UXO which may contain military chemical agents to include Chemical Surety Material (CSM) or other containers intact or leaking which are suspected to contain chemical agents will be reported to the RMA Fire Department (303) 289-0192 and all personnel will be evacuated in an upwind direction from the site. Contamination control of these items is not included in the HFA UXO services and is the responsibility of the U.S. Government. In the event that HFA UXO personnel or equipment becomes contaminated, the procedures outlined in paragraphs 5.11 and 5.11.1 will be followed.

7.4.1 Waste Disposal - HFA will maintain appropriate project on-site house keeping practices during the course of the UXO services project. All waste generated by HFA will be collected and properly disposed of.

7.4.2 Burning - No burning of any sort will occur on-site.

7.4.3 Dust Control - HFA's UXO services will not generate any significant amounts of dust which would require dust control measures.

7.5 Spill Control - As outlined above in paragraph 7.4, HFA's UXO services do not include handling HTW or chemical agent materials. If a spill resulting from a ruptured UXO or some other type of container filled with chemical agent or HTW should occur, HFA and all other personnel on site shall evacuate in an upwind direction. The RMA Fire Department (303) 289-0192 will be notified that a spill has occurred.

7.6 Post UXO Operations Cleanup - HFA will maintain a clean and unobstructed working environment at all times. No tools, equipment, materials (except as noted below), or rubbish will remain on-site following completion of UXO operations. With the exception of the boundary marker flags used to identify the limits of the UXO services performed by HFA, all rubbish and other materials brought on to the project site by HFA will be removed.

7.6.1 Site Walkover - The HFA UXO Project Leader will perform a site walkover inspection to ensure that all of the UXO excavations have been filled and tamped. The Project Leader will also ensure that all of the rubbish and materials brought on site by HFA have been collected and properly disposed of.

NOTE: ***HFA is not responsible for other contractor/subcontractor or Government generated rubbish or materials that may be left on site.***

NOTE: ***HFA is not responsible for filling of craters generated by Military EOD personnel when UXO are detonated in place on the project site.***

NOTE: ***HFA is not responsible for filling other contractor/ subcontractor excavations or auger holes.***

SECTION 5.

QUALITY CONTROL PLAN

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8.0 QUALITY CONTROL PLAN

8.1 Quality Control - To ensure that effective UXO services are being performed, the quality control (QC) procedures outlined below will be in effect on all UXO services projects.

8.2 Equipment - All equipment will be inspected by the Project Leader and/or Safety Officer prior to departing from Indian Head, Maryland to the project site.

8.2.1 Magnetometers and Metal Detectors - Inspect the magnetometer(s) and metal detector(s) to ensure that they are in calibration and operating within specifications. The items will also be inspected to ensure that they are not in need of repair and all required accessories are present.

8.2.2 Emergency Equipment - Inspect the required emergency equipment to include first aid kit, eye wash kit, bleach, fire extinguishers, and any other emergency items to ensure that they are in good repair and complete.

8.2.3 Hand Tools - Inspect the UXO tool kit to include shovels, picks, hand trowels, probes, machetes, etc. to ensure that they are in good repair.

8.2.4 Project Specific Items - Individual projects may require items that are not normally included in the site equipment inventory. These items could include PPE, special tools, power cutters, etc.. All of the site specific items must also be inspected to ensure that they are in good repair.

8.3 On-Site Inspections - All tools and equipment will be inspected by the Project Leader and/or Site Safety Officer on a daily basis.

8.3.1 Operational Checks - The magnetometer(s) and metal detector(s) will be tested before starting UXO operations in the morning and when operations are resumed after lunch. Spot checks will also be performed during daily operations to ensure that the magnetometers and metal detectors are operating properly.

8.4 Excavations - All excavations will be rechecked with a magnetometer and metal detector after the previously located UXO or metallic object has been removed.

8.5 Post Detonation Crater Inspection - After a UXO has been detonated in place, the crater will be rechecked with a magnetometer and metal detector to ensure that no other UXO are present.

8.6 Random Site UXO QC Checks - The Project Leader and/or Site Safety Officer will perform a random QC inspection of each project site to ensure the effectiveness of the UXO search being performed. A minimum of 10 % of each site will be rechecked with a magnetometer and metal detector. The QC check shall be random in nature with all areas of the project site being checked, however, areas that included heavy UXO or metallic contamination should receive emphasis during the QC check. If a UXO is detected during the QC check, the entire project site will be researched to ensure that no other UXO is present. If more than 2 significant nonUXO metallic objects are located during the QC check, the QC inspection area will be increased to 20 %. If additional significant nonUXO metallic objects are located in the added QC inspection area, the entire project site will be researched to ensure that no UXO are present.