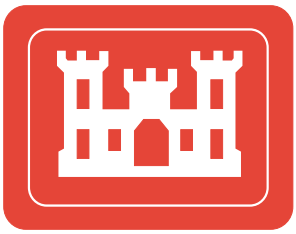
FINAL

SITE SAFETY AND HEALTH PLAN ADDENDUM NO. 1

FOR THE

PHASE I REMEDIAL INVESTIGATION OF THE NACA TEST AREA AT THE RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO

Prepared for



US Army Corps of Engineersâ

Louisville District
Contract No. DACA62-94-D-0029

Delivery Order No. 0077

October 1999

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APPROVALS

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FOR THE
PHASE I REMEDIAL INVESTIGATION
OF THE
NACA TEST AREA
AT THE
RAVENNA ARMY AMMUNITION PLANT,
RAVENNA, OHIO

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Site Safety and Health Plan Addendum for the Phase I Remedial Investigation of the NACA Test Area at the Ravenna Army Ammunition Plant, Ravenna, Ohio

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Prepared by

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CONTENTS

TABLES

ACRONYMS

AOC	area of concern
FSHP	Facility-wide Safety and Health Plan
OE	ordnance and explosives
PCB	polychlorinated biphenyl
PPE	personal protective equipment
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
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 the Phase I Remedial Investigation at the National Advisory Committee on Aeronautics (NACA) Test Area. Copies of the FSHP and this SSHP Addendum will be present at the work site.

The NACA Test Area was used from 1947 to 1953 to test explosion-resistant aircraft fuels and fuel tanks. Testing included crashing aircraft into a fixed barrier (AGOH 1997, NACA 1953). This testing released 100/130 octane aviation fuel, low-volatility fuel, lubricating oil, coolants, hydraulic fluids, alcohol, fire extinguishing agents, and brake fluid. In addition, Demolition Area 1, located immediately south of the NACA Test Area catapult line, was used from 1941 to 1949 for the thermal treatment of munitions. The site was subsequently used to stage aircraft used at the NACA Test Area. As such, some potential exists for residual explosives and propellants contamination within the central portion of the catapult line.

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

- soil boring, soil sampling, and groundwater sampling using a Geoprobe rig;
- soil sampling with scoops, hand augers, and hand-operated power augers;
- 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 ordnance and explosives in the plane fueling and catapult area, vegetation-clearing equipment, moving equipment/vehicles, operating soil sampling equipment (power auger), fuel or decontamination solvent fires, chemical exposure, temperature extremes, noise, stinging/biting insects, poisonous plants, and snakes.

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 hazard during the planned tasks. All of the planned tasks have minimal potential for creating airborne particulate. 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. Task-specific hazard controls have been specified for these tasks. The SSHO will observe all site tasks during daily safety inspections and will use professional judgement, 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 Section 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.

The NACA Test Area, designated as Area of Concern (AOC) RVAAP-38, encompasses an area approximately 914 × 305 meters (3,000 × 1,000 feet) in plan and is located within Training Area "G." The NACA Test Area was used to test explosion-resistant fuel tanks for aircraft, or explosion-resistant fuel, and was in operation from 1947 to 1953 (AGOH, 1997). Airplanes would land on a clay runway and taxi to the Test Facility along plant roads. The planes were fueled, then subjected to controlled crashes into a fixed crash barrier at speeds of 80 to 105 miles per hour using a guide monorail system. The crash barrier allowed much of the aircraft and fuel to pass over and beyond it after impact. The crash strip is approximately 487 meters (1,600 feet) long and comprised of three parallel concrete strips. The aircrafts' main landing wheels traveled upon the two outer strips, while the center strip supported the monorail, which locked onto the aircrafts' central wheels or nose gear.

During the period of operation, a total of 17 aircraft were used for full-scale crash fire studies at the site (AGOH, 1997). The crash-fire testing was designed to permit identification of the mechanisms for crash fires and the true nature of the disruption suffered by airplanes, specifically relating to fuel spillage, combustible vapor distribution, generation of ignition sources, fire incidence and progression, and temperatures and toxic gas concentration. Liquids potentially spilled during the crash-fire studies included 100/130-octane aviation fuel, low-volatility fuel, lubricating oil, coolant compounds, hydraulic fluids, alcohol for deicing systems, and brake fluid. Fluids were generally released within a fan-shaped area beginning at the crash barrier and extending beyond (eastward) up to 400 feet. A small drainage pond is located at the southern edge of, and slightly downgradient from, the fan. While 17,850 gallons of aviation fuel were consumed during this study, exact amounts of the other combustible liquids are not known. A large portion of the combustible liquids spilled and soaked into the ground, releasing combustible vapors into the air that burned long after the crash, until the vapors emanating from the soil had diminished to the point at which they could no longer support combustion. The main expected contaminants are volatiles and semivolatiles (associated with fuels, deicers, lubricants, hydraulic fluids, and fire extinguishing agents), with lessor amounts of metals and polychlorinated biphenyls (PCBs). There is a possibility of ordnance and explosives (OE) or explosives residue near the plane fueling area and along the central portion of the catapult line due to activities conducted at the nearby Demolition Area 1.

An undisclosed number of the aircraft were nearly totally consumed during the crash fires. Others, however, were significantly damaged, but not totally burned. After telemetry and instrumentation are removed, the damaged and burned airframes were bulldozed into an area east of the end of the strip and buried. A few remnants of the airframes protrude from the soil in the burial area.

Since 1969 the Ohio National Guard has been the licensed user of Training Area "G." Activities include dismounted troop training, bivouacking of the troops in training, and vehicle 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 1000 and 2200 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 released large quantities of fuels, it is possible that other contaminants, such as benzene, may be present.

Table 1-1. Summary of Historical Analytical Data

Parameter	HC-2 Surveillance (water, µg/L)[a]	RRSE (sediment, mg/kg)[b]	RRSE (soil, mg/kg)[b]
Arsenic	NA	3.9	12.7
Barium	NA	67.6	179
Cadmium	ND	ND	46
Chromium	4.8	20.3	48.3
Copper	11	4.95	13.4
Zinc	31	44.2	53
RDX	4.8	ND	ND
Phenol	NA	3.8	ND
2-Chlorophenol	NA	3.6	ND
4-Chloro-3-methyphenol	NA	4	ND
1,3-Dichlorobenzene	NA	2	ND
1,4-Dichlorobenzene	NA	1.9	ND
2-Methylnaphthalene	NA	1.6	ND
Methylene chloride	NA	ND	12
N-nitroso-di-n-propylamine	NA	2.3	ND
1,2,4-Trichlorobenzene	NA	2.1	ND
2,4,6-Trinitrotoluene	ND	ND	ND
Acenaphthene	NA	2	ND
2,4-Dinitrotoluene	NA	2.2	ND
4-Nitrophenol	NA	3.9	ND
Pentachlorophenol	NA	4.4	ND
Pyrene	NA	2.2	ND

[a] *Source*: USATHAMA 1980 – 1992; HC = Hinkley Creek at the RVAAP 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.

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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 meter)
X		Heavy equipment (power augers Geoprobe)
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)
	X	Drowning
X		OE (plane fueling and catapult areas)

Specific tasks are as follows:

- 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 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 limited potential to encounter ordnance in the plane fueling/catapult line area due to its close proximity to Demolition Area 1. For this reason, access and sampling locations in these areas 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 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:

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, falls)	B, II	Level D PPE (see Section 5.0) plus hard hat, heavy-duty work gloves, 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 support in the plane fueling/catapult line areas (not required for other areas). 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.
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 Saturday 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 Section 9.0).	Daily safety inspections.
Biological hazards (bees, ticks, wasps, snakes, 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 workday.	Visual survey.
Electric shock	D, II	None expected. SSHO will verify.	Visual survey of all work areas.
Temperature extremes	C, II	Administrative controls (see Section 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, 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, site-specific training including training 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 in the plane fueling/catapult line areas (not required for other areas). Continuous down-hole monitoring at 2-foot intervals in the plane fueling/catapult line areas (not required in other areas). 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. Daily safety inspections in other areas 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. Washing 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.	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 Saturday 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 Section 9.0).	Daily safety inspections.
Biological hazards (poison ivy, bees, ticks, 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 workday.	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 Section 8.0).	Ambient temperature; heart rates as appropriate.
Soil Sampling with Hand Augers or Scoops			
General safety hazards (manual lifting, slips, falls)	D, IV	Level D PPE (see Section 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 in the plane fueling/catapult line areas (not required in other areas). 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 in the plane fueling/catapult line areas. Daily safety inspections in other areas 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. Washing 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 Saturday during season, October and November)	D, I	No fieldwork in areas open to hunting during hunting days.	None.
Biological hazards (poison ivy, bees, ticks, 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 workday.	Visual survey.
Temperature extremes	C, II	Administrative controls (see Section 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 <85 dBA.	Daily 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 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 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 support in the plane fueling/catapult line areas (not required for other areas) Continuous down-hole monitoring at 2-foot intervals (to a depth of 16 feet) in the plane fueling/catapult line areas (not required in other areas). 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 Saturday 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).	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 repellant, 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, falls)	D, IV	Level D PPE (see Section 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. Washing 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 Saturday during season, October and November)	D, I	No fieldwork 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 in the plane fueling/catapult line areas (not required for other areas). 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 in the plane fueling/catapult line areas. In other areas the daily safety inspection will include vigilance for suspicious materials.
Biological hazards (poison ivy, bees, ticks, 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 workday.	Visual survey.
Temperature extremes	C, III	Administrative controls (see Section 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, falls)	D, III	Level D PPE (see Section 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. 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 surveys for ordnance.
Exposure to chemicals (see Table 2-3)	D, III	Natural rubber or similar gloves for contact with potentially contaminated material. Washing 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 Saturday 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 Section 9.0).	Daily safety inspections.
Biological hazards (poison ivy, bees, ticks, 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 workday.	Visual survey.

Table 2-2. (continued)

Safety and Health Hazards	Risk Assess. Codes	Controls	Monitoring
Temperature extremes	C, II	Administrative controls (see Section 8.0).	Ambient temperature; heart rates as appropriate.
Equipment Decontamination (Hot Water Washing, Soap and Water Washing, Solvent Rinse)			
General equipment decontamination hazards (hot water, slips, falls, equipment handling)	C, III	Level D+ PPE (see Section 5.0) plus: Nitrile or PVC gloves, face shield, and Saranax or rain suit (when operating steam washer). HAZWOPER training.	Daily safety inspections.
Noise (spray washer)	B, II	Hearing protection when within 7.6 meters (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, proper storage). Fire extinguisher (see Section 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. Washing 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 Section 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

- 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 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 contamination, if present, is at relatively low concentrations. 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, 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, cancer	Liquid with aromatic odor; FP: 12ºF; VP: 75 mm	Inhalation Ingestion Absorption Contact	All
Chromium	TLV/TWA: 0.5 mg/m^3, A4 IDLH: 25 mg/m^3	Eye irritation, 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, reproductive effects	Orange-yellow solid, VP: 1 mm; FP: 404EF	Inhalation Absorption Ingestion Contact	Near Demolition Area 1
Gasoline (used for fuel)	TLV/TWA: 300 ppm IDLH: Ca	Potential carcinogen per NIOSH, dizziness, eye irritation, dermatitis	Liquid with aromatic odor; FP: -45EF; VP: 38–300 mm	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, 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, respiratory system; drowsiness; headache	Colorless liquid with alcohol odor; VP: 33 mm; 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 mm; IP: 10.84 eV; FP: 52EF	Inhalation Absorption Ingestion Contact	Equipment decontamination area
TNT (2,4,6-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, kidney damage	Pale solid; FP: explodes; VP: 0.0002 mm	Inhalation Absorption Ingestion Contact	Near Demolition Area 1
Methylene chloride	TLV/TWA: 50 ppm	Irritation of eyes and skin, weakness, numbness, cancer	Colorless liquid with chloroform odor; VP: 350 mm; FP: NA	Inhalation Absorption Ingestion Contact	All

[a]The potential chemicals were obtained from the *Ravenna Army Ammunition Plant Phase I Remedial Investigation Report* (SAIC 1997).
[b]From 1999 Threshold Limit Values, *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
IP = ionization potential
PEL = permissible exposure limit
STEL = short-term exposure limit
NA = not available
TWA = time-weighted average
VP = vapor pressure
NIOSH = National Institute for Occupational Safety and Health
FP = flash point
IDLH = immediately dangerous to life and health
TLV = threshold limit value

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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 Science Applications International Corporation (SAIC) and subcontractor individuals who will fill key roles. See the Facility-wide Safety and Health Plan (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

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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 personal protective equipment (PPE) are presented in the FSHP. Specific PPE requirements for this work are presented in the hazard/risk analysis section (Section 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; and
- prior site sampling indicated that contaminants are unlikely to pose an airborne hazard.

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 meters (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) • evaluate need for PPE upgrade Withdraw and evaluate: • 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
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
PID = Photoionization detector
PPE = Personal protective equipment

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 Section 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

AGOH (Ohio Army National Guard) 1997. Draft Information Paper—*Previous Usage of NACA Crash Strip.* AGOH-OT-RTLS, September 24, 1997.

National Advisory Committee for Aeronautics (NACA) 1953. *Thirty-ninth Annual Report of the National Advisory Committee for Aeronautics.* Technical Reports Nos. 1111 to 1157.

NIOSH (National Institute for Occupational Safety and Health) 1997. *NIOSH Pocket Guide to Chemical Hazards*.

SAIC (Science Applications International Corporation) 1997. *Ravenna Army Ammunition Plant Phase I Remedial Investigation* .

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

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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