FINAL

SITE SAFETY AND HEALTH PLAN ADDENDUM NO. 1

FOR THE

PHASE I REMEDIAL INVESTIGATION OF DEMOLITION AREA 1 AT THE RAVENNA ARMY AMMUNITION PLANT RAVENNA, OHIO

PREPARED FOR

US Army Corps of Engineers®

LOUISVILLE DISTRICT

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PHASE I REMEDIAL INVESTIGATION
OF DEMOLITION AREA 1
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RAVENNA, OHIO

Stephen B. Selecman, SAIC Project Manager	Date
Stephen L. Davis, CIH, CSP, SAIC Health and Safety Manager	Date

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Prepared by

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
800 Oak Ridge Turnpike
Oak Ridge, Tennessee 37830

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

contributed to the preparation of this documentand should not
be considered an eligible contractor for its review.

CONTENTS

TABLES iv
ACRONYMS iv
INTRODUCTION v

1.0 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION 1-1
1.1 SITE DESCRIPTION 1-1
1.2 CONTAMINANTS 1-1

2.0 HAZARD/RISK ANALYSIS 2-1
2.1 TASK-SPECIFIC HAZARD ANALYSIS 2-1
2.2 POTENTIAL EXPOSURES 2-11

3.0 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES 3-1

4.0 TRAINING 4-1

5.0 PERSONAL PROTECTIVE EQUIPMENT 5-1

6.0 MEDICAL SURVEILLANCE 6-1

7.0 EXPOSURE MONITORING/AIR SAMPLING PROGRAM 7-1

8.0 HEAT/COLD STRESS MONITORING 8-1

9.0 STANDARD OPERATING SAFETY PROCEDURES 9-1

10.0 SITE CONTROL MEASURES 10-1

11.0 PERSONNEL HYGIENE AND DECONTAMINATION 11-1

12.0 EQUIPMENT DECONTAMINATION 12-1

13.0 EMERGENCY PROCEDURES AND EQUIPMENT 13-1

14.0 LOGS, REPORTS, AND RECORD KEEPING 14-1

15.0 REFERENCES 15-1

TABLES

1-1 Summary of Historical Analytical Data 1-2
2-1 Hazards Inventory 2-1
2-2 Hazards Analysis 2-2
2-3 Potential Exposures 2-12
3-1 Staff Organization 3-1
7-1 Monitoring Requirements and Action Limits 7-2

ACRONYMS

AOC	area of concern
FSHP	Facility-wide Safety and Health Plan
NACA	National Advisory Committee on Aeronautics
PAH	polynuclear aromatic hydrocarbon
OE	ordnance and explosives
PPE	personal protective equipment
SAIC	Science Applications International Corporation
SSHO	Site Safety and Health Officer

INTRODUCTION

Science Applications International Corporation's (SAIC's) formal policy, stated in the Environmental Compliance and Health and Safety Program manual, is to take every reasonable precaution to protect the health and safety of its employees, the public, and the environment. To this end the Ravenna Army Ammunition Plant Facility-wide Safety and Health Plan (FSHP) and this Site Safety and Health Plan (SSHP) Addendum collectively set forth the specific procedures required to protect SAIC and SAIC subcontractor personnel involved in the field activities. All field personnel are required to comply with the requirements of these plans. In addition, subcontractors are responsible for providing their employees with a safe work place, and nothing in these plans relieves such subcontractors of this responsibility. If the requirements of these plans are not sufficient to protect the employees of a subcontractor, that subcontractor is required to supplement this information with work practices and procedures that will ensure the safety of its personnel.

The FSHP addresses program issues and hazards and hazard controls common to the entire installation. This SSHP Addendum to the FSHP serves as the lower-tier document addressing the hazards and controls specific to this work. Copies of the FSHP and this SSHP Addendum will be present at the work site.

Demolition Area 1 was used from 1941 to 1949 for thermal destruction of munitions. Subsequent use of the site occurred between 1947 and 1953 for storage of aircraft in association with the adjacent National Advisory Committee on Aeronautics (NACA) Test Area. The area contains a circular 0.3- to 0.4-meter (1.0- to 1.5-foot)-high berm surrounding a grassed area of about 0.4 to 0.64 hectare (1 to 1.5 acres) in size. Munitions fragments are visible at the ground surface outside the bermed area (USACHPPM 1996, USAEHA 1994). Potential contaminants include ordnance and explosives (OE), explosives residues, propellants, organic compounds, and metals.

The following tasks are to be performed as part of this project:

- soil sampling with scoops, hand augers, and hand-operated power augers;
- soil boring, soil sampling, and groundwater sampling using a Geoprobe rig;
- vegetation clearing with machetes and chainsaws;
- surface water and sediment sampling from shallow ditches;
- disposal of investigation-derived waste; and
- sampling equipment decontamination.

Potential hazards posed by the tasks planned at these locations include OE, vegetation-clearing equipment, moving equipment/vehicles, operating soil sampling equipment (power auger and/or Geoprobe rig), fuel or decontamination solvent fires, chemical exposure, temperature extremes, noise, stinging/biting insects, and poisonous plants.

The potential for chemical overexposure appears to be low given the nature of the planned tasks. Preliminary testing did not detect contaminants at concentrations that appear likely to pose an airborne vapor hazard during the planned tasks. Planned tasks pose minimal potential for creating airborne particulates. There is some potential for adverse effects due to dermal contact with contaminated soil. The crew will use protective gloves to handle potentially contaminated materials and, if necessary, the Site Safety and Health Officer (SSHO) will

upgrade the required personal protective equipment (PPE) to prevent dermal contact with potentially contaminated materials. Physical hazards are associated with power auger and chainsaw use and the potential to encounter OE. Task-specific hazard controls, including area clearance by OE experts, have been specified for these tasks. The SSHO will observe all site tasks during daily safety inspections and will use professional judgment, potentially coupled with instrument readings, to determine if upgrading of the PPE is required. A detailed analysis of these hazards and specific appropriate controls is presented in Chapter 2.0, Table 2-2 of this SSHP.

This investigation will be performed in Level D PPE, plus chemical-resistant gloves when handling potentially contaminated materials, unless one of several action levels is exceeded or the potential for increased risk becomes apparent during the investigation. Protective procedures, including protective clothing, will be upgraded by the SSHO as necessary based on established action levels or judgment.

1.0 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

1.1 SITE DESCRIPTION

The Ravenna Army Ammunition Plant is located in northeastern Ohio within Portage and Trumbull Counties, approximately 4.8 kilometers (3 miles) northeast of the town of Ravenna. The installation consists of 8,668 hectares (21,419 acres) in a 17.7-kilometer (11-mile)-long, 5.6-kilometer (3.5-mile)-wide tract bordered by a sparsely inhabited, private residential area. The site is an inactive government-owned armament, munitions, and chemical command facility maintained by a contracted caretaker, R&R International, Inc.

The installation was active from 1941 to 1992. Activities included loading, assembling, storing, and packing military ammunition; demilitarization of munitions; production of ammonium nitrate fertilizer; and disposal of "off-spec" munitions. Munitions handled on the installation included artillery rounds of 90 millimeters or more and 2,000-pound bombs.

Demolition Area 1, designated as Area of Concern (AOC) RVAAP-3, was in operation from 1941 to 1949. The site, located within Ohio Army National Guard Training Area "G," is approximately 0.64 hectare (1.5 acres) and was used for the purpose of thermal destruction of munitions by burning and detonation (USACHPPM 1996). Presently, the area consists of a circular 0.3- to 0.4-meter (1- to 1.5-foot)-high berm surrounding a grassed area approximately 0.4 to 0.64 hectare (1 to 1.5 acres) in size. Around the perimeter of the berm are areas of bare ground approximately 100 to 150 feet square (USAEHA 1994). Munitions fragments including scrap metal, small arms primers, and fuses lie on the ground surface outside the bermed area. The waste types include shrapnel and other metallic munitions fragments, residual explosive compounds, propellants, and metals. The areas of bare ground surrounding the bermed area suggest possible soil contamination. In addition, the AOC was used as a staging area for airplanes during operation of the adjacent National Advisory Committee on Aeronautics Test Area. Potential leaks and spills of petroleum fuels and other fluids (i.e., coolants and hydraulic oils) may also have occurred.

Since 1969, the Ohio Army National Guard has been the licensed user of Training Area "G." Activities include dismounted troop training, bivouacking of the troops in training, and vehicular parking. The training area has also been used as a helicopter day and night landing zone. Firing of small (7.62-millimeter and smaller) blank ammunition is permitted within the training area between 1,000 and 2,200 hours daily. For additional AOC information, see the Phase I Remedial Investigation Sampling and Analysis Plan (SAP) Addendum.

1.2 CONTAMINANTS

Table 1-1 lists contaminants known to occur in soil, sediment, and water at the site. Inclusion in this table indicates the potential presence of a contaminant but does not necessarily indicate that the contaminant is present in sufficient quantity to pose a health risk to workers. Because site activities may have resulted in releases of fuels, oils, or coolants, it is possible that other contaminants, such as benzene or polynuclear aromatic hydrocarbons (PAHs), may be present.

Table 1-1. Summary of Historical Analytical Data

Parameter	HC-2 Surveillance (water, µg/L)[a]	RRSE (soil, mg/kg)[b]
Arsenic	NA	9
Barium	NA	162
Cadmium	ND	41.1
Chromium	ND	33.8
Copper	11	13.3
Mercury	NA	0.26
Zinc	31	61.5
RDX	4.8	ND
2,4,6-Trinitrotoluene	ND	23,000

[a]*Source*: USATHAMA 1980–1992; HC = Hinkley Creek at the Ravenna Army Ammunition Plant boundary.
[b]*Source*: USACHPPM 1996.
NA = Not analyzed.
ND = Not detected.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
RRSE = Relative Risk Site Evaluation.

2.0 HAZARD/RISK ANALYSIS

The purpose of the task hazard/risk analysis is to identify and assess potential hazards that may be encountered by personnel and to prescribe required controls. Table 2-1, a general checklist of hazards that may be posed by this project, indicates whether a particular major type of hazard is present. If additional tasks or significant hazards are identified during the work, this document will be modified by addendum or field change order to include the additional information.

Table 2-1. Hazards Inventory

Yes	No	Hazard
	X	Confined space entry
	X	Excavation entry (deeper than 1.2 meters)
X		Heavy equipment (power augers, Geoprobe rig)
X		Fire and explosion (fuels)
X		Electrical shock (utilities)
X		Exposure to chemicals
X		Temperature extremes
X		Biological hazards
	X	Radiation or radioactive contamination
X		Noise (power auger, Geoprobe rig)
	X	Drowning
X		OE (former ordnance thermal treatment site)

OE = Ordnance and explosives.

Specific tasks are as follows:

- ordnance and explosives (OE) surveys and sample location clearance,
- vegetation clearing with machete and chainsaw to access sampling points in overgrown areas,
- soil boring, soil sampling, and groundwater sampling using a Geoprobe rig,
- surface soil sampling with hand augers or scoops,
- subsurface soil boring and sampling with power augers,
- surface water and sediment sampling in shallow (less than 2 feet deep) ditches,
- equipment decontamination, and
- characterization and handling of investigation-derived wastes.

2.1 TASK-SPECIFIC HAZARD ANALYSIS

In general, the primary hazards are those associated with the sampling tasks and equipment. These include contact with rotating equipment and noise associated with the power auger and chainsaws. There is also a potential to encounter ordnance. For this reason, access and sampling locations will be cleared by OE experts prior to sampling activities. Table 2-2 presents task-specific hazards; task-specific hazard analyses (Risk Assessment Code); relevant hazard controls; and required monitoring, if appropriate, for all of the planned

Table 2-2. Hazards Analysis

Safety and Health Hazards	Risk Assess. Codes	Controls	Monitoring
Vegetation Clearing with Machetes and Chainsaws			
General safety hazards (rotating machinery, moving equipment, slips, and falls)	B, II	Level D PPE (see Section 5.0) plus hard hat, heavy-duty work gloves, and chainsaw chaps. Uninvolved personnel will be kept at a distance of at least 50 feet. An audible warning will be used to alert personnel when a tree is falling. No elevated (climbing trees, standing on ladders, etc.) chainsaw use. Only personnel experienced with chainsaw use will operate saws. Team members will be at least 10 feet apart, but within visual contact, during cutting. Chainsaw equipped with anti-kickback protection. Chainsaw adjusted so that chain does not move at idle speed. Chainsaw will not be used to cut above shoulder height. Machetes equipped with lanyard, and lanyard looped around wrist during use to prevent accidental release of machete.	Daily safety inspections.
Contact with OE	C, II	Pre-entry screening survey and continuous escort by OE specialist. On-site training in ordnance recognition for all field personnel. If ordnance or suspected ordnance is encountered: • withdraw all SAIC and subcontractor personnel from the immediate area • mark area of suspected ordnance with warning tape to exclude personnel • notify USACE project manager and facility EOD personnel • do not investigate, handle, or otherwise disturb suspected ordnance.	Visual and instrument surveys for ordnance conducted by OE expert personnel. Daily safety inspections conducted by the SSHO will include vigilance for suspicious materials.
Exposure to chemicals (see Table 2-3)	D, IV	Minimal contact with potentially contaminated material is expected during this task. As a precaution, hands will be washed prior to taking anything by mouth. Medical clearance will be required.	Daily safety inspections.
Gunfire (deer hunting with shotguns loaded with slugs is allowed in some areas on Saturdays during season, October and November)	D, I	Work will not be conducted in areas open to hunting during hunting days.	None.

Table 2-2 (continued)

Safety and Health Hazards	Risk Assess. Codes	Controls	Monitoring
Noise	B, II	Hearing protection while operating or within 25 feet of operating chainsaw.	Daily safety inspections.
Fire (fuels)	D, III	Chainsaw turned off and allowed to cool for 5 minutes prior to fueling. Fuel in safety cans with flame arrestors. No ignition sources in fuel storage or refueling areas. Fire extinguisher (see Chapter 9.0).	Daily safety inspections.
Biological hazards (bees, ticks, wasps, snakes, and poison ivy)	C, III	PPE (boots, work clothes). Pants tucked into boots or wrapped with duct tape when in areas with heavy vegetation. Insect repellant, as necessary. Self-inspection for ticks at end of work day.	Visual survey.
Electric shock	D, II	None expected. SSHO will verify.	Visual survey of all work areas.
Temperature extremes	C, II	Administrative controls (see Chapter 8.0).	Ambient temperature; heart rates as appropriate.
Soil Boring and Soil Sampling Using a Hand-operated Power Auger			
General safety hazards (rotating machinery, moving equipment, slips, and falls)	C, II	Level D PPE (see Section 5.0). Hard hat if overhead hazards are present. Operate auger per manufacturer's directions. Positive action control (Deadman switch) or easily accessible kill switch on power auger. HAZWOPER training and site-specific training, including training on auger use or verification of prior experience with the auger. Buddy system.	Daily safety inspections.
Contact with OE	C, II	Pre-entry screening survey and continuous escort by OE specialist support. Continuous down-hole monitoring at 2-foot intervals. On-site training in ordnance recognition for all field personnel. If ordnance or suspected ordnance is encountered: • withdraw all SAIC and subcontractor personnel from the immediate area • mark area of suspected ordnance with warning tape to exclude personnel • notify USACE project manager and facility EOD personnel • do not investigate, handle, or otherwise disturb suspected ordnance.	Visual and instrument surveys conducted by OE expert personnel. Daily safety inspections by SSHO will include vigilance for suspicious materials.

Table 2-2 (continued)

Safety and Health Hazards	Risk Assess. Codes	Controls	Monitoring
Exposure to chemicals (see Table 2-3)	D, IV	Natural rubber or similar gloves for contact with potentially contaminated material. Gloves will be disposed of after single use. 15-Minute eyewash within 100 feet if corrosive sample preservatives are being poured. Wash face and hands and any other exposed areas prior to taking anything by mouth. Minimal contact. Medical clearance will be required.	PID monitoring. Visual surveillance for dust generation. Visual surveillance for significant contamination.
Gunfire (deer hunting with shotguns loaded with slugs is allowed in some areas on Saturdays during season, October and November)	D, I	No fieldwork in areas open to hunting during hunting days.	None.
Noise	B, II	Hearing protection within 7.6 meters (25 feet) of equipment when operating.	Daily safety inspections.
Fire (fuels)	D, III	Fuel in safety cans with flame arrestors. No ignition sources in fuel storage or refueling areas. Auger allowed to cool for 5 minutes prior to refueling. Fire extinguisher (see Chapter 9.0).	Daily safety inspections.
Biological hazards (poison ivy, bees, ticks, and wasps)	C, III	PPE (boots, work clothes). Pants tucked into boots or wrapped with duct tape in heavily vegetated areas. Insect repellant, as necessary. Self-inspection for ticks at end of work day.	Visual survey.
Electric shock	D, II	Identification and clearance of underground utilities.	Visual survey of all work areas.
Temperature extremes	C, II	Administrative controls (see Chapter 8.0).	Ambient temperature; heart rates as appropriate.
Soil Sampling with Hand Augers or Scoops			
General safety hazards (manual lifting, slips, and falls)	D, IV	Level D PPE (see Chapter 5.0). HAZWOPER training. Buddy system.	Daily site safety inspections.

Table 2-2 (continued)

Safety and Health Hazards	Risk Assess. Codes	Controls	Monitoring
Contact with OE	C, II	Pre-entry screening survey, sample location clearing, and continuous escort by OE specialist support. On-site training in ordnance recognition for all field personnel. If ordnance or suspected ordnance is encountered: • withdraw all SAIC and subcontractor personnel from the immediate area • mark area of suspected ordnance with warning tape to exclude personnel • notify USACE project manager and facility EOD personnel • do not investigate, handle, or otherwise disturb suspected ordnance.	Visual and instrument surveys for ordnance conducted by OE experts. Daily safety inspections by the SSHO will include vigilance for suspicious materials.
Exposure to chemicals (see Table 2-3)	D, III	Natural rubber or similar gloves for contact with potentially contaminated material. Gloves will be disposed of after single use. Wash face and hands and any other exposed areas prior to taking anything by mouth. Minimal contact. 15-Minute eyewash within 100 feet if corrosive sample preservatives are being poured. Medical clearance will be required.	Photoionization detector; visual surveillance for significant contamination.
Gunfire (deer hunting with shotguns loaded with slugs allowed in some areas on Saturdays during season, October and November)	D, I	No fieldwork in areas open to hunting during hunting days.	None.
Biological hazards (poison ivy, bees, ticks, and wasps)	C, III	PPE (boots, work clothes). Pants tucked into boots or wrapped with duct tape in heavily vegetated areas. Insect repellant, as necessary. Self-inspection for ticks at end of work day.	Visual survey.
Temperature extremes	C, II	Administrative controls (see Chapter 8.0).	Ambient temperature; heart rates as appropriate.

Table 2-2 (continued)

Safety and Health Hazards	Risk Assess. Codes	Controls	Monitoring
Soil Boring and Sampling Using Geoprobe Rig			
General safety hazards (moving machinery, lifting, slips, falls)	D, III	Level D PPE (see Section 5.0) plus hard hat (if equipment extends past head height) Buddy system Only necessary and experienced personnel near operating rig Rig operated by "dead man" (positive action) control or equipped with kill switches Functional back-up alarm if the rig is large enough to pose hazard of backing over personnel HAZWOPER 40-hour training, standard procedures	Daily site safety inspections
Noise	D, III	Hearing protection within 25 feet of rig during hammer operation, unless site-specific monitoring indicates noise <85dBA	Daily site safety inspections
Fire (fuels)	D, III	Fuel stored in safety cans with flame arresters Fire extinguisher readily available (25 to 75 feet) Flammables cabinet for indoor storage of ≥25 gallons No ignition sources in fuel storage areas Fuel storage areas marked with "No Smoking or Open Flame" signs Bonding (metal to metal contact) during pouring Gasoline-powered equipment shut down during fueling	Daily site safety inspections
Exposure to chemicals (see Table 2-3)	D, IV	PPE (Level D) Natural rubber or similar gloves for contact with potentially contaminated material Gloves will be disposed of after single use Medical clearance for HAZWOPER work Minimal contact; wash face and hands prior to taking anything by mouth 15-minute eyewash within 100 feet if corrosive sample preservatives are being poured; eyewash bottle within 100 feet if samples are being added to pre-preserved containers.	PID or equivalent and other sampling as appropriate

Table 2-2 (continued)

Safety and Health Hazards	Risk Assess. Codes	Controls	Monitoring
Contact with OE	C, II	Pre-entry screening survey and continuous escort by OE specialist. Continuous down-hole monitoring at 2-foot intervals (to a depth of 16 feet). On-site training in ordnance recognition for all field personnel. If ordnance or suspected ordnance is encountered: • withdraw all SAIC and subcontractor personnel from the immediate area • mark area of suspected ordnance with warning tape to exclude personnel • notify USACE project manager and facility EOD personnel • do not investigate, handle, or otherwise disturb suspected ordnance.	Visual and instrument surveys in the plane fueling/catapult line areas for ordnance conducted by OE expert personnel. In other areas daily safety inspections will include vigilance for suspicious materials
Gunfire (deer hunting with shotguns loaded with slugs is allowed in some areas on Saturdays during season, October and November)	D, I	No fieldwork in areas open to hunting during hunting days	None
Temperature extremes	C, II	Administrative controls (see Section 8.0)	Temperature measurements as appropriate/ heart rate monitoring as appropriate
Biological hazards (bees, ticks, wasps, poison ivy)	C, III	PPE (boots, work clothes; tape pant legs as needed) Insect repellent, as necessary Self-inspection for ticks at end of workday	Visual survey
Electric shock	D,II	Identification and clearance of overhead and underground utilities (see Section 8.0)	Visual of all work areas Digging clearance from local utilities
Sediment and Surface Water Sampling in Shallow Ditches			
General safety hazards (moving equipment, slips, and falls)	D, IV	Level D PPE (see Chapter 5.0). HAZWOPER training. Buddy system.	Daily safety inspections.
Drowning	C, II	Personal flotation devices must be worn if within 1.5 meters (5 feet) of water deeper than 1.2 meters (4 feet).	Daily safety inspections.

Table 2-2 (continued)

Safety and Health Hazards	Risk Assess. Codes	Controls	Monitoring
Exposure to chemicals (see Table 2-3)	D, III	Natural rubber or similar gloves for contact with potentially contaminated material. Wash face and hands and any other exposed areas prior to taking anything by mouth. Gloves will be disposed of after a single use. Minimal contact. 15-Minute eye wash within 100 feet if corrosive sample preservatives are being poured. Medical clearance will be required.	Daily safety inspections.
Gunfire (deer hunting with shotguns loaded with slugs is allowed in some areas on Saturdays during season, October and November)	D, I	No field work in areas open to hunting during hunting days.	None.
Contact with OE	D, II	Initial screening survey, sample location clearing, and continuous escort by OE expert personnel. On-site training in ordnance recognition for all field personnel. Visual surveillance for OE. If ordnance or suspected ordnance is encountered: • withdraw all SAIC and subcontractor personnel from the immediate area • mark area of suspected ordnance with warning tape to exclude personnel • notify USACE project manager and facility EOD personnel • do not investigate, handle, or otherwise disturb suspected ordnance.	Visual and instrument surveys for ordnance conducted by OE expert personnel. The daily safety inspection conducted by the SSHO will include vigilance for suspicious materials.
Biological hazards (poison ivy, bees, ticks, and wasps)	C, III	PPE (boots, work clothes). Pants tucked into boots or wrapped with duct tape when in heavily vegetated areas. Insect repellant, as necessary. Self-inspection for ticks at end of work day.	Visual survey.
Temperature extremes	C, III	Administrative controls (see Chapter 8.0).	Ambient temperature; heart rates as appropriate.

Table 2-2 (continued)

Safety and Health Hazards	Risk Assess. Codes	Controls	Monitoring
Disposal of Investigation-derived Wastes (Soil Cuttings and Decontamination Rinsates)			
General safety hazards (power machinery, moving equipment, slips, and falls)	D, III	Level D PPE (see Chapter 5.0) plus heavy-duty work gloves. Hard hat if overhead hazards are present. Personnel not involved with equipment (trailer-mounted liquid tank, manual drum truck, drum grappler, Tommy lift, etc.) will stand clear during operation. HAZWOPER training. Buddy system. No personnel under lifted loads. Only adequately trained, experienced personnel will be allowed to operate equipment. Equipment used to lift or move drums will be used within its rated weight capacity.	Daily safety inspections.
Contact with OE	D, II	On-site training in ordnance recognition for all field personnel. Visual surveillance for OE. Withdrawal of all SAIC and subcontractor personnel, and field marking of the area if ordnance or suspected ordnance is discovered. Notification of USACE Project Manager and facility EOD personnel if ordnance is discovered.	Visual surveys for ordnance.
Exposure to chemicals (see Table 2-3)	D, III	Natural rubber or similar gloves for contact with potentially contaminated material. Wash face and hands and any other exposed areas prior to taking anything by mouth. Minimal contact. Medical clearance will be required.	Daily safety inspections.
Gunfire (deer hunting with shotguns loaded with slugs allowed in some areas on Saturdays during season, October and November)	D, I	No fieldwork in areas open to hunting during hunting days.	None.
Fire (fuels)	D, III	Fuel in safety cans. Exclude ignition sources from fuel storage and refueling areas. Fire extinguisher (see Chapter 9.0).	Daily safety inspections.
Biological hazards (poison ivy, bees, ticks, and wasps)	C, III	PPE (boots, work clothes). Pants tucked into boots or wrapped with duct tape when in areas with heavy vegetation. Insect repellant, as necessary. Self-inspection for ticks at end of work day.	Visual survey.
Temperature extremes	C, II	Administrative controls (see Chapter 8.0).	Ambient temperature, heart rates as appropriate.
Equipment Decontamination (Hot Water Washing, Soap and Water Washing, and Solvent Rinse)			
General equipment decontamination hazards (hot water, slips, falls, and equipment handling)	C, III	Level D+ PPE (see Chapter 5.0) plus: Nitrile or PVC gloves, face shield, and Saranax or rain suit (when operating steam washer). HAZWOPER training.	Daily safety inspections.

Table 2-2 (continued)

Safety and Health Hazards	Risk Assess. Codes	Controls	Monitoring
Noise (spray washer)	B, II	Hearing protection when within 7.6 m (25 feet) of operating washer.	Daily safety inspections.
Fire (flammable decontamination solvents and gasoline)	D, III	Exclusion of ignition sources during solvent use. Control of flammable materials (quantities in decontamination area limited to single-day use and proper storage). Fire extinguisher (see Chapter 9.0).	Daily safety inspections.
Exposure to chemicals (see Table 2-3)	D, III	Natural rubber or similar gloves for handling potentially contaminated materials. Adequate ventilation during solvent use. Wash face and hands and any other exposed areas prior to taking anything by mouth. Minimal contact. Medical clearance will be required.	None.
Temperature extremes	C, II	Administrative controls (see Chapter 8.0).	Temperature measurements as appropriate; heart rate monitoring as appropriate.

EOD = Explosive ordnance disposal.
HAZWOPER = Hazardous Waste Operations and Emergency Response.
OE = Ordnance and explosives.
PID = Photoionization detector.
PPE = Personal protective equipment.
PVC = Polyvinyl chloride.
SAIC = Science Applications International Corporation.
SSHO = Site Safety and Health Officer.
USACE = U.S. Army Corps of Engineers.

tasks. The Risk Assessment Codes in Table 2-2 are derived through a qualitative risk assessment process using probability codes and severity codes. The severity codes are:

- I = injuries/illnesses involving permanent total disability or death;
- II = injuries/illnesses with permanent partial disability or temporary total disability;
- III = injuries/illnesses resulting in temporary, reversible conditions with a period of disability of less than 3 months; and
- IV = injuries/illnesses with reversible adverse effects requiring only minor treatment.

The probability codes are:

- A = likely to occur immediately,
- B = probably will occur in time,
- C = possible to occur in time, and
- D = unlikely to occur.

2.2 POTENTIAL EXPOSURES

Prior sampling results indicate that the identified contaminant with the greatest potential for exposure to site workers is 2,4,6-Trinitrotoluene. Related compounds, such as dinitrotoluene isomers, may also be present. These materials have relatively low vapor pressures, and it is unlikely that airborne vapor concentration will approach the relevant exposure limits during the performance of these tasks. Inhalation of contaminated dust and dermal contact with contaminated soil pose a greater, but still minimal, potential for exposure. As a precaution, steps will be taken to minimize the potential for exposure. Information on the potential contaminants and chemicals that will be used for the project is contained in Table 2-3. Exposure to chemical tools such as corrosive sample preservatives or flammable fuels is a possibility and will be controlled through standard safe handling practices.

Table 2-3. Potential Exposures

Chemical[a]	TLV/PEL/STEL/IDLH[b]	Health Effects/ Potential Hazards[c]	Chemical and Physical Properties[c]	Exposure Route(s)[c]	Location
Arsenic	TLV/TWA: 0.01 mg/m^3, A1 IDLH: Ca	Ulceration of nasal tissue, digestive system irritation, and cancer	Solid; VP: 0 mm; FP: NA	Inhalation Absorption Ingestion Contact	All
Benzene (component of aviation fuels)	TLV/TWA: 0.5 ppm IDLH: Ca	Dizziness, eye irritation, dermatitis, and cancer	Liquid with aromatic odor; FP: 12ºF; VP: 75 millimeters	Inhalation Ingestion Absorption Contact	All
Chromium	TLV/TWA: 0.5 mg/m^3, A4 IDLH: 25 mg/m^3	Eye irritation and sensitization	Solid; properties vary depending upon specific compound	Inhalation Ingestion Contact	All
DNT (dinitrotoluene)	TLV/TWA: 0.2 mg/m^3, A2 IDLH: Ca [50 mg/m^3]	Suspected human carcinogen, anorexia, cyanosis, and reproductive effects	Orange-yellow solid, VP: 1 millimeter; FP: 404EF	Inhalation Absorption Ingestion Contact	Near bermed area
Gasoline (used for fuel)	TLV/TWA: 300 ppm IDLH: Ca	Potential carcinogen per NIOSH, dizziness, eye irritation, and dermatitis	Liquid with aromatic odor; FP: -45EF; VP: 38–300 millimeters	Inhalation Ingestion Absorption Contact	All
Hydrochloric acid (potentially used to preserve water samples or for equipment decontamination)	TLV: 5 ppm ceiling IDLH: 50 ppm	Irritation of eyes, skin, and respiratory system	Liquid; VP: fuming; IP: 12.74 eV; FP: none	Inhalation Ingestion Contact	Equipment decontamination area, sample preservation area
Isopropyl alcohol (potentially used for equipment decontamination)	TLV/TWA: 400 ppm STEL: 500 ppm IDLH: 2,000 ppm	Irritation of eyes, skin, and respiratory system; drowsiness; headache	Colorless liquid with alcohol odor; VP: 33 millimeters; IP: 10.10 eV; FP: 53EF	Inhalation Ingestion Contact	Equipment decontamination area

Table 2-3 (continued)

Chemical[a]	TLV/PEL/STEL/IDLH[b]	Health Effects/ Potential Hazards[c]	Chemical and Physical Properties[c]	Exposure Route(s)[c]	Location
Liquinox (used for decontamination)	TLV/TWA: None	Inhalation may cause local irritation to mucus membranes	Yellow, odorless liquid (biodegradable cleaner); FP: NA	Inhalation Ingestion	Equipment decontamination area
Methanol (potentially used for equipment decontamination)	TLV/TWA: 200 ppm Skin notation IDLH: 6,000 ppm	Irritation of eyes, skin, respiratory system; headache; optic nerve damage	Liquid; VP: 96 millimeters; IP: 10.84 eV; FP: 52EF	Inhalation Absorption Ingestion Contact	Equipment decontamination area
Methylene chloride	TLV/TWA: 50 ppm	Irritation of eyes and skin, weakness, numbness, and cancer	Colorless liquid with chloroform odor; VP: 350 millimeters; FP: NA	Inhalation Absorption Ingestion Contact	All
Trinitrotoluene	TLV/TWA: 0.5 mg/m^3 Skin notation IDLH: 500 mg/m^3	Cluster headache; irritation of skin and mucus membranes, liver damage, and kidney damage	Pale solid; FP: explodes; VP: 0.0002 millimeter	Inhalation Absorption Ingestion Contact	Near bermed area

[a]The potential chemicals were obtained from the *Ravenna Army Ammunition Plant Phase I Remedial Investigation Report* (SAIC 1997).
[b]From 1999 American Conference of Governmental Industrial Hygienists, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, and *NIOSH Pocket Guide to Chemical Hazards*, 1997.
[c]From 1997 *NIOSH Pocket Guide to Chemical Hazards, the Condensed Chemical Dictionary*, tenth edition.

A2 = suspected human carcinogen.
A3 = confirmed animal carcinogen with unknown relevance to humans.
A4 = not classifiable as a human carcinogen.
FP = flash point.
IDLH = immediately dangerous to life and health.
IP = ionization potential.
NA = not available.
NIOSH = National Institute for Occupational Safety and Health.
PEL = permissible exposure limit.
STEL = short-term exposure limit.
TLV = threshold limit value.
TWA = time-weighted average.
VP = vapor pressure.

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3.0 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

This section presents the personnel (and their associated telephone numbers) responsible for site safety and health and emergency response. Table 3-1 identifies the SAIC and subcontractor individuals who will fill key roles. See the FSHP (USACE 1996) for information on the roles and responsibilities of key positions.

Table 3-1. Staff Organization

Position	Name	Phone
Program Manager (DACA62-94-D-0029)	Ike Diggs	423-481-8710
Health and Safety Manager	Steve Davis CIH, CSP	423-481-4755
Project Manager	Stephen Selecman	423-481-8761
Technical Manager	Kevin Jago	423-481-4614
Field Operations Manager	Kathryn Dominic	937-431-2220
Site Safety and Health Officer	Martha Clough	937-431-2220

CIH = Certified Industrial Hygienist.
CSP = Certified Safety Professional.

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4.0 TRAINING

Training requirements are outlined in the FSHP. In addition to the FSHP's requirements, at least two first aid/CPR-trained personnel must be on site during field activities.

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5.0 PERSONAL PROTECTIVE EQUIPMENT

General guidelines for selection and use of PPE are presented in the FSHP. Specific PPE requirements for this work are presented in the hazard/risk analysis section (Chapter 2.0).

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6.0 MEDICAL SURVEILLANCE

Medical surveillance requirements are presented in the FSHP.

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7.0 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

Assessment of airborne chemical concentrations will be performed, as appropriate, to ensure that exposures do not exceed acceptable levels. Action levels, with appropriate actions, have been established for this monitoring. In addition to the specified monitoring, the Site Safety and Health Officer (SSHO) may perform, or require, additional monitoring such as organic vapor monitoring in the equipment decontamination area or personnel exposure sampling for specific chemicals. The deployment of monitoring equipment will depend on the activities being conducted and the potential exposures. All personal exposure monitoring records will be maintained in accordance with 29 *Code of Federal Regulations* 1910.20. The minimum monitoring requirements and action levels are presented in Table 7-1.

Most of the Phase I fieldwork is not expected to pose airborne exposure hazards for the reasons below:

- work will be performed in open areas with natural ventilation;
- the site has not been used for more than 40 years, and any volatile contaminants should have dissipated;
- prior site sampling indicated that contaminants are unlikely to pose an airborne hazard; and
- the most probable contaminants (metals, explosives, propellants, and PAHs) are materials with relatively low vapor pressures.

Accordingly, air monitoring using a photoionization detector or equivalent is planned only for subsurface soil boring and sampling. The SSHO will, of course, examine site conditions and will contact the Health and Safety Manager and initiate additional monitoring if there is any indication of potential airborne exposure.

Table 7-1. Monitoring Requirements and Action Limits

Hazard or Measured Parameter	Area	Interval	Limit	Action	Tasks
Airborne organics with PID or equivalent	Breathing zone [0.9 meter (3 feet) from source or 0.36 meter (14 inches)] in front of employee's shoulder	At least every 15 minutes during soil and sediment sampling tasks.	< 1 ppm 1 to 5 ppm >5 ppm	Level D Level D (assess benzene) Withdraw and evaluate: • evaluate need for PPE upgrade • identify contaminants • notify Project Manager and Health and Safety Manager	Soil and sediment sampling and as required by SSHO based on site conditions
Detector tubes (benzene)	Breathing zone	Only if PID monitoring indicates organic vapor 1 to 5 ppm	1 ppm (detection limit)	Withdraw and evaluate; controls may include engineering, administrative, or personal protective measures	None, unless indicated by site conditions
Flammability and oxygen content with combustible gas indicator	Near borehole and any area where flammable gases are suspected	Only if PID monitoring exceeds 100 ppm at the vapor source or other indicators of flammability observed	<10 percent LEL >10 percent LEL	Continue and evaluate source Withdraw and allow area to ventilate; notify Project Manager and Health and Safety Manager	None, unless indicated by site conditions
Noise	All	During operation of power augers and any area where there is some doubt about noise levels	85 dBA and any area perceived as noisy	Require the use of hearing protection	Hearing protection will be worn when within 25 feet of operating power augers and other noisy equipment
Visible contamination	All	Continuously	Visible contamination of skin or personal clothing	Upgrade PPE to preclude contact; may include disposable coveralls, boot covers, etc.	All

Table 7-1 (continued)

Hazard or Measured Parameter	Area	Interval	Limit	Action	Tasks
Visible airborne dust in potentially contaminated areas	All	Continuously	Visible dust generation	Stop work; use dust suppression techniques such as wetting surface	All

LEL = Lower explosive limit.
PEL = Permissible exposure limit.
PID = Photoionization detector.
PPE = Personal protective equipment.
SSHO = Site Safety and Health Officer.

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8.0 HEAT/COLD STRESS MONITORING

General requirements for heat/cold stress monitoring are contained in the FSHP.

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9.0 STANDARD OPERATING SAFETY PROCEDURES

Standard operating safety procedures are described in the FSHP.

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10.0 SITE CONTROL MEASURES

Site control measures are described in the FSHP. In general, this sampling will not require formal site control. Exclusion zones will be established (using barricade tape) around sampling points and other work areas as described in the FSHP if the SSHO determines that there is a potential for unauthorized personnel to approach within 25 feet of the work or otherwise be at risk due to proximity to the work.

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11.0 PERSONNEL HYGIENE AND DECONTAMINATION

Personal hygiene and decontamination requirements are described in the FSHP and in Chapter 2.0 of this addendum.

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12.0 EQUIPMENT DECONTAMINATION

Equipment decontamination procedures are described in the FSHP.

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13.0 EMERGENCY PROCEDURES AND EQUIPMENT

Emergency contacts, telephone numbers, directions to the nearest medical facility, and general procedures can be found in the FSHP. The SAIC Field Operations Manager will remain in charge of all SAIC and subcontractor personnel during emergency activities. The SAIC field office will serve as the assembly point if it becomes necessary to evacuate one or more sampling locations. During mobilization the SSHO will verify that the emergency information in the FSHP is correct.

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14.0 LOGS, REPORTS, AND RECORD KEEPING

Logs, reports, and record keeping requirements are described in the FSHP.

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15.0 REFERENCES

ACGIH (American Conference of Governmental Industrial Hygienists) 1999. *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, ISBN: 1-882417-32-1, Cincinnati, Ohio.

NIOSH (National Institute for Occupational Safety and Health) 1997. *NIOSH Pocket Guide to Chemical Hazards*, NIOSH Publication No. 97-140, Cincinnati, Ohio, June 1997.

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USACE (U.S. Army Corps of Engineers) 1996. *Facility-wide Sampling and Analysis Plan for the Ravenna Army Ammunition Plant, Ravenna, Ohio*.

USAEHA (U.S. Army Environmental Hygiene Agency) 1994. *Preliminary Assessment Screening No. 38-26-1329-94, Boundary Load Line Areas, Ravenna Army Ammunition Plant, Ravenna, Ohio, June 6–10, 1994*.

USACHPPM (U.S. Army Center for Health Promotion and Preventive Medicine) 1996. *Relative Risk Site Evaluation, Ravenna Army Ammunition Plant, 28 October–1 November 1996*, Hazardous and Medical Waste Study No. 37-EF-5360-97.

USATHAMA (U.S. Army Toxic and Hazardous Materials Agency) 1980–1992. Ravenna Army Ammunition Plant Water Quality Surveillance Program (data only).

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